



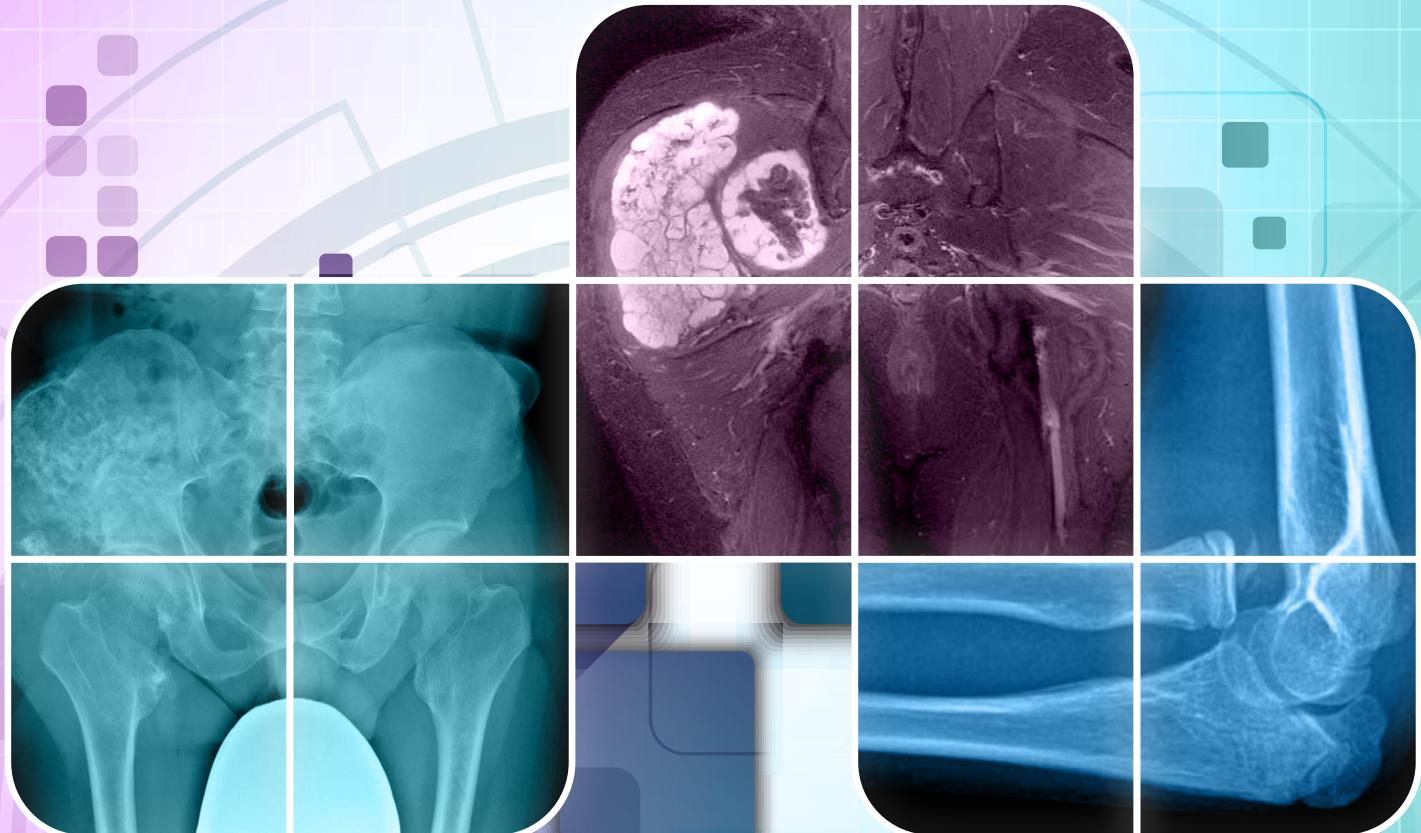
# The Hong Kong Orthopaedic Association

## 42<sup>nd</sup> Annual Congress

### 香港骨科醫學會 第四十二屆週年大會

*Off the Beaten Track:*

***The Unusual, the Unexpected, the Unmissable***



## Programme & Abstracts

**Date:**

5 - 6 November 2022  
二零二二年十一月五至六日

**Venue:**

Hong Kong Convention and Exhibition Centre  
香港會議展覽中心 (In-person meeting for local participants)

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## Welcome Message from the President of The Hong Kong Orthopaedic Association



Dear Fellows, Members and Honourable Guests,

On the behalf of the Hong Kong Orthopaedic Association, it is my great pleasure to greet you all with a very warm welcome to our 42nd Annual Congress of the Hong Kong Orthopaedic Association.

For the past 3 years, the whole world has been deeply disturbed by the COVID-19 pandemic. A lot of damage has been dealt to various sectors of society due to the pandemic. With the resilience and passion of our fellows and members, we are still able to maintain our association activities to a reasonable level. I think it is time to pick ourselves up and get ready for the path of further development and growth.

The main theme of this Congress is “The Unusual, the Unexpected, the Unmissable”.

Orthopaedic oncology has long been a subspecialty that is not as eye-catching as the others. However, it is also a subspecialty of great importance that manages a lot of unusual, unexpected as well as unmissable conditions in our specialty. I genuinely hope that the theme of this year can draw the attention and interest of our fellows and members to re-explore the importance, the interest, and the legacy of orthopaedic oncology and paediatric orthopaedics. I wish that this Congress can also inspire the young fellows and members to join and explore these important subspecialties.

This Congress is also a good platform to foster friendships and relationships. With the interruption of international travel and numerous infection control measures, we are physically separated from our international friends and colleagues. However, our connection and friendships will not falter. All the fellows and friends from overseas are sincerely invited to join our annual Congress in the form of teleconference.

I would like to express my sincere gratitude to all members of the Organising Committee, led by Co-chairmen Dr Albert Ying-lee Lam and Dr Evelyn Eugenie Kuong for organising a fantastic programme, inspiring us to explore those unusual, unexpected and yet unmissable conditions.

Finally, I wish you all a fruitful and enjoyable Congress.

I look forward to welcoming you in Hong Kong.

**Dr Yau-bun WONG**  
**President, The Hong Kong Orthopaedic Association (2021-2022)**

## Welcome Message from the Co-Chairmen of the Organising Committee



Dear Fellows, Members, and Honourable Guests,

It is our great honour to welcome you to the Hong Kong Orthopaedic Association 42nd Annual Congress 2022. May we present this year's theme, "Off the Beaten Track: the Unusual, the Unexpected, and the Unmissable".

In the face of a global trend of super-subspecialisation in orthopaedic surgery, it is important to remember the old adage "common things come first". Recent

technological advances mean that sophisticated investigations and imaging are becoming increasingly readily available. This can provide convenience at the expense of a progressive loss of clinical acumen in diagnosing unusual and unexpected conditions. Regardless of experience, it is always useful for us to revisit and refocus ourselves regarding conditions that cannot afford to be missed due to their devastating consequences if overlooked. We are confident this meeting will be beneficial to orthopaedic surgeons from all ranges of years of practice and experience.

This year there are 18 renowned overseas and local surgeons lined up to share their expertise with our audience in the Plenary and Concurrent Sessions. In addition, there are over 500 papers in the Free Paper and Poster sessions. We are certain that attendees will learn a great deal from this weekend's conference. On behalf of the Organising Committee, we would like to express our sincere gratitude to all our speakers and presenters for contributing their time and knowledge to this Congress.

Finally, our heartfelt thanks to every member of the Organising Committee of this year's Annual Congress. Your time and your hard work have made this Congress a most valuable learning opportunity for all in attendance.

As we emerge slowly from the grips of COVID-19, we genuinely hope that this will be the last conference that we need to hold in a hybrid format of in-person and online. We wait with bated breath to welcome all speakers, overseas and local, to Hong Kong next year to continue our annual tradition of education, camaraderie, and scientific exploration.

Enjoy the conference!

**Dr Albert LAM and Dr Evelyn KUONG**  
**Co-Chairmen, Organising Committee**

## Organising Committee



### Co-Chairmen

Honorary Secretary  
Honorary Treasurer  
Scientific Subcommittee

### Co-Conveners

### Members

### Publication Subcommittee

Social Function Subcommittee  
Information Technology Audio-visual and Venue Subcommittee  
Extended Abstract Adjudicators

Dr Albert Ying-lee LAM  
Dr Evelyn KUONG  
Dr Raymond Ching Hin YAU  
Dr Dennis King Hang YEE

Dr Ka Lok MAK  
Dr Lin Wing LOK  
Dr Calvin Wang Kei CHIU  
Dr Alex Ching Lik HUI  
Dr Jeffrey Justin Siu Cheong KOO  
Dr Kenneth HUI  
Professor Sheung Wai LAW  
Dr Chun Man MA  
Dr Alden Ho Yin MAN  
Dr Michael Tim Yun ONG  
Dr Noah Lok Wah SO  
Dr Ronald Man Yeung WONG  
Dr Tak Man WONG  
Dr Tsz Lung CHOI  
Dr Gloria Yan Ting LAM  
Dr Gary Tze Wang CHAN  
Dr Michael Siu Hei TSE  
Dr Cho Yau LO  
Dr Ka Hei LEUNG  
Dr Kevin WONG  
Dr Kwai Ming SIU  
Dr Pak Cheong HO  
Dr Ping Tak CHAN  
Dr Jason Pui Yin CHEUNG  
Dr Quinn Jid LEE  
Professor Sheung Wai LAW  
Dr Shing Hing CHOI  
Dr Shui Wah MAN  
Dr Sin To KWOK  
Dr Tik Koon KWOK  
Dr Warren CHEUNG  
Dr Angela Wing Hang HO  
Dr Yuk Chuen SIU

## Overseas and Local Faculties

### OVERSEAS SPEAKERS — Plenary Sessions and Concurrent Sessions

**Professor Goo-hyun BAEK**

Director of Hand Service

YESON Hospital

South Korea



**Professor Shanlin CHEN**

M.D., Ph. D, Orthopaedic Consultant and Hand Surgeon

Director of Hand Surgery Department, Beijing Jishuitan Hospital

Professor of Beijing University

Beijing, China



**Professor Peter CHOONG**

Sir Hugh Devine Professor and Head of the Department of Surgery

Melbourne Medical School

Associate Dean Innovation & Enterprise

Faculty of Medicine Dentistry and Health Sciences

University of Melbourne

Melbourne, Australia



**Dr Alessandro GASBARRINI**

Department of Spine Surgery

IRCCS Istituto Ortopedico Rizzoli

Bologna, Italy



**Professor Peter GIANNOUDIS**

Professor & Chairman

Academic Department of Trauma & Orthopedic Surgery

University of Leeds

Leeds, United Kingdom



**Professor Ashish GULIA**

Professor - Orthopaedic Oncology

Department of Surgical Oncology

Tata Memorial Centre

Mumbai, India



**Dr Stephen HOWELL**

Orthopedic Surgeon Adventist Health/Lodi Memorial Hospitals

Professor of Biomedical Engineering

The University of California, Davis

United States of America



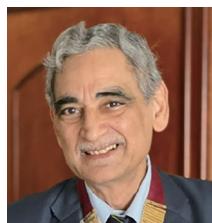
**Professor James HUI**

Head and Senior Consultant  
Department of Orthopaedic Surgery  
National University of Singapore & National University Hospital  
Singapore



**Dr Ashok JOHARI**

Director, Paediatric Orthopaedics  
Nanavati Max Super Specialty Hospital  
Mumbai, India



**Dr Nattha KULKAMTHORN**

Chief of Shoulder and Sports Medicine Unit  
Department of Orthopaedics  
Phramongkutklao Hospital & College of Medicine  
Thailand



**Professor Shekhar Madhukar KUMTA**

Academic Lead and Professor of Surgery  
The University of Melbourne  
Melbourne, Australia



**Dr Wee Leon LAM**

Consultant Plastic and Hand Surgeon and Honorary Clinical Senior Lecturer  
Royal Hospital for Children and Young People, Edinburgh  
University of Edinburgh  
United Kingdom



**Dr Xiaohui NIU**

Professor and Director of JST Sarcoma & Bone Tumor Center  
Beijing Jishuitan Hospital  
Beijing, China



**Professor Yukio SHIMIZU**

Associate Professor  
Department of Rehabilitation Medicine  
Faculty of Medicine, University of Tsukuba  
Tsukuba, Japan



**Professor David SKAGGS**

Professor of Orthopaedics, Pediatrics and Neurosurgery  
Director, Spine Center  
Cedars Sinai Medical Center  
Los Angeles, United States of America



**Dr Robert SMIGIELSKI**

Chief of Orthopaedics and Sports Medicine Department  
LIFE Institute  
Warsaw, Poland



**Professor Michael STEPHENS**

Consultant Orthopaedic Surgeon  
Department of Orthopaedics  
Mater Private Hospital  
Dublin, Ireland



**Professor Stuart WEINSTEIN**

Ignacio V. Ponseti Chair and Professor of Orthopaedic Surgery  
Professor of Pediatrics  
University of Iowa  
Iowa, United States of America



**Dr Simon YOUNG**

Director of Research, Associate Professor in Orthopaedics  
University of Auckland, North Shore Hospital  
Auckland, New Zealand



**LOCAL SPEAKERS — Plenary Sessions and Concurrent Sessions**

Dr Chi-wai CHAN  
Dr Ping-tak CHAN  
Dr Ying-kei CHAN  
Dr Esther Ching-san CHOW  
Mr Kam-wah HO  
Dr Pak-cheong HO  
Dr Kenny Yat-hong KWAN  
Professor Sheung-wai LAW  
Professor Frankie Ka-li LEUNG  
Dr Ka-kin LI  
Dr Shui-wah MAN  
Dr Wan-yiu SHEN  
Dr Kwai-ming SIU  
Dr Timothy Yat-cheong SO  
Mr Giant Pak-hi TSE  
Dr Yat-wa WONG  
Dr Dennis King-hang YEE

## OVERSEAS AND LOCAL SPEAKERS — Lunch Symposia

**Professor Changhai DING**

Director  
Clinical Research Centre  
Zhujiang Hospital at Southern Medical University  
China



**Dr Chin-hung HO**

Director  
Reliance of Orthopaedic and Physiotherapy Centre  
Hong Kong



**Dr Miguel Ángel RUIZ IBÁN**

Chairman, Shoulder and Elbow Unit  
Department of Orthopedic Surgery and Traumatology  
Hospital Universitario Ramón y Cajal  
Madrid, Spain



**Professor Chris PEACH**

Consultant Shoulder and Elbow Surgeon  
Manchester University NHS Foundation Trust  
Manchester, United Kingdom



**Dr Kwok-chuen WONG**

Consultant  
Department of Orthopaedics and Traumatology  
Prince of Wales Hospital  
Hong Kong



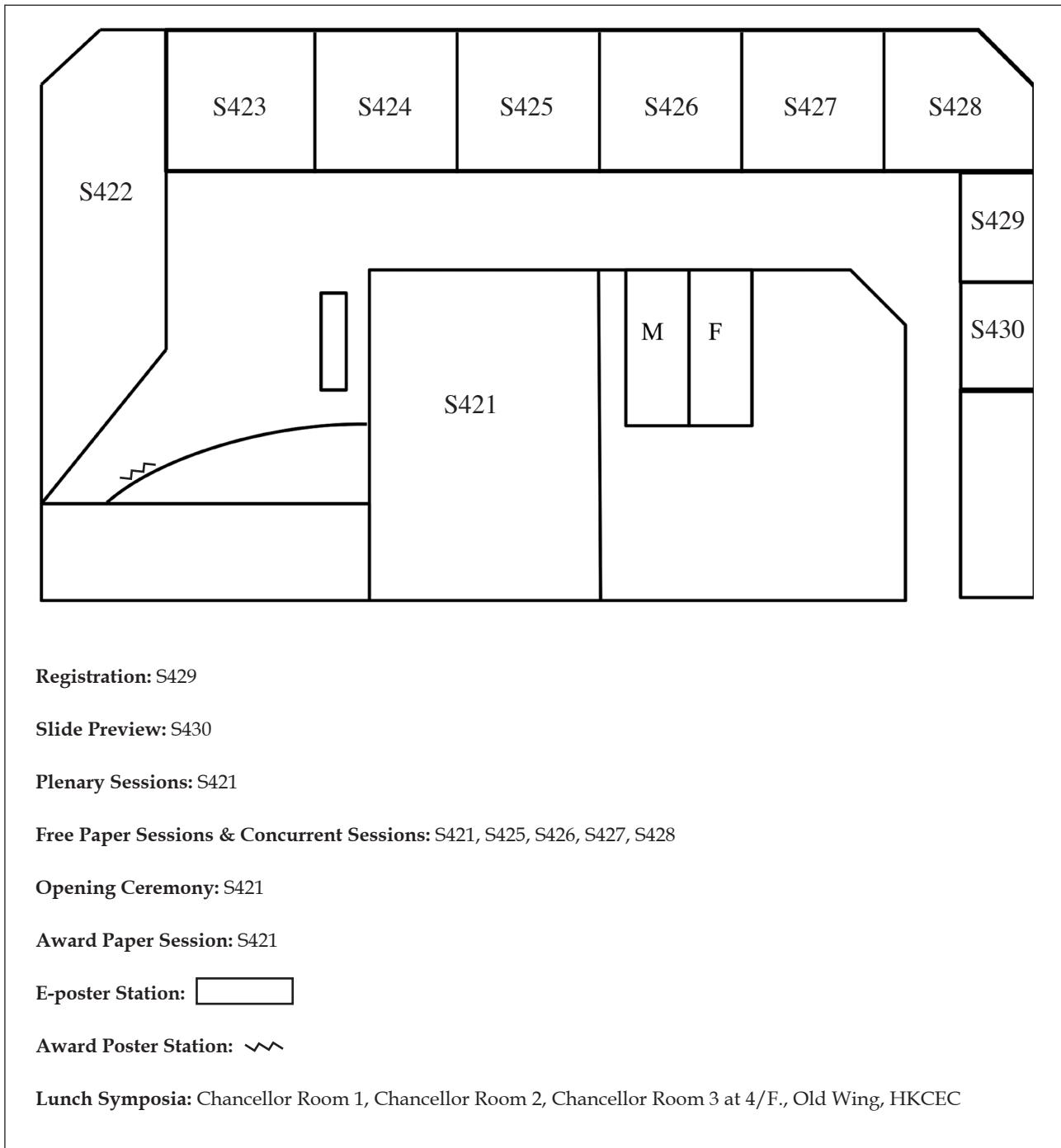
**Dr Chun-hoi YAN**

Honorary Consultant, Co-Director, Joint Replacement Centre  
Gleneagles Hong Kong Hospital  
Hong Kong



## Floor Plan

### The Hong Kong Convention and Exhibition Centre



## Programme at a Glance

### Saturday, 5 November 2022

07:30 – 10:00	Free Paper Session I: Sports Medicine I (08:00 – 10:00) Free Paper Session II: Hand and Microsurgery, Others (08:00 – 10:00) Free Paper Session III: Basic Science Free Paper Session IV: Adult Joint Reconstruction I Free Paper Session V: Paediatric Orthopaedics		Room S421 Room S425 Room S426 Room S427 Room S428		
10:00 – 10:30	<b>Coffee Break / Exhibition</b>				
10:30 – 12:00	<b>Plenary Session I: Paediatric Orthopaedics</b>		Room S421		
12:00 – 12:30	<b>Opening Ceremony</b>		Room S421		
12:30 – 13:30	<b>Lunch / Lunch Symposium</b>				
13:30 – 15:45	<b>Award Paper Session</b>		Room S421		
15:45 – 16:15	Room S421 Foyer <b>Award Poster Session</b>	<b>Coffee Break / Exhibition</b>			
16:15 – 17:45	Room S421 <b>Plenary Session II: Paediatric Orthopaedics &amp; Hand</b>	<b>Concurrent Session I: Trauma</b> <b>Concurrent Session II: Sports Medicine</b> <b>Concurrent Session III: Foot &amp; Ankle</b>			
17:45 – 18:15	<b>Annual General Meeting of The Hong Kong Orthopaedic Association</b>				
18:30 – 22:00	<b>Congress Banquet</b>				

### Sunday, 6 November 2022

07:30 – 10:00	Free Paper Session VI: Sports Medicine II (08:00 – 10:00) Free Paper Session VII: Spine Free Paper Session VIII: Foot & Ankle, Rehabilitation, Tumour (08:00 – 10:00) Free Paper Session IX: Adult Joint Reconstruction II Free Paper Session X: Trauma (08:00 – 10:00)		Room S421 Room S425 Room S426 Room S427 Room S428
10:00 – 10:30	<b>Coffee Break / Exhibition</b>		
10:30 – 12:00	<b>Plenary Session III: Tumour</b>		Room S421
12:00 – 13:00	<b>Lunch</b>		
13:00 – 14:30	Room S421 <b>Plenary Session IV: Rehabilitation &amp; Tumour</b>	<b>Concurrent Session IV: Spine</b> <b>Concurrent Session V: Adult Joint Reconstruction</b> <b>Concurrent Session VI: The Hong Kong College of Orthopaedic Surgeons</b>	
14:30 – 15:00	<b>Coffee Break / Exhibition</b>		
15:00 – 16:45	<b>Concurrent Session VII: Hand – Common Congenital Hand Conditions</b>		Room S427
	<b>Concurrent Session VIII: Rehabilitation</b>		Room S425
	<b>Concurrent Session IX: Paediatric Orthopaedics</b>		Room S421
16:45 – 16:55	<b>Closing Remarks</b>		

## Programme in Detail

**Saturday, 5 November 2022**

Time	Room	Topic (Moderators)	Speakers / Presenters
08:00 – 10:00	S421	<b>Free Paper Session I: Sports Medicine I</b> (Stephen CY Chung, Richard HL Lee)	
1.1		Review on acute patellar dislocation in the paediatric population	Jojo HC Lai
1.2		Isolated medial patellofemoral ligament reconstruction reduces patella height in patients with patella alta: a retrospective review	Kam-to Siu
1.3		Pulsed electromagnetic field enhances healing of a meniscal tear in avascular region and mitigates post-traumatic osteoarthritis in a rat model	Ming Wang
1.4		Repair of meniscus root tear—is there a difference between medial meniscus root repair and lateral meniscus root repair? A systematic review and meta-analysis	Jun-ren Khoo
1.5		Smoking is associated with a higher chance of graft rupture after anterior cruciate ligament reconstruction	Yat-chi Chan
1.6		Signal noise quotient predicts graft rupture in anterior cruciate ligament reconstruction	Wai-pan Yau
1.7		Does non-dominant side injury affect neuromuscular performance at the time for return-to-play after anterior cruciate ligament reconstruction?	Matthew CS Chow
1.8		Effects of whole-body vibration on quadriceps neuromuscular function and knee function before anterior cruciate ligament reconstruction: a randomised controlled trial	Ji-hong Qiu
1.9		Anterior cruciate ligament injury prevention training in athletes: a systematic review of current evidence on secondary injury prevention	Kam-ming Mok
1.10		Bilateral quadriceps neuromuscular function impairment at the early stage of anterior cruciate ligament injury	Arthur OF Woo
1.11		Effect of serum 25-hydroxyvitamin D level on quadriceps strength, function and muscle size: a systematic review and meta-analysis of observational studies	Chun-kit Tsang
1.12		The association between vitamin D status and quadriceps muscle strength in anterior cruciate ligament injury	Tina ST Ip
1.13		The circulating vitamin D level is associated with quadriceps neuromuscular function in patients with anterior cruciate ligament injury	Michael TY Ong
1.14		Anthropometric analysis of Asian anterior cruciate ligament reconstruction hamstring graft size and rerupture	Nicole CH Leung
1.15		A novel artificial intelligence high resolution computer tomography for bone mineral density for patellofemoral joint subchondral bone change after anterior cruciate ligament reconstruction	Cham-kit Wong
1.16		A novel quantitative assessment of bone tendon junction healing in patients after ACL reconstruction by high resolution peripheral computer tomography: the development of a deep-learning system	Michael TY Ong

Time	Room	Topic (Moderators)	Speakers / Presenters
08:00 - 10:00	S425	<b>Free Paper Session II: Hand and Microsurgery, Others</b> (Edmund LK Yau, Ka-ki Tam)	
<b>2.1</b>		Comparison between Wide Awake Local Anaesthesia No Tourniquet Surgery (WALANT) and traditional local anaesthesia surgery for limb operations	Sing-yuen Ng
<b>2.2</b>		Carpal tunnel release in super-elderly: safety profile and clinical outcome	Chloe WS Lam
<b>2.3</b>		Optimal timing of surgical fixation for distal radius fracture: the earlier the better?	Kit Leung
<b>2.4</b>		Long-term outcome of Camitz opponensplasty for severe carpal tunnel syndrome	Ho-lam Leung
<b>2.5</b>		Functional outcomes of local flap reconstruction in fingertip injury: a single-centre study	Eunice YY Chow
<b>2.6</b>		Clinical review on the application of total elbow replacement in complex elbow fractures	Tsz-ching Chau
<b>2.7</b>		Treatment of proximal interphalangeal joint fracture-dislocation using dynamic external fixator: a retrospective review	Sik-lok To
<b>2.8</b>		Ultrasonographic measurements for the diagnosis of cubital tunnel syndrome: a study in the Hong Kong Chinese population	Pui-man Chung
<b>2.9</b>		Factors affecting outcomes after arthroscopic repair of dorsal tears of triangular fibrocartilage complex (TFCC)	Arthur OF Woo
<b>2.10</b>		Computer-assisted correctional osteotomy for distal radius fracture malunion: Early results of a customised 3-D printed spacer reduction guide	Michelle KL Li
<b>2.11</b>		Comparison of Kleinert versus Saint John protocol in Zone I/II flexor tendon injuries: a pilot study	Douglas SL Ho
<b>2.12</b>		Homemade dynamic external fixator for unstable proximal interphalangeal joint fracture dislocations	Kin-ling Kwok
<b>2.13</b>		A pilot study of the outcomes of endoscopy-assisted cubital tunnel release—prospective study of 64 patients	Gabriel CN Leung
<b>2.14</b>		A novel three-dimensional, estimation-free method for single-cut rotational osteotomy planning for long bone deformities	Michael CK Mak
<b>2.15</b>		Holistic pathology-based treatment protocol significantly improves clinical results in complex elbow fracture-dislocation	William KP Fung
<b>2.16</b>		Clinical features and treatment of mycotic mycetoma: a review	Angus CK Chan
<b>2.17</b>		Comparing the quality of life in physical component among older adults by six different sarcopenia diagnostic criteria	Qian-wen Wang
<b>2.18</b>		3D ultrasonographic profile of quadriceps sarcopenia in knee osteoarthritis	Justin LC Chan
<b>2.19</b>		Superiority of multiple-joint space width over minimum-joint space width approach in the machine learning for radiographic severity and knee osteoarthritis progression	Justin LC Chan
<b>2.20</b>		Cloud-based deep-learning framework for whole body automatic segmentation	Elvis CS Chui

Time	Room	Topic (Moderators)	Speakers / Presenters
07:30 - 10:00	S426	Free Paper Session III: Basic Science (Victor Leung, Wayne YW Lee)	
3.1		Establishment of a mouse model of patellar tendinopathy	Zuru Liang
3.2		Effect of bioactive decellularised tendon-derived stem cell sheet on early graft healing after anterior cruciate ligament reconstruction	Shi-yi Yao
3.3		Doxycycline promotes graft healing and attenuates post-traumatic osteoarthritis after anterior cruciate ligament reconstruction in a rat model	Mingde Cao
3.4		One-step strategy for in situ osteochondral repair using acellular 3D-printed Mg microparticles-functionalised scaffolds in a preclinical rabbit model	Liangbin Zhou
3.5		Patellofemoral osteoarthritis detection and knee replacement surgery prediction from knee lateral X-ray textures using radiomics	Jiang Zhang
3.6		Quantitative measurement of joint space width on computed tomography image of knee osteoarthritis	Wei Wang
3.7		A self-administrable and interpretable machine-learning-driven knee osteoarthritis prognostic model for early diagnosis	Lok-chun Chan
3.8		Cadaveric study on bone cut surface roughness after robotic arm assisted versus conventional total knee arthroplasty	Henry Fu
3.9		Ageing-related sarcopenia along with mitochondrial degeneration in SAMP8 mice model	Yufeng Long
3.10		CFTR-deficiency accelerates skeletal muscle ageing through interfering autophagy in myogenesis	Ziyi Chen
3.11		A novel high-efficiency quantitative control of mitochondrial transfer based on droplet microfluidics and its application on muscle regeneration	Jessica HT Lo
3.12		Mesenchymal stromal cells therapy for sarcopenia: a preclinical in vivo study	Belle YH Wang
3.13		Anti-RANKL treatment attenuates sarcopenia via suppression of inflammation and macrophage infiltration	Ronald MY Wong
3.14		Senescence-associated secretory phenotype (SASP) profiling and regulation in ageing tissues	Chuhan Li
3.15		Yin Yang 1 deficiency in skeletal muscle stem cell aggravates muscle fibrosis in Duchenne muscular dystrophy mouse by disrupting muscle stem cell/macrophage/fibro-adipogenic progenitor crosstalk	Yang Li
3.16		The role of dentin matrix protein 1 (DMP1) in LIPUS accelerated osteoporotic fracture healing	Michelle MC Li
3.17		Magnesium containing hybrid fixation system promotes the healing of long bone fractures: a large animal study	Arthur OF Woo
3.18		Hydrogel delivery of DNase I and liposomal-vancomycin to eradicate fracture-related methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) infection and support osteoporotic fracture healing	Ronald MY Wong
3.19		A comparison of the efficacy of antiseptic solutions against microorganisms in biofilm: an in vitro testing in microtiter dish biofilm model	Ping-keung Chan
3.20		<i>Lycium barbarum</i> extract can enhance functional recovery after decompression in a preclinical rat model of cervical spondylotic myelopathy	Kenny YH Kwan
3.21		Abnormal morphological features of osteocyte lacunae in adolescent idiopathic scoliosis: a large-scale assessment of 300 000 lacunae by ultra-high-resolution micro-computed tomography	Kenneth GP Yang
3.22		Biomechanics of the vertebral body tethering: explaining the tether breakage	Ogulcan Guldeniz
3.23		A novel recombinant spidroin protein for potential orthopaedic applications	Haozhi Zhang

Time	Room	Topic (Moderators)	Speakers / Presenters
07:30 - 10:00	S427	<b>Free Paper Session IV: Adult Joint Reconstruction I</b> (George KH Leung, Kenneth WK Law)	
<b>4.1</b>		Prediction of unicompartmental knee arthroplasty sizes with patient demographics, hand, and foot sizes	Vincent WK Chan
<b>4.2</b>		Can patient demographics be used to predict the size of implants for unicompartmental knee arthroplasty?	Karen KM Ng
<b>4.3</b>		Early result of cementless versus cemented Oxford unicompartmental knee arthroplasty – a retrospective study	William KP Fung
<b>4.4</b>		Discharge on day of surgery following unicompartmental knee arthroplasty – physiotherapy can make it possible	Hei-yan Yuen
<b>4.5</b>		The effect of joint-line obliquity angle on pain and functional outcomes following Oxford unicompartmental knee arthroplasties (OUKA) – a review of 400 cases	Kelvin CH Lo
<b>4.6</b>		Predicting the postoperative limb alignment using simple preoperative valgus stress films in Oxford unicompartmental knee arthroplasties	Cheryl CW Kong
<b>4.7</b>		Robotic-arm assisted versus conventional medial unicompartmental knee arthroplasty: a comparative study in the radiological outcomes	Reena Chow
<b>4.8</b>		Mobile-bearing unicompartmental replacement versus medial open-wedge high tibial osteotomy in advanced medial unicompartmental knee osteoarthritis in relatively young patients: a mid-term retrospective analysis	Pui-ku Chan
<b>4.9</b>		Coronal tibiofemoral subluxation after Oxford unicompartmental knee arthroplasties (OUKA) – a review of 414 cases	Gloria YT Lam
<b>4.10</b>		When things did not go as planned. Incidence and causes of intra-operative switch of decision from UKR to TKR	Kit-ci Chan
<b>4.11</b>		Extremes of cement mantle thickness associated with increased incidence of radiolucent lines in total knee arthroplasty	Michelle Hilda Luk
<b>4.12</b>		A novel image-based machine learning model for knee arthroplasty loosening detection and clinical decision making	Lawrence CM Lau
<b>4.13</b>		Comparison of gait analysis between bi-cruciate retaining (BCR) and bi-cruciate stabilised (BCS) total knee arthroplasty	Ashley YY Wong
<b>4.14</b>		Comparison of incidence of patellar clunk syndrome in two generations of posterior stabilised total knee arthroplasty	Sze-ying Chan
<b>4.15</b>		Outcomes of primary and revision total knee arthroplasty with constrained condylar knee prosthesis: a retrospective review	Chun-hin Lo
<b>4.16</b>		Single-dose intravenous dexamethasone reduces early postoperative pain from 8 to 24 hours post total knee replacement: a prospective double-blinded randomised study	Dennis KH Yee
<b>4.17</b>		Tourniquet use only during cementation can improve cement penetration in total knee arthroplasty	Chun-yiu Leung
<b>4.18</b>		Factors affecting successful restrictive kinematic alignment with robotic total knee arthroplasty	Samuel YJ Fang
<b>4.19</b>		Reliability and validity of pre-excision gap balancing assessment in robotic assisted total knee replacement	Bernard WT Yung
<b>4.20</b>		All intraincisional pinning technique for robotic arm assisted total knee arthroplasty	Holy MH Chan
<b>4.21</b>		Determining the risk factors for hyperglycaemia and glucose variability after total knee arthroplasty with continuous glucose monitoring	Vincent WK Chan
<b>4.22</b>		What are the reasons and risk factors of 30-day unplanned hospital readmission after primary TKA? A retrospective review from 2001 to 2020	Omar WK Tsui

Time	Room	Topic (Moderators)	Speakers / Presenters
07:30 - 10:00	S428	<b>Free Paper Session V: Paediatric Orthopaedics</b> (Rocky WM Chan, Karen CM Yeung)	
5.1		"Toe-sock" dressing for thumb polydactyly patients	Jeremiah Seeway Chan
5.2		Applying novel use of wide awake local anaesthesia no tourniquet (WALANT) in neuromuscular and syndromic patients requiring complex upper limb surgeries – a feasibility study with technical notes	Anubrat Kumar
5.3		Juvenile hallux valgus – can we arrest its progression and avoid complex reconstruction in adulthood?	Lucci Lugee Liyeung
5.4		A looming challenge for paediatric orthopaedic surgeons: hip instability in SMA type II patients receiving Nusinersen	Evelyn Kuong
5.5		Adolescent idiopathic scoliosis patients had higher metabolic cost and easier fatigability during high-intensity interval training	Rufina WL Lau
5.6		More prevalent and severe low bone mineral density in boys with severe adolescent idiopathic scoliosis than girls: a retrospective cohort study with 798 surgical patients	Zhichong Wu
5.7		Low baseline serum 25OHD level is associated with better response of bone qualities to vitamin D supplementation during the peripubertal period in adolescent idiopathic scoliosis	Kenneth GP Yang
5.8		Ultrasound for quantitative assessment of spinal curvatures in patients with idiopathic scoliosis – a systematic review and meta-analysis	Jeff CH Lai
5.9		Effectiveness of supine direct cast moulding with mechanical frame and workshop custom modification for scoliosis corrective brace fabrication	Bobby KW Ng
5.10		A novel prediction model for curve progression to surgical threshold in adolescent idiopathic scoliosis derived from unsupervised machine learning of bone microarchitecture phenotypes – a 6-year longitudinal study of 323 patients followed till skeletal maturity	Kenneth GP Yang
5.11		Deep learning based adolescent idiopathic scoliosis patients Cobb angles prediction model	Elvis CS Chui
5.12		A randomised double-blinded placebo-controlled trial with 6 years of longitudinal follow-up on the effect of 2 years of calcium and vitamin D supplementation on the bone density, bone microarchitectural profiles, and curve progression in 330 girls with adolescent idiopathic scoliosis (AIS)	Raymond CW Wan
5.13		Paediatric anterior cruciate ligament reconstruction – deriving the optimal treatment strategy based on 15-year study	Lawrence CM Lau
5.14		A novel play-kit for paediatric patients with cast treatment – can cast-related complications be reduced?	Lucci Lugee Liyeung
5.15		The use of the distal radius ulna (DRU) classification system in predicting final limb length – a user friendly method	Noah LW So
5.16		One-stage single-cut osteotomy and lengthening in upper limb deformity correction: 2 cases	Michael CK Mak
5.17		Can post-neonatal clinical and sonographic screening parameters effectively predict hip dysplasia in children at their walking age?	Anubrat Kumar
5.18		Common presentations of developmental dysplasia of the hip and their clinical significance: a retrospective review	Siu-on Yip
5.19		A decade's review on the ever changing paediatric pyogenic osteomyelitis and septic arthritis in New Territories West Cluster	Wing-yeo Choy
5.20		Osteochondroma: a clinical and radiological review in a Chinese paediatric cohort	Sum-lik Cheung
5.21		Paediatric trigger thumb: outcome of conservative treatment	Kwing-cham Ng
10:00 - 10:30		Coffee Break / Exhibition	

Time	Room	Topic (Moderators)	Speakers / Presenters
<b>10:30 - 12:00</b>	<b>S421</b>	<b>Plenary Session I: Paediatric Orthopaedics (Wang Chow, Alec LH Hung)</b>	
10:30 - 11:10		Developmental dysplasia of the hip: pearls and pitfalls in management	Stuart Weinstein
11:10 - 11:35		Easily missed paediatric spinal fractures	David Skaggs
11:35 - 12:00		Paediatric knee injuries	James HP Hui
<b>12:00 - 12:30</b>	<b>S421</b>	<b>Opening Ceremony</b>	
12:00 - 12:05		Welcome address	Evelyn Kuong Ying-lee Lam
12:05 - 12:10		Presidential address	Yau-bun Wong
12:10 - 12:25		Speech of Guest of Honour	Keith DK Luk
12:25 - 12:30		Present souvenir to the Guest of Honour	Yau-bun Wong
<b>12:30 - 13:30</b>		<b>Lunch / Lunch Symposium</b>	
		<b>Chancellor Lunch Symposium I (sponsor: Procter &amp; Gamble Hong Kong Limited)</b>	
	<b>Room 1</b>		
		Out of box solution for osteoarthritis management: inflammation control	Changhai Ding
		<b>Chancellor Lunch Symposium II (sponsor: Smith &amp; Nephew Limited)</b>	
	<b>Room 2</b>		
		Advanced rotator cuff healing with bioinductive implant	Miguel Ángel Ruiz Ibán Chris Peach
		<b>Chancellor Lunch Symposium III (sponsor TRiORTHO Limited)</b>	
	<b>Room 3</b>		
		The ideal alignment after total knee replacement	Chun-hoi Yan
<b>13:30 - 15:45</b>	<b>S421</b>	<b>Award Paper Session (Ka-lok Mak, Lin-wing Lok)</b>	
AP01		Smoking is associated with a higher chance of graft rupture after anterior cruciate ligament reconstruction	Yat-chi Chan
AP02		Blood flow restriction training of quadricep muscles in advanced osteoarthritis of the knee: a randomised controlled study	Vincent WK Chan
AP03		Hip fracture caregiver empowerment programme to enhance transitional rehabilitation at home – The Home Sweet Home 1 (HSH1) randomised control trial	Colin SY Yung
AP04		<i>Lycium barbarum</i> extract can enhance functional recovery after decompression in a preclinical rat model of cervical spondylotic myelopathy	Kenny YH Kwan
AP05		Mesenchymal stromal cells therapy for sarcopenia: a preclinical <i>in vivo</i> study	Belle YH Wang
AP06		Magnesium containing hybrid fixation system promotes the healing of long bone fractures: a large animal study	Arthur OF Woo
AP07		One-step strategy for <i>in situ</i> osteochondral repair using acellular 3D-printed Mg microparticles-functionalised scaffolds in a preclinical rabbit model	Liangbin Zhou
AP08		COVID-19 hip fracture outcomes in a city with one of the highest death rates: cycle threshold values have no prognostic role	Moya KH Tsui
AP09		Beta-lactam antibiotic allergy is a newly identified, independent and treatable risk factor for periprosthetic joint infection following TKA: a 28-year retrospective cohort study of 4800 cases	Man-hong Cheung
AP10		A self-administrable and interpretable machine-learning-driven knee osteoarthritis prognostic model for early diagnosis	Lok-chun Chan
AP11		Immediate versus gradual brace weaning in the clinical management of adolescent idiopathic scoliosis – a randomised controlled trial	Prudence WH Cheung
<b>15:45 - 16:15</b>	<b>S421 Foyer</b>	<b>Best Poster Presentation (Raymond CH Yau)</b>	
BP01		HKCOS position statement on management of osteoarthritis of knee: a delphi study	Amy YL Cheung
BP02		The effect of low-magnitude high-frequency vibration on Wnt/β-catenin signalling pathway in C2C12 myoblasts	Waujian Lin
BP03		The effect of platelet-rich plasma injections on people with achilles tendinopathy: a systematic review and meta-analysis	Clarence TK Mak
BP04		Adolescent idiopathic scoliosis (AIS) patients getting old – their health-related quality of life and spinal appearance when the number of post-surgical years turns more than 30 years	Alec LH Hung
<b>15:45 - 16:15</b>		<b>Coffee Break / Exhibition</b>	

Time	Room	Topic (Moderators)	Speakers / Presenters
<b>16:15 - 17:45</b>	<b>S421</b>	<b>Plenary Session II: Paediatric Orthopaedics &amp; Hand</b> (Alexander KY Choi, Jeffrey Justin SC Koo)	
16:15 - 16:35		Tarsal coalition	Michael Stephens
16:35 - 16:55		Posteromedial tibial bowing: is this a "benign" deformity?	Ashok Johari
17:00 - 17:20		PRUJ synostoses	Shanlin Chen
17:20 - 17:40		Congenital hand surgery: how my practice has changed	Wee Leon Lam
<b>16:15 - 17:45</b>	<b>S428</b>	<b>Concurrent Session I: Trauma</b> (Ronald MY Wong, Christian X Fang)	
16:15 - 16:45		Complex patella fracture and syndesmosis injuries	Peter Giannoudis
16:45 - 16:55		Discussion	All
16:55 - 17:10		Case discussion	Wan-yiu Shen
17:10 - 17:20		Discussion	All
17:20 - 17:35		Vertical patellar wiring for distal pole fractures	Frankie KL Leung
17:35 - 17:45		Discussion	All
<b>16:15 - 17:45</b>	<b>S427</b>	<b>Concurrent Session II: Sports Medicine</b> (Sammy NT Mak, Michael TY Ong)	
16:15 - 16:30		Paediatric ACL reconstruction	Robert Smigelski
16:30 - 16:45		Current role of soft tissue transfer in RSA	Nattha Kulkamthorn
16:45 - 17:00		Paediatric patellar instability	James HP Hui
17:00 - 17:05		Discussion	All
17:05 - 17:15		Biomechanics comparison between transtibial pull-out, suture anchor and all-suture anchor techniques for posterior medial meniscal root repair	Napat Prasitmeeboon
17:15 - 17:25		Identification of the cut-off point for the Patient Acceptable Symptom State of the Thai IKDC subjective knee form in patients underwent primary anterior cruciate ligament reconstruction	Tananthorn Piamtipmanas
17:25 - 17:35		The difference in contact pressure, area, and peak pressure of tibiofemoral joint between transtibial pull-out suture and all-suture anchor technique for posterior medial meniscal root repair: Porcine cadaveric study	Sutip Noowan
17:35 - 17:40		Discussion	All
17:40 - 17:45		Sports Medicine Chapter Annual General Meeting	
<b>16:15 - 17:45</b>	<b>S425</b>	<b>Concurrent Session III: Foot &amp; Ankle</b> (Yeung Yeung, Angela WH Ho)	
16:15 - 16:30		Surgical management of charcot foot and ankle	Kwai-ming Siu
16:30 - 16:45		Conversion total ankle replacement – the first local case report of pre-operative navigation for realignment of symptomatic varus deformity after ankle fusion	Shui-wah Man
16:45 - 17:15		Biomechanics and treatment of cavovarus deformity	Michael Stephens
17:15 - 17:30		Q&A and case discussion	All
17:30 - 17:45		Foot and Ankle Chapter Biennial General Meeting & Hong Kong Foot and Ankle Society Annual General Meeting	
<b>17:45 - 18:15</b>	<b>S421</b>	<b>The Hong Kong Orthopaedic Association Annual General Meeting</b>	
<b>18:30 - 22:00</b>		<b>Congress Banquet</b>	

**Sunday, 6 November 2022**

Time	Room	Topic (Moderators)	Speakers / Presenters
08:00 – 10:00	S421	<b>Free Paper Session VI: Sports Medicine II</b> (Stephen CY Chung, Richard HL Lee)	
<b>6.1</b>		Impact of COVID-19 on sports and arthroscopic surgery	Thomas WK Liu
<b>6.2</b>		Physical and biomechanical factors related to postural stability during simulated horse racing in Hong Kong apprentice jockeys	Xin He
<b>6.3</b>		The incidence and experience of sports related shoulder injuries in cricket	Kam-ming Mok
<b>6.4</b>		The use of foam roller on patellofemoral pain syndrome for Hong Kong recreational and professional runners	Kam-ming Mok
<b>6.5</b>		Clinical performance of metal-based patient specific instrumentation for high tibial osteotomy, a retrospective study	Jane CY Tsui
<b>6.6</b>		Computer-aided high tibial osteotomy (HTO) – a comparative study of commonly used 3D printing technology and navigation application	Florence OS Pang
<b>6.7</b>		Radiological diagnosis of subscapularis tendon tear	George YK Law
<b>6.8</b>		Smoking is associated with poorer outcome after rotator cuff repair	Wai-pan Yau
<b>6.9</b>		The effect of 6-week community exercise programme on shoulder function in Hong Kong Chinese elderly	Karen KM Ng
<b>6.10</b>		Mid-term clinical outcomes of subacromial balloon spacer implantation for massive rotator cuff tear	Michelle KL Li
<b>6.11</b>		Longitudinal change of effectiveness of acupuncture in patients with rotator cuff disease: a systematic review	Cyrus Hung
<b>6.12</b>		Worldwide incidence and prevalence of shoulder dislocation variation by race and population: a systematic review and meta-analysis of population-based studies	Thomas WH Yuen
<b>6.13</b>		Paediatric shoulder dislocation – 14 years of experience at Prince of Wales Hospital	Kelvin CH Lo
<b>6.14</b>		Reunderstanding bone loss in shoulder instability based on 17 years' follow-up study of arthroscopic Bankart repair from original Griffith index deriving cohort – functional outcomes worsen with "minimum critical" instead of "subcritical" bone loss	Lawrence CM Lau

Time	Room	Topic (Moderators)	Speakers / Presenters
07:30 - 10:00	S425	Free Paper Session VII: Spine (Tsang-tung Chan, Yip-kan Yeung)	
7.1		The value of computed tomography imaging in diagnosing the presence, location and morphology of tether breakages in vertebral body tethering	Matthew HY Yeung
7.2		Safety of continuing aspirin use in cervical laminoplasty: a propensity score-matched analysis	Yu-chung Wong
7.3		Vertebral body tethering results in progressive improvement in coronal Cobb but deterioration in axial rotation, a three-dimensional analysis	Teenie KT Wong
7.4		Vertebral body tethering of main thoracic curve results in spontaneous correction in untethered proximal thoracic Cobb and shoulder balance: a three-dimensional analysis	Teenie KT Wong
7.5		Prospective, randomised controlled trial evaluating Floseal, a Gelatin and Thrombin-based haemostatic matrix, in postoperative drain output and blood transfusion rate in transforaminal lumbar interbody fusion (TLIF) surgery	Eugene PL Ng
7.6		Physical performance test is valid in assessing degenerative cervical myelopathy	Karlen KP Law
7.7		Mechanical characterisation and design of biomaterials for nucleus pulposus replacement and regeneration	Zhuoqi Li
7.8		Adolescent idiopathic scoliosis with spinal proprioceptive deficits are associated with curve magnitudes of over 45 degrees	Kenney KL Lau
7.9		The effectiveness of robotic-assisted upper limb rehabilitation to improve upper limb function in patients with cervical spinal cord injuries—a scoping review	Jocelyn SW Ho
7.10		A deep learning-based motion video analysis for scoliosis screening	Dong Chan
7.11		Inter-screw index: a novel method for identifying tether breakage in vertebral body tethering	Sandra HT Wan
7.12		Why are some intervertebral discs more prone to degeneration? Insights into isolated thoracic 'dysgeneration'	Samuel TY Cheung
7.13		Self-reported physical activities in patients with adolescent idiopathic scoliosis – a cross-sectional observational study	Chrysanne HL Chow
7.14		Outcome results after 200 consecutive single portal full endoscopic unilateral laminotomy for bilateral decompression for lumbar spinal stenosis	Sze-hung Wong
7.15		Male SpA patients in later disease have less severe disc degeneration due to higher mSASSS scores than female – A propensity-score matched comparison with the population	Samuel TY Cheung
7.16		Incidence of neural axis abnormality and neurosurgical intervention after screening MRI in early onset scoliosis	Herng Ee Chiang
7.17		Osteosarcopenia in elderly vertebral compression fracture patients	Marco CS Chui
7.18		Canonical correlation analysis between surface topography and spinal three-dimensional reconstruction in adolescent idiopathic scoliosis	Jack Zijian Wei
7.19		A survival probability tool (SMEW) based on 10 537 patients with spinal metastases in Hong Kong using a machine learning-based model	Kenny YH Kwan
7.20		Fukuda-Uttenberger stepping test: ability to reflect proprioception deficit and relation with the severity of degenerative cervical myelopathy	Cody TS Ng
7.21		Review of halo immobilisation for cervical spine injury in elderly	Chi-kuen Wong
7.22		Immediate versus gradual brace weaning in the clinical management of adolescent idiopathic scoliosis – a randomised controlled trial	Prudence WH Cheung
7.23		Radiological and clinical outcome of expandable lordotic cage in transforaminal lumbar interbody fusion (TLIF) for degenerative lumbar spinal pathology	Jimmy KY Lau
7.24		Prospective clinical validation of MSKalign: a radiation-free portable alignment analysis system and device for scoliosis	Teng Zhang

Time	Room	Topic (Moderators)	Speakers / Presenters
08:00 - 10:00	S426	<b>Free Paper Session VIII: Foot &amp; Ankle, Rehabilitation, Tumour</b> (Simon SM Leung, Dennis CC Chan)	
8.1		The clinical effectiveness of pulsed electromagnetic field therapy on patient-reported pain and physical function in patients with hallux valgus: pilot study	Cheryl SM Chia
8.2		Muggle quidditch injury analysis	Sin-kiu Tang
8.3		Prevalence of ankle instability in a hypermobile yoga population	Samuel KK Ling
8.4		Clinical effects of pulsed electromagnetic field therapy on self-reported pain and function in patients with Achilles tendinopathy	Samuel KK Ling
8.5		Tibial cortex transverse transport accelerates wound healing via enhanced angiogenesis and immunomodulation	Yongkang Yang
8.6		Investigation on the prognostic predictors following arthroscopic microfracture for osteochondral lesions of the talus	Kendrew YH Choi
8.7		The morphological differences of intrinsic foot muscles in active distance runners with and without plantar fasciitis	Fannie OY Lau
8.8		Can pulsed electro-magnetic field (PEMF) therapy enhance calf muscle function in healthy individuals	Chun-ho Lau
8.9		Clinical outcomes of a standardised rehabilitation protocol for meniscal repair	Gavin CW Lam
8.10		Hereditary neuropathy with liability to pressure palsy presenting with footdrop	Kenneth Yiu
8.11		What do individuals with spinal cord injury want the most?—A survey of functional recovery priorities in Hong Kong	Christopher CH Yip
8.12		The current usage of 3D-printed hand wrist orthoses: a systematic review	Yiwen Zheng
8.13		A pilot hybrid programme with tele-care for patients with carpal tunnel syndrome	Charles CS Lam
8.14		Return to community and become active again—exercise training programme for patients with knee osteoarthritis in MacLehose Medical Rehabilitation Centre	Shun-shing Yeung
8.15		Can a structured home-based rehabilitation programme reduce dorsal central wrist pain?	Lai-fan Tse
8.16		Application of machine learning models in developing a predictive model on length of hospital stay in geriatric fragility fracture patients	Prudence KL Mok
8.17		Effectiveness of Schroth exercise in adolescents with idiopathic scoliosis: a systematic review	Subrina SC Chan
8.18		Effect of sarcopenia in elderly women with vertebral compression fracture on global sagittal alignment and its relationship with quality of life	Cheuk-kin Kwan
8.19		The ageing population—the need to improve efficiency of geriatric hip fracture care	Linus CY Lee
8.20		Risk factors for fixed flexion deformity redevelopment after total knee replacement: a guide to rehabilitation	Alan MK Tsang
8.21		Outcome of limb salvaging procedure for bone tumour using liquid nitrogen technique: a case series of 23 patients	Chun-wai Cheng

Time	Room	Topic (Moderators)	Speakers / Presenters
07:30 - 10:00	S427	<b>Free Paper Session IX: Adult Joint Reconstruction II</b> (Kevin KW Ho, Matthew WH Lee)	
9.1		Blood flow restriction training of quadricep muscles in advanced osteoarthritis of the knee: a randomised controlled study	Vincent WK Chan
9.2		The effect of physiotherapist-supervised exercise programme on the muscle function for patients with end stage knee OA	Kendrew YH Choi
9.3		The association between vitamin D status and muscle function for patients with OA knees	Michael TY Ong
9.4		A comparison between MRI Osteoarthritis Knee Score (MOAKS) and KL Grading on reflecting severity of clinical symptoms in osteoarthritic patients	Stephanie WS Tso
9.5		Constitutional varus in Chinese patients with knee osteoarthritis	Thomas WK Liu
9.6		Adaptive fusion of deep learning with statistical shape model for robust patella segmentation from CT images	Tianshu Jiang
9.7		Prevalence and factors of hypercalcaemia after the use of Stimulan absorbable calcium sulphate beads in lower limb arthroplasty	Ka-yau Li
9.8		How much waste do we generate? Steps towards greener arthroplasty	Amy Cheung
9.9		Factors determining outcome while on waiting list for and after joint replacement surgery	Amy Cheung
9.10		Universal fructosamine and haemoglobin A1c screening in primary hip and knee arthroplasties	Vincent WK Chan
9.11		Use of non-invasive wound closure device for total joint replacement surgery achieve at least comparable cosmesis outcome as subcuticular suture: A retrospective single-blinded study	Man-hong Cheung
9.12		Outcomes of total knee replacement for end stage osteoarthritis before and after COVID-19 outbreak in Hong Kong	Leo CH Wong
9.13		Has the bacteriology of periprosthetic joint infection after total knee arthroplasty changed over the years? A retrospective cohort study of 2171 patients	Jun-ren Khoo
9.14		Are there any differences in the bacteriology of periprosthetic joint infection after total knee arthroplasty and total hip arthroplasty: a retrospective study of 2773 patients	Jun-ren Khoo
9.15		A matched cohort comparison of clinical outcomes following one-stage and two-stage revision for peri-prosthetic joint infection after total knee arthroplasty	Cheuk-yun But
9.16		Beta-lactam antibiotic allergy is a newly identified, independent and treatable risk factor for periprosthetic joint infection following TKA: a 28-year retrospective cohort study of 4800 cases	Man-hong Cheung
9.17		Comparison of the diagnostic accuracy of joint fluid in blood culture bottles (BACTEC) to conventional culture for the diagnosis of prosthetic joint infection	Ping-keung Chan
9.18		Do wear rates of highly crosslinked polyethylene in total hip arthroplasty change over time? A study over two decades	Amy Cheung
9.19		Prospective cohort study on a novel oxidised zirconium modular dual mobility total hip arthroplasty	Henry Fu
9.20		Long-term follow-up of an uncemented hydroxyapatite-coated femoral stem beyond 20 years – survivorship and radiographic measurements	Andy Hon-fai Yee

Time	Room	Topic (Moderators)	Speakers / Presenters
08:00 - 10:00	S428	<b>Free Paper Session X: Trauma</b> (Raymond WK Ng, Christian X Fang)	
10.1		The effect of non-steroidal anti-inflammatories prophylaxis on heterotopic ossification after elbow trauma surgery	Hoi-tung Lam
10.2		Is Barrack and Harris Cement Grading System correlate with clinical outcome of cemented hip hemiarthroplasty in geriatric fracture neck of femur patients?	Wing-hong Liu
10.3		Three-dimensional navigation guided percutaneous trans-sympyseal screw for mechanically unstable pubic symphysis diastasis	Angus CK Chan
10.4		Safe zone for implant placement in olecranon	Tin-sui Ko
10.5		Fixation of patella fracture with non-metallic implant	Giselle TY Ho
10.6		Percutaneous cerclage wiring as an adjunct to intramedullary nailing for fixation of subtrochanteric fractures	Arnold Nicholas TC Leung
10.7		Hip fracture caregiver empowerment programme to enhance transitional rehabilitation at home – The Home Sweet Home 1 (HSH1) randomised control trial	Colin SY Yung
10.8		Prevalence and effect of osteosarcopenia in Chinese hip fracture patients	Christopher Ian Lam
10.9		Outcome comparison of the presence or absence of associated ulnar fractures in middle aged patients with operated distal radius fractures	Jason LY Ho
10.10		Outcomes and peri-operative management of COVID-19 positive geriatric hip fractures during the fifth wave pandemic	Brian HW Leung
10.11		Modern results of conservative treatment for pertrochanteric and neck of femur fracture for patients with ultra-high comorbidities: a propensity score matched analysis	Cheuk-yin Tam
10.12		Identification of osteosarcopenia by high-resolution peripheral quantitative computed tomography (HR-pQCT)	Ronald MY Wong
10.13		Retrospective comparative study between reverse shoulder arthroplasty and open reduction internal fixation in geriatric patients with comminuted proximal humerus fracture – an early experience from a district general hospital	Wing-leong Chan
10.14		Compliance to 11 clinical markers of BOAST 4 guidance for treating open fractures in a major trauma centre in Hong Kong	Ho-tung Lam
10.15		Muscle plays more superior role than fat in bone homeostasis: a cross-sectional study	Linus Chee-yeen Lee
10.16		COVID-19 hip fracture outcomes in a city with one of the highest death rates: cycle threshold values have no prognostic role	Moya Kwan-hung Tsui
10.17		The ORACLE study: open fracture risks associated with infection – a cohort longitudinal evaluation study of 517 open fractures across 20 years	Ching-yau Wong
10:00 - 10:30		<b>Coffee Break / Exhibition</b>	
10:30 - 12:00	S421	<b>Plenary Session III: Tumour</b> (Raymond CH Yau, Calvin WK Chiu)	
10:30 - 11:00		The unusual, the unexpected and the unmissable in orthopaedic oncology in Hong Kong	Shekhar Madhukar Kumta
11:00 - 11:30		Surprising results: simultaneous/metachronous treatment of severe leg length discrepancy using time-honoured surgical procedures after tumour surgery	Xiao-hui Niu
11:30 - 12:00		The challenges facing orthopaedic oncologists in the 21st century	Peter Choong
12:00 - 13:00		<b>Lunch / Lunch Symposia</b>	
		<b>Chancellor Lunch Symposium I</b> (sponsor: Addify Medical Co Limited)	
		<b>Room 1</b>	
		Mixed reality application in orthopaedic oncology	Kwok-chuen Wong
		<b>Chancellor Lunch Symposium II</b> (sponsor: Amgen Hong Kong Limited)	
		<b>Room 2</b>	
		Surgical Strategies for Osteoporosis Spine Fractures: Any ways to perfect Chin-hung Ho surgery planning and perfect anti-osteoporosis management?	

Time	Room	Topic (Moderators)	Speakers / Presenters
13:00 - 14:30	S421	<b>Plenary Session IV: Rehabilitation &amp; Tumour</b> (Ka-lok Mak, Raymond WK Ng)	
13:00 - 13:30		Recent advance in prosthesis fitting for paediatric amputees	Yukiyo Shimizu
13:30 - 14:00		Avoiding whoops surgery – approach to soft tissue tumours in the hand and beyond	Timothy YC So
14:00 - 14:30		Van Nes Rotationplasty in the 21st Century	Ashish Gulia
<b>13:00 - 14:30</b>	<b>S425</b>	<b>Concurrent Session IV: Spine</b> (Kam-kwong Wong, Chun-man MA)	
13:00 - 13:15		Spinal Metastasis I: Treatment Strategies	Kenny YH Kwan
13:15 - 13:35		Spinal Metastasis II: Surgical Treatment and Complications Management	Alessandro Gasbarrini
13:35 - 13:50		Paraspinal tumours and en bloc surgical techniques for primary tumour	Ka-kin Li
13:50 - 14:05		Chordoma: diagnosis and current treatment trend	Yat-wa Wong
14:05 - 14:20		Q&A	All
14:20 - 14:30		Spine Chapter Biennial General Meeting	
<b>13:00 - 14:30</b>	<b>S427</b>	<b>Concurrent Session V: Adult Joint Reconstruction</b> (Lewis PK Chan, Kenneth WK Law)	
13:00 - 13:15		Current concepts of knee alignment: kinematic vs mechanical vs functional vs anatomical alignment	Simon Young
13:15 - 13:30		Are kinematic/anatomical/functional alignment better than mechanical alignment? any evidence?	Simon Young
13:30 - 13:45		Unrestricted caliper-verified kinematically aligned TKA: targets, accuracy, balancing, implant survival, outcomes	Stephen Howell
13:45 - 14:00		The most accurate technique for performing kinematically aligned TKA uses manual instruments and a caliper	Stephen Howell
14:00 - 14:20		Case discussion and Q&A session	All
14:20 - 14:30		Adult Joint Reconstruction Biennial General Meeting	
<b>13:00 - 14:30</b>	<b>S428</b>	<b>Concurrent Session VI: Hong Kong College of Orthopaedic Surgeons</b> (Ping-tak Chan, Ying-kei Chan)	
13:00 - 13:30		Curriculum review – what do we want to achieve?	Ying-kei Chan
13:30 - 14:00		OSCE in Orthopaedics	Ping-tak Chan
14:00 - 14:30		Post-fellowship trauma training	Peter Giannoudis
<b>14:30 - 15:00</b>		<b>Coffee Break / Exhibition</b>	
<b>15:00 - 16:30</b>	<b>S427</b>	<b>Concurrent Session VII: Hand - Common Congenital Hand Conditions</b> (Margaret WM Fok, Wing-lim Tse)	
15:00 - 15:15		Embryology and development of the hand	Wee Leon Lam
15:15 - 15:30		Syndactyly	Esther CS Chow
15:30 - 15:45		Clinodactyly and camptodactyly	Goo-hyun Beak
15:45 - 16:00		Thumb hypoplasia and radial club hand	Shanlin Chen
16:00 - 16:15		Madelung deformity	Ping-tak Chan
16:15 - 16:30		Thumb polydactyly	Pak-cheong Ho
<b>15:00 - 16:30</b>	<b>S425</b>	<b>Concurrent Session VIII: Rehabilitation</b> (Raymond WK Ng)	
15:00 - 15:20		Care Pathway for Amputee – from Surgery to Community Reintegration	Sheung-wai Law
15:20 - 15:40		Lower Limb Prosthetic Component; Microprocessor-Controlled Components	Giant PH Tse
15:40 - 16:00		What's new in amputation surgery – osseointegration-surgical management and prosthetic	Dennis KH Yee
16:00 - 16:20		Sports for amputee: adaptive lower limb for sports and recreation	Kam KW Ho
16:20 - 16:30		Q&A	All
<b>15:00 - 16:30</b>	<b>S421</b>	<b>Concurrent Session IX: Paediatric Orthopaedics</b> (Alec LH Hung, Lin-wing Lok)	
15:00 - 15:30		My journey in complex paediatric spinal deformity management	Stuart Weinstein
15:30 - 16:00		Catastrophic sequelae of missed paediatric infections	Ashok Johari
16:00 - 16:30		Paediatric orthopaedics in developing countries	Chi-wai Chan
16:30 - 16:45		Paediatric Orthopaedic Chapter Annual General Meeting	
<b>16:45 - 16:55</b>	<b>S421</b>	<b>Closing Remarks</b> (Evelyn Kuong, Ying-lee Lam)	

## Award Paper Session

### AP01

#### **Smoking is associated with a higher chance of graft rupture after anterior cruciate ligament reconstruction**

**Yat Chi Chan, Wai-pan Yau**

*Department of Orthopaedics and Traumatology, The University of Hong Kong*

**Introduction:** The incidence of anterior cruciate ligament reconstruction (ACLR) graft rupture was reported to be 7.9% at 10-year follow-up. It has been known that smoking clinically impacted on different orthopaedics surgery and tissue healing. Yet, there is limited study on the implication of smoking on graft rupture after ACLR.

**Methods:** From 1 January 2013 to 31 December 2019, 233 patients who received primary ACLR with hamstring tendon autograft were assessed by MRI at a mean  $20.2 \pm 1.9$  months after surgery. Based on their smoking history, the patients were categorised into two groups: smokers ( $n=39$ ) and non-smokers ( $n=194$ ).

Primary outcome was ACLR graft rupture (diagnosed by either arthroscopy or magnetic resonance imaging). The secondary outcome was signal/noise quotient (SNQ), which assessed the signal intensity of the intact graft quantitatively.

**Results:** The rate of ACLR graft rupture was 6.0%. Smokers had a higher rupture rate (12.8%) than non-smokers (4.6%) [ $p=0.0498$ , chi square test]. The odd ratio was 2.76. The intact graft of smokers was found to have a less satisfactory ligamentisation ( $p=0.028$ ) because of higher SNQ ( $4.7 \pm 4.4$ ) than non-smokers (SNQ= $3.3 \pm 3.7$ ) [ $p=0.028$ ]. The two groups were comparable in other parameters, including demographics, length of follow-up, and surgical details.

**Discussion and Conclusion:** In reference to the postoperative MRI captured at an average of 20 months after index surgery, smoking posed a higher risk of graft rupture of ACLR and undermined the ligamentisation process of the intact graft.

### AP02

#### **Blood flow restriction training of quadricep muscles in advanced osteoarthritis of the knee: a randomised controlled study**

**Vincent Wai Kwan Chan,<sup>1</sup> Shun Shing Yeung,<sup>2</sup> PK Chan,<sup>3</sup> Henry Fu,<sup>3</sup> MH Cheung,<sup>3</sup> Amy Cheung,<sup>1</sup> Michelle Hilda Luk,<sup>1</sup> Raymond Chi Chung Tsang,<sup>2</sup> KY Chiu<sup>3</sup>**

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<sup>3</sup>*Department of Orthopaedics and Traumatology, The University of Hong Kong*

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#### AP03

### Hip fracture caregiver empowerment programme to enhance transitional rehabilitation at home—The Home Sweet Home 1 (HSH1) randomised control trial

**Christian Xinshuo Fang,<sup>1</sup> Colin Shing-Yat Yung,<sup>2</sup> Rebecca Kit Yuk Chan,<sup>1</sup> Tak Man Wong,<sup>1</sup> Tak Wing Lau,<sup>2</sup> Frankie Ka-Li Leung<sup>1</sup>**

<sup>1</sup>Department of Orthopaedics and Traumatology, The University of Hong Kong

<sup>2</sup>Department of Orthopaedics and Traumatology, Queen Mary Hospital

**Introduction:** Development and randomised controlled trial of a Caregiver Empowerment Programme (CEP) for geriatric hip fracture patients.

**Methods:** A total of 125 geriatric hip fracture patients with identifiable caregivers were recruited and block randomised (Control: 64 and Intervention:61). The CEP consists of multimedia and training sessions with patient's caregivers by allied health therapists, including transfer, bed mobility and walking. Baseline characteristics: age, sex, abbreviated mental test and modified Barthel index (MBI) were compared. Co-primary outcomes include global health, quality of life assessments, functional and physical assessments using EQ-5D-5L questionnaire, VAS-QOL score, MBI score and Timed-Up and Go test (TUG) at discharge, 2-month, 6-month and 12-month interval. Secondary outcomes include mortality, readmission rates, length of stay and subsequent fractures.

**Results:** Baseline characteristics showed no differences. The global health measures with EQ-5D-5L and VAS-QOL showed improvement in the CEP group at all timepoints with statistically significant difference at 6-months for VAS-QOL (control: 56.5 vs. intervention: 69.9, p=0.03) and 12 months for EQ-5D-5L (control:8.40 vs. intervention: 6.33, p=0.03). Functional improvement with higher MBI scores were seen at all timepoints. Improvements were most pronounced in mid-term results with MBI statistically higher at 6-months (control:76.1 versus intervention: 87.7, p=0.03). Physical assessment showed mid-term improvements with TUG test (control: 175 seconds vs intervention: 78.8 seconds, p<0.01) at 6 months. A NNT of 3.11 was achieved for improved physical assessment. Secondary outcomes were not significantly different.

**Discussion:** CEP leads to significantly better perceived general health, functional and physical improvements. The implementation of a structured CEP is highly recommended to all rehabilitation institutions for geriatric hip fractures.

#### AP04

### *Lycium barbarum* extract can enhance functional recovery after decompression in a preclinical rat model of cervical spondylotic myelopathy

**Kenny Yat Hong Kwan,<sup>1</sup> Kangheng Wang,<sup>2</sup> Rong Li,<sup>3</sup> Guang-Sheng Li,<sup>2</sup> Kwok Fai So,<sup>4</sup> Yong Hu<sup>1</sup>**

<sup>1</sup>Department of Orthopaedics and Traumatology, The University of Hong Kong

<sup>2</sup>Department of Orthopaedics and Traumatology, The Affiliated Hospital of Guangdong Medical University, Zhanjiang

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<sup>4</sup>Department of Ophthalmology, The University of Hong Kong

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#### AP05

### Mesenchymal stromal cells therapy for sarcopenia: a preclinical in vivo study

**Belle Yu Hsuan Wang,<sup>1</sup> Wayne Yuk Wai Lee,<sup>1</sup> Chien-Wei Lee<sup>2</sup>**

<sup>1</sup>Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong

<sup>2</sup>Center for Translational Genomics Research, China Medical University

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## AP06

### Magnesium containing hybrid fixation system promotes the healing of long bone fractures: a large animal study

**Yuantao Zhang,<sup>1</sup> Arthur On Fai Woo,<sup>2</sup> Lizhen Zheng,<sup>1</sup> Michael Tim-yun Ong,<sup>2</sup> Ning Tang,<sup>2</sup> Ronald Man-yeung Wong,<sup>2</sup> Wenzhe Tong,<sup>1</sup> Dick Ho Kiu Chow,<sup>1</sup> Jiankun Xu,<sup>1</sup> Ling Qin<sup>1</sup>**

<sup>1</sup>Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong

<sup>2</sup>Department of Orthopaedics and Traumatology, Prince of Wales Hospital

**Introduction:** Biodegradable magnesium (Mg) is beneficial for fracture healing. However, its applications mainly limited to non-weight-bearing sites as these biometals usually lose their mechanical strength at early stage. We innovatively designed Mg-containing hybrid intramedullary nail (IMN) to maintain the mechanical strength while make good use of the biological effects of Mg. Here we tested the feasibility of our Mg-IMN in the fixation of long bone fracture established in goats, which is essential for broadening clinical applications.

**Methods:** A total of 36 skeletally mature Chinese mountain goats were divided into IMN group and Mg-IMN group. Osteotomy was conducted at the tibial mid-shaft and the fracture models were fixed with either Ti-based IMN or Mg-IMN.

**Results:** No implant failure was found during implementation. X-ray and computed tomography results suggested that Mg-IMN group presented with significantly larger callus at early stage of fracture healing, and enhanced mineralisation and remodelling at late stage, as compared to IMN group. Haematoxylin and eosin and Stevenel Blue-Van Gieson-Alizarin Red staining show more callus formation at week 6 and more regular lamellar bone at week 12 in Mg-IMN group than IMN group. Calcein/xylol double labelling suggest accelerated new-bone formation in the Mg-IMN group at week 6 and accelerated the formation of mature lamellar bone tissue at week 12.

**Discussion and Conclusion:** To our knowledge, this is the first successful attempt to apply the Mg-IMN for long bone fracture established in large animals. Mg-IMN shows superior outcomes in terms of bone formation as well as remodelling than conventional IMN, highlighting the great translational merit.

## AP07

### One-step strategy for in situ osteochondral repair using acellular 3D-printed Mg microparticles-functionalised scaffolds in a preclinical rabbit model

**Liangbin Zhou, Jiankun Xu, Wenzhe Tong, Lizhen Zheng, Ye Li, Kevin Kiwai Ho, Ling Qin**

*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

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## AP08

### COVID-19 hip fracture outcomes in a city with one of the highest death rates: cycle threshold values have no prognostic role

**Moya Kwan Hung Tsui,<sup>1</sup> Wai Wang Chau,<sup>2</sup> Wing Hong Liu,<sup>1</sup> Cheuk Yin Tam,<sup>3</sup> Dennis King Hang Yee,<sup>3</sup> Chi Yin Tso,<sup>1</sup> Ning Tang,<sup>1</sup> Ronald Man Yeung Wong<sup>2</sup>**

<sup>1</sup>Department of Orthopaedics and Traumatology, Prince of Wales Hospital

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**AP09****Beta-lactam antibiotic allergy is a newly identified, independent and treatable risk factor for periprosthetic joint infection following TKA: a 28-year retrospective cohort study of 4800 cases**

**Man Hong Cheung,<sup>1</sup> Martin Shun Sing Cheng,<sup>2</sup> Philip H Li,<sup>3</sup> Valerie Chiang,<sup>4</sup> Kwong Yuen Chiu,<sup>1</sup> Ping Keung Chan,<sup>1</sup> Henry Fu,<sup>1</sup> Amy Cheung,<sup>2</sup> Vincent Wai Kwan Chan,<sup>2</sup> Thomas Chak Ming Tang<sup>1</sup>**

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<sup>2</sup>*Department of Orthopaedics and Traumatology, Queen Mary Hospital*

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**AP10****A self-administrable and interpretable machine-learning-driven knee osteoarthritis prognostic model for early diagnosis**

**Lok Chun Chan,<sup>1</sup> Toby Ho-Hin Li,<sup>2</sup> Lewis Ping-Keung Chan,<sup>3</sup> Chunyi Wen<sup>1</sup>**

<sup>1</sup>*Department of Biomedical Engineering, The Hong Kong Polytechnic University*

<sup>2</sup>*Department of Prosthetics and Orthotics, Tuen Mun Hospital*

<sup>3</sup>*Department of Orthopaedics and Traumatology, The University of Hong Kong*

**Introduction:**

- Osteoarthritis (OA) is the most prevalent joint disease, over half of which is knee OA (KOA).
- Precise aetiology remains unknown and no cure is available.
- Delayed diagnosis often occurs and the knee joint may experience irreversible damage.
- Accurate disease trajectory prediction using Machine Learning (ML) through self-administrable assessment can enhance disease prevention and reduce unwarranted hospital use.

**Methods:**

1. Compared the inter-cluster distance of different combinations of KOA progression definition.
  - Radiographic progression
    - a. Joint-space-width progression: Reduction in the minimum knee joint space width by more than 0.7mm.
    - b. Kellgren-Lawrence (KL) progression: Any increase in KL grade, except from grade 0 to 1.
  - Pain progression
    - Increase in the WOMAC pain score by at least 1.8 points.
2. Developed the prognostic model with the best-performing progression definition.
  - An ML model was developed using 2200 knee samples from the Osteoarthritis Initiative dataset.
  - End point of prediction: 48-month after the first clinical visit.
  - ML algorithm: Self-paced Ensemble for imbalanced classification with a train-test split of 8:2.
3. Visualised feature importance by Shapley Additive Explanations (SHAP).

**Results:**

- The composite definition of KL-Pain progression best differentiated the progressor and non-progressor classes with the highest average inter-cluster distance of 0.344 ( $\pm 0.024$ ).
- Prediction performance: AUROC 0.775.
- BMI and KOOS quality-of-life score are the most crucial factors for progression prediction from SHAP analysis.

**Conclusion:**

A self-administrable and interpretable ML-driven KOA prognostic model was developed under the KL-Pain progression for early disease detection in the community.

**AP11**

**Immediate versus gradual brace weaning in the clinical management of adolescent idiopathic scoliosis—a randomised controlled trial**

**Prudence Wing Hang Cheung,<sup>1</sup> Hao Wu,<sup>1</sup> Marcus Kin Long Lai,<sup>1</sup> Lester Po Kwan Wong,<sup>1</sup> Vincent Yeng,<sup>2</sup> Lawrence Chi-kwan Chan,<sup>2</sup> Jason Pui Yin Cheung<sup>1</sup>**

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## Award Poster Session

**BP01**

### **HKCOS position statement on management of osteoarthritis of knee: a Delphi study**

**Wai Pan Yau,<sup>1</sup> Chi-kit Chiu,<sup>2</sup> Man-hong Cheung,<sup>3</sup> Amy Yim-ling Cheung<sup>4</sup>**

<sup>1</sup>*Department of Orthopaedics and Traumatology, The University of Hong Kong*

<sup>2</sup>*Department of Orthopaedics and Traumatology, United Christian Hospital*

<sup>3</sup>*Department of Orthopaedics and Traumatology, Gleneagles Hong Kong Hospital*

<sup>4</sup>*Department of Orthopaedics and Traumatology, Queen Mary Hospital*

**Introduction:** Osteoarthritis of knee is one of the commonest causes of chronic pain and disability in Hong Kong. For the benefit of the public, it is the responsibility of the Hong Kong College of Orthopaedic Surgeons to prepare a position statement on management of OA knee.

**Methods:** Taking reference of international guidelines and the practice of orthopaedic surgeons in Hong Kong, 26 potential interventions for management of OA knee are included into the position statement. A literature review was conducted in early 2022. Summaries of the best available evidence were prepared according to the Oxford Centre for Evidence-Based Medicine. A Delphi survey was distributed to an expert panel formed by 106 fellows of the College in June 2022. The results of the Delphi survey form the recommendations of the College in this position statement.

**Result:** The College RECOMMENDS patient education, land-based exercise, water-based exercise, self-management programme, weight reduction, cane, paracetamol, topical NSAID, oral NSAID, high tibial osteotomy, total knee arthroplasty as treatment of OA knee; and does not recommend lateral wedge insole, denervation therapy and arthroscopic lavage. The College is unable to advocate for or against the use of thermotherapy, transcutaneous electrical nerve stimulation, pulsed electromagnetic wave therapy, acupuncture, valgus off-loading knee brace, knee sleeve, opioid analgesics, intra-articular steroid injection, intra-articular hyaluronic acid injection, intra-articular platelet rich plasma injection, oral supplements, and partial meniscectomy.

**Conclusion:** The College presents a position statement on management of osteoarthritis of knee. These recommendations are in line with other international guidelines and represent the best clinical practice in OA knee available in Hong Kong.

## BP02

### The effect of low-magnitude high-frequency vibration on Wnt/β-catenin signalling pathway in C2C12 myoblasts

**Wujian Lin, Can Cui, Yufeng Long, Ronald Man Yeung Wong, Simon Kwoon Ho Chow, Wing Hoi Cheung**

*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** Low-magnitude high-frequency vibration (LMHFV) was found to significantly increase muscle strength and suppress adipogenesis of muscle-derived stem cells in sarcopenia animal model, whereas Wnt/β-catenin signalling pathway may be the principal mechanism. However, the mechanism how LMHFV affects Wnt pathway in muscle remains unclear.

**Methods:** Myogenic differentiation induction of C2C12 myoblastic cell line was performed. 20 000 cells per well were randomly allocated to the vibration group or the control group. The vibration group received LMHFV (35 Hz, 0.3 g, 20 min/day for 10 days). Samples were collected on Day 1, 5 and 10. Polymerase chain reaction and western blot were used to examine the Wnt-related markers expression.

**Results:** Wnt10b, LRP5, β-catenin and TCF/LEF decreased ( $p<0.02$ ), while FRZB, AXIN2, GSK3β and APC did not change ( $p>0.62$ ) on Day 5 compared with Day 1. The inhibition-markers including FRZB, AXIN2 and APC significantly increased ( $p<0.02$ ) from Day 5 to 10, yet the activation-markers including Wnt10b, LRP5 and β-catenin resumed to the initial level ( $p<0.03$ ) on Day 10 compared to Day 1. After 10-day intervention, LMHFV significantly increased Wnt10b, LRP5, FZD1, β-catenin and TCF/LEF ( $P<0.01$ ) but decreased FRZB and GSK3β ( $p<0.05$ ).

**Discussion and Conclusion:** After 5-day induction, the activation-markers of Wnt pathway were down-regulated and the inhibition-markers up-regulated, yet more inhibition-markers were up-regulated at the end. LMHFV was found to enhance the Wnt pathway expression after 10-day treatment. These results support that the Wnt pathway inhibited by myogenic differentiation could be restored and enhanced by LMHFV. These revealed the beneficial effect of LMHFV on Wnt/β-catenin signalling pathway of myoblasts.

## BP03

### The effect of platelet-rich plasma injections on people with Achilles tendinopathy: a systematic review and meta-analysis

**Clarence Tsz-kit Mak, Patrick Shu-Hang Yung, Samuel Ka-Kin Ling**

*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** Achilles tendinopathy is commonly occurring among various populations. Platelet-rich plasma (PRP) injection was suggested, but its effectiveness is controversial. This systematic review and meta-analysis reviews the current evidence of the effect of PRP injection on Achilles tendinopathy.

**Methods:** This review follows the PRISMA guidelines. CINAHL via EBSCOhost, Cochrane Library, and PubMed were searched for RCTs comparing PRP injection to another conservative treatment on VISA-A score or max AT thickness. Risk of bias assessment was done with RoB2. Meta-analysis was performed with Revman 5.3.

**Results:** Six studies including 422 participants suffering from chronic mid-portion Achilles tendinopathy were identified. Two, one and three of them were with low risk, some concerns and high risk of bias, respectively. There were no statistically significant differences between PRP injection and control at all time-points for VISA-A score (short-term: MD=2.28, 95% confidence interval [CI]=[-1.95, 6.51],  $p=0.29$ ; Intermediate-term: MD=1.83, 95% CI=[-2.66, 6.32],  $p=0.42$ ; Long-term: MD=3.46, 95% CI=[-8.62, 15.55],  $p=0.56$ ) and max AT thickness (Short-term: MD=0.26, 95% CI=[-0.71, 1.24],  $p=0.60$ ; Intermediate-term: MD=-0.84, 95% CI=[-2.12, 0.43],  $p=0.20$ ; Long-term: MD=-0.28, 95% CI=[-1.19, 0.64],  $p=0.55$ )

**Discussion and Conclusion:** Despite trends of increasing PRP injections, no solid evidence exists. Future studies need to standardise and investigate the injection site and technique and quantify the type and dose of PRP to ascertain if PRP injections are an effective treatment for Achilles tendinopathy.

**BP04**

**Adolescent idiopathic scoliosis (AIS) patients getting old—their health-related quality of life and spinal appearance when the number of post-surgical years turns more than 30 years**

**Alec Lik-Hang Hung, Wai Wang Chau, Bobby Kin-Wah Ng**

*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** Patients with severe adolescent idiopathic scoliosis (AIS) demanding spinal surgical correction usually undergo surgery in their earlier teenage years. Their health-related quality of life (HRQOL) and appearance are commonly thought to be stable years after surgery. We speculate that their HRQOL and appearance experience changes when age advances. This study investigated the HRQOL and appearance of patients with AIS 20-25, 25-30 and >30 years after surgery.

**Methods:** A total of 32 patients (90.6% female) who had regular follow-up in our clinic since their spinal correction surgery were recruited. Scoliosis Research Society-22r questionnaire (SRS-22) and Spinal Appearance Questionnaire (SAQ) were invited to fill out every time they attended their regular postoperative follow-up clinic sessions.

**Results:** Mean major Cobb angle was 67.2 (54.96) measured at perioperative stage, 55.2% underwent anterior spinal fusion+posterior spinal fusion and 44.8% underwent posterior spinal fusion only. Mean age was 38.80 (32,45) years and mean follow-up was 22.1, 27.1, 31.4 years in patients 20-25, 25-30, and >30 years after surgery, respectively. All SRS-22 subscores and total score was similar among the 3 time points. Self-image scored at middle range values (20-25, 25-30, >30=3.5 vs 3.3 vs 3.6, p=0.55). In SAQ, Curve scores were significantly increasing (5.41 vs 6.86 vs 7.67, p=0.047) and Prominences scores increased between 20-25 and 25-30, and dropped at >30 (4.29 vs 6.14 vs 5.50, p=0.046).

**Conclusion:** HRQOL maintained stable >30 years after surgery, while self-image scored at middle range reflecting how advancing age change their self-scrutiny. Poor perceptions on their trunk curve and prominence when patients with AIS are aged ≥40 years should be addressed. Special care and tailor-made follow-up should be provided when patients with AIS are getting older, particularly approaching peri-menopause for female.

## Free Paper Session I: Sports Medicine I

### FP1.1

#### Review on acute patellar dislocation in the paediatric population

**Jojo Hoi Ching Lai,<sup>1</sup> Lawrence Chun Man Lau,<sup>1</sup> Stephanie Wing Sum Tso,<sup>1</sup> Jack Wai Wang Chau,<sup>1</sup> Michael Tim-Yun Ong,<sup>2</sup> Patrick Shu-Hang Yung<sup>2</sup>**

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### FP1.2

#### Isolated medial patellofemoral ligament reconstruction reduces patella height in patients with patella alta: a retrospective review

**Kam To Siu, Yan Jin Samuel Fang, Tak Man Wong**

*Department of Orthopaedics and Traumatology, Queen Mary Hospital*

**Introduction:** This study investigates the effect of medial patellofemoral ligament reconstruction (MPFLr) on patella height.

**Methods:** A retrospective study was conducted to review all skeletally mature patients having lateral patellar dislocation and received isolated MPFLr in the past 12 years in a teaching hospital in Hong Kong. The authors retrospectively reviewed the charts to evaluate age, sex, side of knee, lateral knee radiographs and calculated the pre- and postoperative Insall Salvati Ratio.

**Results:** A total of 26 skeletally mature patients were included in the study. The mean age was 32.2 years (range, 17-50 years). Female patients constitute 80.8%. Patella alta (as defined by Insall Salvati ratio >1.2) was present in 15 patients (57.7%). For patients with patella alta preoperatively, the correction of patella height after MPFLr is significant at p value of 0.009 and effect size of 0.698. On the other hand, for patients without patella alta preoperatively, the change of patella height after MPFLr is not significant (p=0.433). Scatter plot shows that more severe preoperative patella alta was associated with larger correction of patella height after MPFLr. Such association showed moderate strength of positive correlation with coefficient of 0.450 at p=0.01. There was no significant correlation between age or sex and the correction of patella height after MPFLr.

**Conclusion:** Patients with patella alta benefit from a significant correction of patella height after MPFLr. There is moderate correlation between the severity of patella alta and the magnitude of correction in patella height after MPFLr.

**FP1.3****Pulsed electromagnetic field enhances healing of a meniscal tear in avascular region and mitigates post-traumatic osteoarthritis in a rat model****Ming Wang, Sien Lin, Gang L***Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** Meniscal tears located in the avascular region are thought to rarely heal and considered as a considerable challenge. Although the therapeutical effects of pulsed electromagnetic field (PEMF) were extensively studied in a variety of orthopaedic disorders, the effect of PEMF on meniscal healing has not been reported.

**Methods:** Seventy-two 12-week-old male Sprague-Dawley rats with full-thickness longitudinal medial meniscal tears in avascular region were divided into three groups: control group, treated with classic signal PEMF, and high slew rate signal PEMF. Macroscopic observation and histological analysis of the meniscus and articular cartilage were performed to evaluate the meniscal healing and progression of osteoarthritis. The synovium was harvested to evaluate the intra-articular inflammation.

**Results:** Dramatic degenerative changes of meniscus and articular cartilage were noticed during gross observation and histological evaluation in the control group at 8 weeks. However, the menisci in the two treatment groups were restored to normal morphology with a smooth surface and shiny white colour. The meniscal healing scores of PEMF treatment groups were significantly higher than those in the control group at 8 weeks. The degeneration score and synovitis score of the control groups were significantly higher than those in the two treatment groups.

**Discussion and Conclusion:** PEMF promoted the healing of meniscal tears in the avascular region and restored the injured meniscus to its structural integrity and functional stability. PEMF treatment could protect the knee joint from OA development via exerting reparative effect on meniscus and modulating the intra-articular inflammation.

**FP1.4****Repair of meniscus root tear—is there a difference between medial meniscus root repair and lateral meniscus root repair? A systematic review and meta-analysis****Jun Ren Khoo, Wai-pan Yau***Department of Orthopaedics and Traumatology, The University of Hong Kong*

**Introduction:** Complete root tear is associated with meniscus extrusion, resulting in loss of meniscus function and accelerated osteoarthritis of knee. Root tears can occur in both medial and lateral meniscus. Small scale retrospective case-control study suggested that the outcomes were different between medial and lateral meniscus root repair. This meta-analysis aimed to study whether such discrepancies exist via a systematic review of the available evidence in the literature.

**Methods:** Studies evaluating the outcomes of surgical repair of posterior meniscus root tears (PMRTs), with reassessment MRI or second-look arthroscopy, were identified through a systematic search of three prominent databases. The degree of meniscus extrusion, healing status of the repaired root, and functional outcome scores after repair were the outcomes of interest.

**Results:** Among the 732 studies identified, 20 studies were included in this systematic review. 624 knees and 122 knees underwent MMPRT and LMPRT repair, respectively. The amount of meniscus extrusion following MMPRT repair was  $3.8 \pm 1.7$  mm, which was significantly larger than the  $0.9 \pm 1.2$  mm observed after LMPRT repair ( $p < 0.001$ ). Significantly better healing outcomes were observed on reassessment MRI after LMPRT repair ( $p < 0.001$ ). The postoperative Lysholm score and IKDC score was also significantly better after LMPRT than MMPRT repair ( $p < 0.001$ ).

**Discussion and Conclusion:** LMPRT repairs resulted in significantly less meniscus extrusion, substantially better healing outcomes on magnetic resonance imaging, and superior Lysholm/IKDC scores, when compared to MMPRT repair. This is the first meta-analysis we are aware of that systematically reviews the differences in the clinical, radiographic, and arthroscopic results of MMPRT and LMPRT repair.

## FP1.5

### **Smoking is associated with a higher chance of graft rupture after anterior cruciate ligament reconstruction**

**Yat Chi Chan, Wai-pan Yau**

*Department of Orthopaedics and Traumatology, The University of Hong Kong*

**Introduction:** The incidence of anterior cruciate ligament reconstruction (ACLR) graft rupture was reported to be 7.9% at 10-year follow-up. It has been known that smoking clinically impacted on different orthopaedics surgery and tissue healing. Yet, there is limited study on the implication of smoking on graft rupture after ACLR.

**Methods:** From 1 January 2013 to 31 December 2019, 233 patients who received primary ACLR with hamstring tendon autograft were assessed by MRI at a mean  $20.2 \pm 1.9$  months after surgery. Based on their smoking history, the patients were categorised into two groups: smokers ( $n=39$ ) and non-smokers ( $n=194$ ).

Primary outcome was ACLR graft rupture (diagnosed by either arthroscopy or magnetic resonance imaging). The secondary outcome was signal/noise quotient (SNQ), which assessed the signal intensity of the intact graft quantitatively.

**Results:** The rate of ACLR graft rupture was 6.0%. Smokers had a higher rupture rate (12.8%) than non-smokers (4.6%) [ $p=0.0498$ , chi square test]. The odd ratio was 2.76. The intact graft of smokers was found to have a less satisfactory ligamentisation ( $p=0.028$ ) because of higher SNQ ( $4.7 \pm 4.4$ ) than non-smokers (SNQ= $3.3 \pm 3.7$ ) [ $p=0.028$ ]. The two groups were comparable in other parameters, including demographics, length of follow-up, and surgical details.

**Discussion and Conclusion:** In reference to the postoperative MRI captured at an average of 20 months after index surgery, smoking posed a higher the risk of graft rupture of ACLR and undermined the ligamentisation process of the intact graft.

## FP1.6

### **Signal noise quotient predicts graft rupture in anterior cruciate ligament reconstruction**

**Wai Pan Yau**

*Department of Orthopaedics and Traumatology, The University of Hong Kong*

**Introduction:** The cumulative graft rupture rate of anterior cruciate ligament reconstruction (ACLR) is 7.9% at 10 years. There is no scientific method to predict which ACLR will rupture in subsequent follow-up. Increased graft signal (measured by signal-noise quotient, SNQ) in postoperation. Magnetic resonance imaging (MRI) is frequently used to monitor graft maturation in ACLR. However, it is not known whether SNQ helps predict future graft rupture.

**Methods:** To test the hypothesis that increased SNQ was associated with subsequent graft rupture, a prospective MRI study was performed from 2007 to 2019 with postoperation MRI offered to all ACLR patients at or beyond 12 months after surgery. Signal intensity of intact graft was measured with SNQ. The incidence of subsequent graft rupture was documented.

**Result:** In all, 536 ACLRs with intact graft on reassessment MRI (done at an average of 17 months after surgery) were recruited. The mean follow-up was 68 months. 22 graft ruptures occurred at a mean of 45 months (4%). Graft hyperintensity was noted in 43% and was associated with higher chance of subsequent graft rupture ( $p<0.001$ , odd ratio=9). SNQ was higher in the graft-rupture group ( $7.4 \pm 6$  vs  $4.3 \pm 4$ ;  $p=0.004$ ). Age ( $p<0.001$ ) and longer follow-up ( $p=0.003$ ) were also associated with graft rupture. Multiple regression showed that higher SNQ and younger age were independent predictors of future graft rupture (SNQ,  $p=0.011$ ; age,  $p<0.001$ ).

**Conclusion:** In a prospective cohort of 536 ACLR with mean follow-up of 5.5 years, higher SNQ in reassessment MRI predicts graft rupture in subsequent follow-up.

**FP1.7****Does non-dominant side injury affect neuromuscular performance at the time for return-to-play after anterior cruciate ligament reconstruction?**

**Matthew Chun Sing Chow, Xin He, Jihong Qiu, Ben Chi Yin Choi, Michael Tim-Yun Ong, Patrick Shu-Hang Yung**  
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**Introduction:** It has been reported that patients who underwent anterior cruciate ligament reconstruction (ACLR) on their non-dominant side had a higher future rate of revision and contralateral ACL rupture than those on the dominant side. However, the underlying mechanism is not fully understood. This study aimed to investigate the effect of leg dominance on neuromuscular performance after ACLR.

**Methods:** A total of 37 male patients with unilateral ACLR (age:  $27.5 \pm 4.5$  years, time from ACLR:  $9.2 \pm 2.7$  months) participated in this study. The patients were allocated into two groups: non-dominant side injury ( $n=21$ ) and dominant side injury ( $n=16$ ). Isokinetic muscle strength was measured by knee flexion/extension peak torque at  $60^\circ/\text{s}$  and  $180^\circ/\text{s}$ . Hop performance was evaluated by limb symmetry index (LSI) of the single-leg-hop distance. The knee biomechanics during single-leg-hop landing was captured by the three-dimensional motion analysis system (VICON). The neuromuscular criteria for return-to-play are defined as  $\geq 85\%$  symmetry in quadriceps peak torque at  $60^\circ/\text{s}$  and  $\geq 85\%$  LSI in single-leg-hop test.

**Results:** There was no difference between groups in age, body mass index, activity level, time from ACLR, and meniscus injury ( $p>0.05$ ). Group comparison revealed no difference in isokinetic quadriceps and hamstring strength deficits, LSI of the single-leg-hop distance and knee biomechanics during landing ( $p>0.05$ ). Regarding the number of patients who passed the return-to-play neuromuscular criteria, they similarly showed no significant difference ( $p=0.191$ ).

**Discussion and Conclusion:** It seems that non-dominant side injury does not affect neuromuscular performance at the time of return-to-play after ACLR. The reason why non-dominant side ACL injuries have higher secondary ACL injury rate warrants further investigation.

**FP1.8****Effects of whole-body vibration on quadriceps neuromuscular function and knee function before anterior cruciate ligament reconstruction: a randomised controlled trial**

**Jihong Qiu,<sup>1</sup> Michael Tim-Yun Ong,<sup>1</sup> Xin He,<sup>1</sup> Chi-Yin Choi,<sup>1</sup> Sai-Chuen Fu,<sup>1</sup> Daniel TP Fong,<sup>2</sup> Patrick Shu-Hang Yung<sup>1</sup>**

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**FP1.9**

**Anterior cruciate ligament injury prevention training in athletes: a systematic review of current evidence on secondary injury prevention**

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**Introduction:** After reconstruction, the return to full competition rate of athletes was low, while the re-injury rate remains high despite the completion of a rehabilitation programme. Primary anterior cruciate ligament (ACL) injury prevention programmes are well developed, yet few research papers focus on secondary ACL injury prevention. This study is to determine if current secondary ACL injury prevention training has a positive influence on the re-injury rate, the clinical or functional outcomes, or the risk of re-injury in athletes.

**Methods:** Studies investigating secondary prevention of ACL injury were searched in PubMed and EBSCOhost, followed by a review of the references in the identified articles. Inclusion criteria included randomised trials, English-language studies, contain secondary prevention training for athletes who had undergone a unilateral ACL reconstruction (ACLR) and have completed rehabilitation, and the effects of training reported.

**Results:** All studies investigated the effectiveness of secondary prevention in modifying the risk factors of re-injury rather than the re-injury rates. The effectiveness of secondary prevention in modifying the risk factors of ACL re-injury in athletes is controversial (4 in favour, 5 against). The existing evidence is prone to suggest neuromuscular training, eccentric strengthening, and plyometric exercises may have a positive impact on the biomechanical, functional, and psychological outcomes in athletes, while secondary prevention programmes may be ineffective in influencing gait asymmetries.

**Discussion and Conclusion:** Literature available regarding secondary prevention of ACL injury in athletes is scarce and not conclusive. Future research is needed to investigate the effectiveness of secondary ACL injury prevention in reducing the re-injury rates.

**FP1.10****Bilateral quadriceps neuromuscular function impairment at the early stage of anterior cruciate ligament injury**

**Arthur On Fai Woo,<sup>1</sup> Jihong Qiu,<sup>2</sup> Tianzhi Jiang,<sup>2</sup> Chi-Yin Choi,<sup>2</sup> Xin He,<sup>2</sup> Lawrence Chun Man Lau,<sup>2</sup> Michael Tim-Yun Ong,<sup>2</sup> Patrick Shu-Hang Yung<sup>2</sup>**

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**Introduction:** Anterior cruciate ligament (ACL) injury is common in athletes. We understood the strong correlation between preoperative quadriceps neuromuscular (QNM) function with post-ACL reconstruction quadriceps recovery and knee function. However, preoperative QNM training has not been well established as the level of impairment is unavailable. This study is to investigate the early impairments in quadriceps strength, ability of rapid contraction, and voluntary activation (VA) after early ACL injury.

**Methods:** A cross-sectional study was conducted. We recruited thirty physically active patients (female: 12; male: 18; age: 18-40 years; BMI <30) with early (<3 months) unilateral primary ACL injury, scheduled for reconstruction; and thirty matched healthy controls. All QNM function parameters were measured with knee at 45° flexion. The quadriceps strength was measured by maximal voluntary isometric contractions. The ability of rapid contraction was quantified by the early and late rate of torque development (RTD0-50 and RTD100-200), calculated as the average slope of the torque-time curve of the MVIC from 0 to 50 ms and 100-200 ms. The VA was quantified by the central activation ratio (CAR) measured by the superimposed burst technique.

**Results:** Compared with the control group, the ACLR group showed significant lower quadriceps strength ( $p<0.001$ ), RTD0-50 ( $p<0.001$ ) and RTD100-200 ( $p<0.001$ ) on the injured limb; and lower quadriceps strength ( $p=0.009$ ), RTD0-50 ( $p=0.006$ ) and CAR ( $p=0.010$ ) on the uninjured limb.

**Conclusion:** Bilateral quadriceps neuromuscular impairment is observed after ACL injury. Preoperative rehabilitation protocol of both limbs should be established, aiming a speedy return to sports for our athletes.

**FP1.11****Effect of serum 25-hydroxyvitamin D level on quadriceps strength, function and muscle size: a systematic review and meta-analysis of observational studies**

**Chun Kit Tsang, Michael Tim-Yun Ong, Patrick Shu-Hang Yung**

*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** The benefit of vitamin D on muscle health has not yet been well-recognised, while the quadriceps muscle plays a crucial role in injury prevention and recovery from possible lower limb incapacities. Serum 25-hydroxyvitamin D (25OHD) level can potentially be positive-correlated with quadriceps strength, function, and muscle size. The aim of the review was to investigate the current evidence on the correlation between vitamin D status and comprehensive quadriceps muscle health.

**Methods:** Five online bibliography databases were searched. Data were independently selected and assessed by pairs of reviewers using standard forms. This review concluded three primary and four subgroup findings through a meta-analysis of correlation and reported in the Summary of Findings Table.

**Results:** A total of 24 cross-sectional and 4 longitudinal studies (5752 participants) gave 57 reports (Isokinetic [ $n=25$ ]; Isometric [ $n=22$ ]; Maximal Voluntary Contraction [ $n=4$ ]; Muscle Size [ $n=6$ ]) and the risk of bias is low to moderate. 23 reports proceeded to meta-analysis. A significant weak-positive correlation between serum 25OHD and three different groups of isokinetic measurements ( $r=0.224-0.245$ ,  $p<0.01$ ), while a moderate-positive ( $r=0.345$ ,  $P=0.001$ ) on the isometric measurements among elderly. Other findings showed no significance.

**Discussion and Conclusion:** The review suggested weak to moderate-positive effects of serum 25OHD level on quadriceps strength and physical functions, but no significant discovery on neuromuscular functions and muscle size. These data may support the role of maintaining vitamin D sufficiency on overall quadriceps muscle health.

## FP1.12

### The association between vitamin D status and quadriceps muscle strength in anterior cruciate ligament injury

**Tina Shuk Tin Ip,<sup>1</sup> Michael Tim-Yun Ong,<sup>2</sup> Jihong Qiu,<sup>2</sup> Chi-Yin Choi,<sup>2</sup> Xin He,<sup>2</sup> Lawrence Chun-Man Lau,<sup>3</sup> Patrick Shu-Hang Yung<sup>2</sup>**

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**Introduction:** Vitamin D deficiency is highly prevalent in athletes (56%). Low vitamin D level negatively affects muscle strength, power, and endurance. Previously, we demonstrated low vitamin D level is associated with poor quadriceps muscle strength which can persist beyond postoperative rehabilitation. This study aims to determine (1) the association of serum vitamin D level and quadriceps muscle strength post-ACL injury; and (2) association of serum vitamin D level and quadriceps muscle recovery at 4 months post-anterior cruciate ligament reconstruction (ACLR).

**Methods:** Patients with ACL tear were recruited. Peak isokinetic knee extension, serum vitamin D level and quadriceps muscle thickness were measured preoperatively and at 4 months post-ACLR. Limb Symmetric Index (LSI) of peak torque of isokinetic knee extension <70% was considered quadriceps muscle weakness post-ACLR.

**Results:** Twenty-nine patients with ACL tear were recruited (mean age  $\pm$  SD=27.4  $\pm$  6.4) preoperatively. Twenty-three (90%) were found to have vitamin D deficiency (mean  $\pm$  SD=12.6  $\pm$  4.3). Four failed to perform isokinetic test preoperatively, of which, three had vitamin D deficiency. Non-deficient group showed a significantly higher IKDC score than deficient group ( $p=0.033$ ). At 4 months post-ACLR, nine subjects with vitamin D deficiency preoperatively were recruited. Seven remained deficient, two improved to non-deficient status. Serum vitamin D level showed a significant positive correlation with peak torque of knee extension ( $r=0.7$ ).

**Discussion and Conclusion:** High prevalence of vitamin D deficiency in patients with ACL tear. Vitamin D deficiency was associated with poorer knee function (IKDC) preoperatively and poorer quadriceps muscle strength (isokinetic) at 4 months post-ACLR.

**FP1.13****The circulating vitamin D level is associated with quadriceps neuromuscular function in patients with anterior cruciate ligament injury****Michael Tim-Yun Ong,<sup>1</sup> Jihong Qiu,<sup>1</sup> Chi-Yin Choi,<sup>1</sup> Xin He,<sup>1</sup> Lawrence Chun Man Lau,<sup>2</sup> Patrick Shu-Hang Yung<sup>1</sup>**<sup>1</sup>*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*<sup>2</sup>*Department of Orthopaedics and Traumatology, Prince of Wales Hospital*

**Introduction:** Anterior cruciate ligament (ACL) injury can cause complicated neuromuscular alterations in quadriceps. Previous evidence supports Vitamin D (VitD) level affects muscle anabolism, neuromuscular junction innervation. This study aimed to investigate the associations of VitD levels with quadriceps neuromuscular functions including maximal strength, the ability of rapid contraction, and voluntary activation in patients with ACL injury.

**Methods:** A total of 15 patients with unilateral primary ACL injury were recruited, with age from 18 to 40, and Tegner score 6 or more, body mass index under 30. All quadriceps neuromuscular functions were measured on an isokinetic dynamometer. Quadriceps strength was measured by the maximal voluntary isometric contractions (MVIC); the ability of rapid contraction was quantified by the rate of torque development (RTD), which was divided into the early (RTD0-50) and the late phase (RTD100-200). Voluntary activation of quadriceps was quantified by the central activation ratio (CAR), measured by the superimposed burst technique.

**Results:** Partial correlation analyses showed that VitD level correlated with MVIC bilaterally ( $r=0.673-0.748$ ,  $p<0.05$ ). The results of Spearman rank analyses showed that the VitD level correlated with RTD0-50 on both limbs ( $r=0.571-0.588$ ,  $p<0.05$ ); a moderate correlation with RTD100-200 on the uninjured limb ( $r=0.656$ ,  $p=0.006$ ), and a moderate correlation with CAR on the uninjured limb ( $r=0.672$ ,  $p=0.004$ ). However, no significant correlation was found between the VitD level with RTD100-200 for CAR on the injured limb.

**Discussion and Conclusion:** VitD level significantly associated with neuromuscular functions, including maximal strength, the ability of rapid contraction, and voluntary activation. Thus, the findings suggest providing VitD supplements may help ACL injury patients restore quadriceps neuromuscular functions.

**FP1.14****Anthropometric analysis of Asian anterior cruciate ligament reconstruction hamstring graft size and rerupture****Nicole Chun-Hei Leung, Lawrence Chun-Man Lau, Jack Wai-Wang Chau, Cyrus Hung, Thomas Wai-Him Yuen, Michael Tim-Yun Ong, Patrick Shu-Hang Yung***Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** The current study aimed to investigate and assess the relationship of patient weight, height, and body mass index with the size of quadrupled hamstring tendon assessed using femoral and tibial tunnel size used in anterior cruciate ligament reconstruction (ACLR). The association of ACLR failure with body height, weight, and sex was investigated alongside the association of ACLR failure with diameter of hamstring autografts.

**Methods:** Retrospectively assessed weight, height, body mass index (BMI) and graft sizes of 714 patients who underwent ACLR using a quadrupled hamstring tendon autograft between January 2010 and December 2014 at our institution.

**Results:** Tibial and femoral tunnel sizes ranged from 6 mm to 11 mm with a median of 7.5 mm. Body height, weight, and BMI correlated with femoral and tibial tunnel size ( $p<0.01$ ). Statistically significant relationships between height, weight and occurrence of revision surgery were found in select groups of patients with specific body height e.g. 165-169 cm but overall no simple statistically significant relationship found between femoral and tibial tunnel size and occurrence of revision surgery.

**Discussion and Conclusion:** Anthropometric measurements such as height, weight, and BMI were related to graft size in ACLR surgery in specific body height only. In comparison to existing studies, smaller graft sizes represented by femoral and tibial tunnel size were not found to have significantly higher failure rates.

**FP1.15**

**A novel artificial intelligence high resolution computer tomography for bone mineral density for patellofemoral joint subchondral bone change after anterior cruciate ligament reconstruction**

**Cham Kit Wong,<sup>1</sup> Jeremy Ho Pak Liu,<sup>2</sup> Gene Chi-wai Man,<sup>2</sup> Xie Ke,<sup>3</sup> Lawrence Chun-man Lau,<sup>1</sup> Michael Tim-yun Ong,<sup>2</sup> Patrick Shu-hang Yung<sup>2</sup>**

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**FP1.16**

**A novel quantitative assessment of bone tendon junction healing in patients after ACL reconstruction by high resolution peripheral computer tomography: the development of a deep-learning system**

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**Introduction:** Graft healing after anterior cruciate ligament (ACL) reconstruction (ACLR) is a major challenge determining the surgical outcome. Bone shell size reflects bone-tendon junction healing progress, which may contribute to functional recovery after ACLR. This study aimed to devise a novel quantitative assessment of peri-tunnel bone shell size and determined its correlation to functional recovery after ACLR.

**Methods:** A total of 24 patients received ACLR were imaged by high-resolution-CT. Knee functions were evaluated by International Knee Documentation Committee (IKDC) score. Quadriceps muscle atrophy and quadriceps elastic properties were evaluated by ultrasound imaging and shear wave elastography. U-Net was further employed for the development of an image-based machine-learning algorithm on detecting the tunnel size, using 625 CT images (500 for training and 125 for validation).

**Results:** Both tunnel size and bone shell formation altered along the depth of tunnel. Bone shell formation was associated with time post operation, and variations in femoral tunnel angle ( $r=0.567$ ,  $p=0.018$ ). Regression analysis showed that bone shell formation in femoral tunnel (standardised  $\beta= 0.440$ ,  $p=0.022$ ) and quadricep atrophy (standardised  $\beta=-0.400$ ,  $p=0.036$ ) were significantly associated with IKDC scores (adjusted  $R^2=0.376$ ). For the machine learning algorithm, the mean pixel accuracy and mean intersection of union values of the algorithm were 0.95 and 0.77, with the precision and recall 81.3% and 95%, respectively.

**Discussion and Conclusion:** The measurement of bone shell formation by high-resolution-CT is suitable to assess the graft healing after ACLR. Based on our novel method, further machine learning model will provide an accurate imaging assessment and monitoring tool for ACL injury patients.

## Free Paper Session II: Hand and Microsurgery, Others

### FP2.1

#### Comparison between Wide Awake Local Anaesthesia No Tourniquet Surgery (WALANT) and traditional local anaesthesia surgery for limb operations

**Sing Yuen Ng, Emily Ka Yan Yip**

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**Background:** In traditional local anaesthesia surgeries, tourniquets are used to reduce blood loss. However, it may induce tourniquet pain. If long tourniquet time is anticipated, regional or general anaesthesia may be required. Wide awake local anaesthesia no tourniquet (WALANT) surgery suggests blood loss can be controlled by the use of adrenaline instead of a tourniquet. This study aimed to investigate the difference in patient's pain perception, satisfaction, and haemostasis control between two groups of patients, the WALANT group, who underwent WALANT surgery, and the traditional group, who underwent local anaesthesia with tourniquet surgery.

**Methods:** This was a prospective cohort study of patients who underwent common orthopaedic local anaesthesia surgeries in a regional hospital in 2020. Patients were allocated into two groups by the surgeon in-charge. Data were collected via questionnaires which included patients' demographics, operation type, surgeon experience, dosage and type of local anaesthesia use, tourniquet use, operation time, haemostasis status, difficulty of operation, pain perception (pain during LA injection, wound site pain during operation, tourniquet pain, postoperative pain), and satisfaction.

**Results:** A total of 143 questionnaires were collected. WALANT group had less wound site pain during operation ( $p=0.008$ ), less tourniquet pain ( $p<0.001$ ) and less postoperative pain ( $p<0.001$ ). WALANT group had longer operation time ( $p=0.002$ ). Both traditional group and WALANT group had good haemostasis with median scores of 1 and 2, respectively, although the difference in haemostasis control value was significant ( $p<0.001$ ).

**Conclusion:** WALANT surgery was safe, and could achieve similar haemostasis with no limitation of tourniquet time, and could significantly reduce postoperative pain compared with traditional local anaesthesia with tourniquet use.

## FP2.2

### Carpal tunnel release in super-elderly: safety profile and clinical outcome

**Chloe Wing Shuen Lam, Marvin Man Ting Chung, Eunice Yik Yee Chow, Wing Yuk Ip**

*Department of Orthopaedics and Traumatology, The University of Hong Kong*

**Introduction:** The clinical outcome of carpal tunnel release (CTR) for carpal tunnel syndrome in the super-elderly older than 80 years old remained controversial in the literature. This study aimed at reviewing the functional outcome and patient satisfaction of CTR in the super-elderly in a tertiary hospital as compared to that in a younger control group within a five-year period.

**Methods:** A total of 40 hands in 37 patients that received CTR from 2016 to 2020 were recruited in this study, with 18 hands in super-elderly group (age over 80) and 22 hands in control group (aged 50-54). Demographic data and short-term outcomes were retrieved from patient records. Subjective long-term outcomes were obtained via telephone follow-up (mean follow-up duration 49.3 months), with Boston Carpal Tunnel Questionnaire (BCTQ) used as assessment tool.

**Results:** All cases were performed under local anaesthesia and there were no major complications including nerve injury and wound infection. At 2-month follow-up, mean power grip strength was 74% of contralateral hand in both groups, while mean pinch grip strength was 63% (super-elderly group) and 73% (control group) of contralateral hand respectively. Mean subjective symptom improvement percentage is lower in super-elderly group (53% vs 68%), as well as the mean satisfaction rate (67% vs 84%). There were however no significant differences in the mean symptom-severity score (1.32 vs 1.25) and mean functional-status score (1.92 vs 1.14) of BCTQ.

**Conclusion:** CTR in super-elderly is safe with good clinical outcome comparable to the younger patient group, although the subjective satisfaction rate is generally lower.

## FP2.3

### Optimal timing of surgical fixation for distal radius fracture: the earlier the better?

**Kit Leung, Ka Chi Lau, Lo Ramon Yiu**

*Department of Orthopaedics and Traumatology, Tseung Kwan O Hospital*

**Introduction:** We aimed to investigate the impact of timing of surgery on patients' functional outcomes for intra-articular distal radius fracture.

**Methods:** Retrospective cohort study was conducted on patients with intra-articular distal radius fracture treated with internal fixation between 1 March 2019 and 31 March 2021. 113 patients (aged 19-82) were identified and divided into three groups: Early (operation  $\leq$ 3 days from injury, n=32), Intermediate (operation 4-6 days from injury, n=42) and Delayed (operation  $\geq$ 7 days from injury, n=39). Clinical outcomes including range of motion (ROM), grip strength (GS) and numeric rated pain scale (NRPS) were assessed at 1 month, 3-6 months and 9-12 months postoperatively. Disability of the Arm, Shoulder and Hand score (DASH) was assessed at 12-18 months postoperatively.

**Results:** At 1 month, ROM in early group and intermediate group were comparable and were both statistically better than delayed group with mean combined flexion-extension range 94, 85 and 56 degree, respectively ( $p<0.01$ ) and mean combined forearm rotational range 137, 132 and 109 degree, respectively ( $p<0.01$ ). At 3-6 month and 9-12 month, ROM, GS and NRPS showed no significant differences among three groups. At 12-18 month, DASH were comparable in early group and intermediate group and were both statistically superior to delayed group with mean scores 8.2, 10.9 and 17.6, respectively ( $p<0.01$ ).

**Discussion and Conclusion:** For patients with intra-articular distal radius fracture, operation with volar plating within 7 days from injury resulted in superior functional outcomes. Operation within 3 days from injury showed no added benefit.

## FP2.4

### Long-term outcome of Camitz opponensplasty for severe carpal tunnel syndrome

**Ho Lam Leung, Marvin Man Ting Chung, Wing Yuk Ip**

*Department of Orthopaedics and Traumatology, The University of Hong Kong*

**Introduction:** Camitz opponensplasty has been described as a useful adjunct to carpal tunnel release for patients with severe carpal tunnel syndrome to improve thumb opposition, with good short-term results demonstrated in the literature. There are however few reports of long-term functional outcome assessment. Our study aimed at assessing the long-term outcome of Camitz opponensplasty in a single centre of teaching hospital.

**Methods:** Retrospective review of patients who received Camitz opponensplasty for severe carpal tunnel syndrome from 2007 to 2019 was performed. 28 patients were included into the study for telephone follow-up and 16 patients agreed for further objective assessment. Subjective outcome was measured with QuickDASH score. Objective assessment included Kapandji score, power grip, tripod and pinch grip strength, sensory modality assessment with monofilament and two-point discrimination test.

**Results:** Mean follow-up duration was 8.9 years. No major complications were found. Majority of patients reported subjective improvement after Camitz opponensplasty with low QuickDASH score at time of assessment. A high mean Kapandji score was achieved in most patients with significant overall improvement in grip strength and sensory assessment.

**Conclusion:** Camitz opponensplasty improves hand function and provides good long-term clinical outcome in patients with severe carpal tunnel syndrome.

## FP2.5

### Functional outcomes of local flap reconstruction in fingertip injury: a single-centre study

**Eunice Yik Yee Chow, Marvin Man Ting Chung, Chloe Wing Shuen Lam, Wing Yuk Ip**

*Department of Orthopaedics and Traumatology, The University of Hong Kong*

**Introduction:** Various methods of local flap reconstruction for fingertip injury have been reported with no current consensus on the ideal option of management. Our study aimed at evaluating the functional outcomes of different flap reconstruction for fingertip injury in a single centre.

**Methods:** From 2015 to 2021, 43 digits with local flap reconstruction performed in 41 patients in total were recruited into the study. Retrospective review of demographic data, injury details and short-term functional outcome was conducted using patient records. Long-term functional outcome was assessed by telephone interview in 31 patients with QuickDASH score. Objective sensory and motor assessments were performed in 14 digits.

**Results:** Types of flaps included 25 volar advancement flaps, 7 bilateral V-Y flaps, 4 volar V-Y flaps 2 heterodigital island flaps, 2 homodigital island flaps, 1 cross finger flap, 1 lateral V-Y flap and 1 first dorsal metacarpal artery flap. Common complications included hook nail deformity (14.0%), wound infection (11.6%) and wound gaping (7.0%). There were no flap necrosis or failure. Mean percentage power grip and pincer grip were 73.1% and 63.2%, respectively upon discharge from therapy. For long-term functional outcome (at mean follow-up of 58.8 months), mean QuickDASH score was 7.48. Mean monofilament measurement at pulp centre is 4.37 and 28.6% of patients had 2-point discrimination within 5 mm. Mean percentage power grip and pincer grip were 106.9% and 88.0%, respectively.

**Conclusion:** Local flap reconstruction in fingertip injury provides good functional outcome with high patient satisfaction.

## FP2.6

### Clinical review on the application of total elbow replacement in complex elbow fractures

**Tsz Ching Chau, Chu Kay Mak, Wing Lim Tse, Chi Yin Tso, Ning Tang, Pak Cheong Ho,**

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**Introduction:** Complex elbow fractures have been posing difficulty to surgical fixation with suboptimal clinical outcomes and often required subsequent operation. Primary total elbow replacement has been proposed to be an alternative for complex fracture non-amendable for fixation, or elbows with pre-existing arthritis. However, its application in local clinical practice has been limited.

**Methods:** Data from patients who received total elbow replacement for trauma related conditions in Prince of Wales Hospital between 2012 to 2022 were retrospectively retrieved. Patient's demographics and past medical history were documented. Serial X-rays were retrieved for evaluation. Postoperative clinical function, range of movement and longevity of the implant were recorded.

**Results:** Data from six patients were retrieved. Four patients received primary total elbow replacement in acute setting and two received subsequent arthroplasty for fracture non-union. Three patients had rheumatoid arthritis, one patient had osteoarthritis of the elbow, and the remaining two patients had AO type C distal humerus fracture. Mean follow-up time was 2 years. No arthroplasties required revision. Mean range of movement was 113 degrees flexion and 19.1 degrees extension. We experienced one case of intraoperative shaft fracture requiring fixation, as well as one case of transient ulnar nerve palsy.

**Discussion and Conclusion:** Total elbow arthroplasty is a viable option for complex elbow fractures, or fracture elbows with pre-arthritis condition. Satisfactory short-term outcomes are demonstrated. Future studies may further conclude on the long-term survivorship of the implant.

## FP2.7

### Treatment of proximal interphalangeal joint fracture-dislocation using dynamic external fixator: a retrospective review

**Sik Lok To, Esther Ching San Chow**

*Department of Orthopaedics and Traumatology, United Christian Hospital*

**Introduction:** Fracture-dislocation of proximal interphalangeal joint (PIPJ) remains challenging with many patients reporting residual stiffness, pain, and deformities. This study aimed to review the clinical outcomes of PIPJ fracture-dislocation cases treated with dynamic external fixators.

**Methods:** Cases with PIPJ fracture-dislocations treated with dynamic external fixators from July 2014 to July 2022 were included. The demographic data were retrieved. The clinical, radiological and functional outcomes were assessed.

**Results:** There was a total of 9 patients with 12 fingers included (5 little fingers, 4 ring fingers, and 3 middle fingers). The average age at injury was 44.2 (range, 28-67). The average period between injury and surgery was 5.1 days (range, 2-16). The type of external fixators used includes Suzuki in 7 fingers, Arex®Ligamentotaxor in 2 fingers, and syringe-spring in 3 fingers. The external fixators were kept on average 31 days (range, 21-43). The average FU time was 27 months.

The average total active range-of-motion (AROM) of the involved finger was 217.2 degrees (165-270). The average AROM of the involved PIPJ was 80 degrees (range, 50-100). The average grip strength was 19.8 kgf (75% of contralateral hand). The brief Michigan Hand Outcome questionnaire score was averaged 80.7/100. Complications include deformation of external fixator, pin tract infection and non-union.

**Discussion and Conclusion:** Dynamic external fixators represent a reasonable option in treating PIPJ fracture-dislocation. However, there are still room for optimisation in terms of improving functional outcomes and reducing complications. Further studies aiming at modifying external fixators may be warranted.

**FP2.8****Ultrasonographic measurements for the diagnosis of cubital tunnel syndrome: a study in the Hong Kong Chinese population****Pui Man Chung,<sup>1</sup> Esther Ching-san Chow<sup>2</sup>**<sup>1</sup>*Department of Radiology, Princess Margaret Hospital*<sup>2</sup>*Department of Orthopaedics and Traumatology, United Christian Hospital*

**Introduction:** Ulnar nerve enlargement is observed by ultrasonography in patients with cubital tunnel syndrome (CuTS). This study aimed to compare the ultrasonography size of the ulnar nerve between CuTS patients and control subjects, to find the cut off size for diagnosis, and to validate the use of ultrasonography as an adjunct in CuTS diagnosis.

**Methods:** There were 23 elbows with clinical and nerve conduction test (NCT) confirmed CuTS, and 42 elbows in the control group. Cases with elbow deformities, old ulnar nerve injuries and postoperative cases were excluded. The ulnar nerve cross sectional area (CSA) was measured at six different levels and positions: over the medial epicondyle (ME) in elbow flexion/extension, 2 cm and 5 cm distal to the ME, 2 cm and 5 cm proximal to the ME. A cut off CSA value for CuTS diagnosis was derived. Correlation between ulnar nerve CSAs and NCT was analysed.

**Results:** The age and gender distribution was similar in both groups (61.2 vs 56.6; M>F, p>0.05). The mean CSA of the CuTS group vs control group was 0.192 cm<sup>2</sup> vs 0.070 cm<sup>2</sup>, 0.195 cm<sup>2</sup> vs 0.071 cm<sup>2</sup>, 0.208 cm<sup>2</sup> vs 0.081 cm<sup>2</sup> at ME flexion, ME extension and maximal CSA, respectively. The derived CSA cut-off value for CuTS at ME flexion, ME extension and maximal CSA were 0.105 cm<sup>2</sup>, 0.115 cm<sup>2</sup>, and 0.15 cm<sup>2</sup>, respectively. The CSA difference at different levels between the two groups were significant except at 5 cm proximal to ME. A strong negative correlation was seen between the CSA and the across elbow nerve conduction velocity, with correlation coefficient -0.748 at ME flexion, -0.654 at ME extension, and -0.676 at maximal CSA.

**Conclusion:** Ultrasonography can be used as an adjunct for the diagnosis of CuTS with high accuracy and patient safety.

**FP2.9****Factors affecting outcomes after arthroscopic repair of dorsal tears of triangular fibrocartilage complex (TFCC)**

**Arthur On Fai Woo,<sup>1</sup> Wai Wang Chau,<sup>2</sup> Michael Chu-Kay Mak,<sup>1</sup> Wing-Lim Tse,<sup>1</sup> Pak-Cheong Ho,<sup>1</sup> Jeffery Justin Siu-Cheong Koo<sup>1</sup>**

<sup>1</sup>*Department of Orthopaedics and Traumatology, Prince of Wales Hospital*<sup>2</sup>*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** To investigate the clinical and functional outcomes of patients with dorsal tears of the triangular fibrocartilage complex (TFCC) lesions after arthroscopic repair and the factors which could influence the outcomes.

**Methods:** A retrospective review of 32 patients with arthroscopic repair of TFCC dorsal tears (Male: 16, Female: 16, mean age: 36 years old) was carried out. We classified our patients into isolated dorsal tear group and concomitant double lesion group. We evaluated their clinical and functional outcomes, including range of motion, grip strength, wrist performance score, Visual Analog Score (VAS) and Modified Mayo Wrist Score (MMWS), and also compared the two groups with demographics, injury mechanism and ulnar variances.

**Results:** In the isolated group, the wrist performance score was improved from 29 to 37 (p=0.01), the VAS score was improved from 6 to 3 (p<0.01), the MMWS was improved from 60 to 74 (p=0.01), the hand grip strength was improved from 18 to 28 kg (p=0.05) and the distal radioulnar joint achieved 100% stability after surgery (p <0.01). In the double lesion group, the VAS score was improved from 6 to 3 (p=0.01) and the MMWS was improved from 44 to 79 (p=0.01). No statistically difference nor correlation with regards to age, sex, injured side, hand dominance, mechanism of injury and ulnar variance were found between dorsal TFCC injury.

**Discussion and Conclusion:** Arthroscopic repair of dorsal TFCC tear provides excellent postoperative results. Our patients were benefited with significant pain relief and increased capacity in performing daily activities.

## FP2.10

### Computer-assisted correctional osteotomy for distal radius fracture malunion: Early results of a customised 3-D printed spacer reduction guide

**Michelle Kar Lam Li, Michael Chu-kay Mak, Wing-Lim Tse, Pak Cheong Ho**

*Department of Orthopaedics and Traumatology, Prince of Wales Hospital*

**Introduction:** Malunion following distal radius fracture alters the alignment and biomechanics of the radio-carpal and distal radio-ulnar joint, resulting in pain, reduced range of motion and grip strength, often due to ulnar impaction. Corrective osteotomy for malunion aims to restore normal anatomy for symptom relief. Conventional surgical planning based on biplanar radiographs is inadequate in analysing multiplanar deformities, while on-table assessment is time consuming and often inaccurate due to positional factors. The advent of three-dimensional (3D) computer-assisted surgical planning based on computed tomography (CT) scans improves precision, allowing 3D printing of customised, patient-specific surgical guides. We report our experience with a 3D printed spacer reduction guide, which facilitates stable deformity reduction. Complex deformity correction may then be performed in a similar fashion as simple extra-articular distal radius fracture fixation.

**Methods:** This is a single-centre retrospective review of patients with extra-articular opening wedge distal radius osteotomy for fracture malunion performed from February 2018 until December 2021, via computer assisted planning and customised 3D printed spacer reduction guides.

**Results:** Six patients underwent the procedure, with average follow-up of 26 months. Postoperative radiographical parameters were all corrected to within acceptable range. An average residual error of  $2.2^\circ \pm 2.4^\circ$  in radial inclination,  $2.0 \text{ mm} \pm 1.6 \text{ mm}$  in radial height,  $1.2^\circ \pm 1.1^\circ$  in tilt and  $2.0 \text{ mm} \pm 2.0 \text{ mm}$  in ulnar variance remained compared to the contralateral normal wrist.

**Discussion and Conclusion:** The use of patient-specific 3D printed spacer reduction guides in distal radius corrective osteotomy provides a high degree of precision.

## FP2.11

### Comparison of Kleinert versus Saint John protocol in Zone I/II flexor tendon injuries: a pilot study

**Douglas See Lok Ho, Esther Ching San Chow**

*Department of Orthopaedics and Traumatology, United Christian Hospital*

**Introduction:** Flexor tendon injuries remain one of the most difficult hand injuries to manage. Till this day, there are still controversies regarding the best rehabilitation protocol. The aim of our study was to compare the Kleinert protocol with the Saint John protocol.

**Methods:** Cases with Flexor zone I and II injuries admitted to our hospital from March 2019 to Feb 2020 (Group 1: Kleinert protocol) and from Nov 2021 to May 2022 (Group 2: Saint John protocol) were recruited in this study. Exclusion criteria include: defaulted follow-up, psychiatric illness, and failure to follow protocol. Outcome measurements include range of motion, grip strength, pain score, and Strickland score at 6 weeks and 12 weeks. Complications were reviewed.

**Results:** There were 7 patients and 9 fingers in group 1 and 7 patients and 9 fingers in group 2. The average age was 42.1 (group 1) and 39.4 (group 2),  $p=0.731$ . The gender distribution and zone of involvement have no difference between the two groups ( $p=0.637$ ,  $p=0.317$ ). The total active motion (TAM) at 6 weeks showed a better result in group 2 (201.6) than group 1 (184.4) with  $p=0.048$ . However, the TAM at 12 weeks had no statistically significant difference in the two groups (213 vs 226,  $p=0.399$ ). The Strickland score showed no statistical difference between the two groups at 6 and 12 weeks.

**Discussion and Conclusion:** We propose that when compared with Kleinert protocol, the Saint John protocol achieves a better range of movement at an early postoperative period.

**FP2.12****Homemade dynamic external fixator for unstable proximal interphalangeal joint fracture dislocations****Kin Ling Kwok,<sup>1</sup> Michael Chu Kay Mak,<sup>2</sup> Esther Ching San Chow,<sup>1</sup> Kam Leung Yeung,<sup>1</sup> Chi Hang Cheung<sup>1</sup>**<sup>1</sup>*Department of Orthopaedics and Traumatology, United Christian Hospital*<sup>2</sup>*Department of Orthopaedics and Traumatology, Prince of Wales Hospital*

Proximal interphalangeal joint (PIPJ) fracture dislocations are prone to persistent pain, stiffness and arthritis. The treatment goal is to achieve fracture reduction with good alignment and to promote early mobilisation. Dynamic external fixator is commonly used for this type of injury. This study aimed to compare the results of a homemade dynamic external fixator and the classical Suzuki frame, including initial reduction, and alignment maintenance after mobilisation. A homemade dynamic external fixator using syringe-and-spring (SS) was compared with Suzuki frame in eight cadaveric fingers. An unstable PIPJ fracture dislocation was created in each of the fingers, which later was fixed with either the SS construct or Suzuki frame. The post-fixation fingers underwent fourteen-hundred cycles of flexion-extension motion. Post-fracture, post-fixation and post-motion X-rays were taken for assessment. The time taken for applying SS construct was significantly shorter than applying Suzuki frame. Both the SS group and Suzuki group achieved satisfactory initial fracture reduction. There was no statistical significance in the reduction power. Fractures remained reduced after 1400 cycles of flexion-extension in both groups. No frame deformity was noted in the SS group, however, windswept effect and rotational deformity were noted after mobilisation in Suzuki group. The SS construct achieved satisfactory fracture reduction and was able to maintain the reduction after mobilisation. It is more time-efficient and more resistant to deformity. The spring component allows fine adjustment of tension.

**FP2.13****A pilot study of the outcomes of endoscopy-assisted cubital tunnel release—prospective study of 64 patients****Gabriel Ching Ngai Leung, Chi Fat Chan, Margaret Woon Man Fok***Department of Orthopaedics and Traumatology, Queen Mary Hospital*

**Introduction:** Cubital tunnel syndrome is a common and prevalent cause of ulnar nerve compressive neuropathy. Conventionally, cubital tunnel release is performed by open decompression and concomitant anterior transposition with potentially significant wound comorbidities. Introduction of endoscopic guidance for cubital tunnel release reduces wound-related complications. This study thus reviewed the outcome of endoscopy-assisted cubital tunnel release in a tertiary referral centre from year 2017 to 2021.

**Methods:** Subjects were sequentially recruited. Preoperative neurophysiological study was performed to ascertain diagnosis of cubital tunnel syndrome. All patients have had at least 6 months postoperative follow-up. Subjective assessment included numerical rating scale and quick disabilities of the arm, shoulder, and hand outcome measure. Objective assessment included clinical signs, motor modality assessment with manual muscle testing, power grip strength, lateral pinch strength, and sensory modality assessment with monofilament test.

**Results:** A total of 64 subjects were recruited (79.6% male). Mean age of the subject population was 65.4 years. Majority of subjects (45%) was found to have severe cubital tunnel syndrome. 56 subjects had endoscopic decompression in situ while 8 subjects underwent endoscopic decompression with anterior transposition. At 6 months follow-up, majority of subjects reported improvement in symptoms with objective assessment showing improvement in grip strength, muscle power and sensation. Three subjects were noted to have postoperative haematoma which resolved by conservative means. No wound complication, medial antebrachial cutaneous neuropraxia or recurrence was noted.

**Discussion:** Our results support that endoscopic assisted cubital tunnel release is a viable option in the management of cubital tunnel syndrome.

**FP2.14**

**A novel three-dimensional, estimation-free method for single-cut rotational osteotomy planning for long bone deformities**

**Michael Chu-kay Mak,<sup>1</sup> Roseanne XY Huang<sup>2</sup>**

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**FP2.15**

**Holistic pathology-based treatment protocol significantly improves clinical results in complex elbow fracture-dislocation**

**William Kwun-ping Fung,<sup>1</sup> Jeffrey Justin Siu-cheong Koo,<sup>1</sup> Charles Cheuk-sang Lam,<sup>2</sup> Adrian Kam-yiu Leung,<sup>2</sup>**

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**Introduction:** The study aimed to evaluate the functional results in patients with elbow fracture-dislocations and compare between the three different injury patterns.

**Methods:** We performed retrospective study on 31 patients with unstable elbow fracture dislocations between 2015 and 2020.

Elbow collateral ligaments laxity was assessed with intraoperative fluoroscopy under general anaesthesia. The repair and fracture fixation were based on the assessment, range of motion (ROM), elbow and grip strength, visual analog scale (VAS) pain score, Mayo elbow performance score (MEPS), quick disabilities of the arm, shoulder, and hand (Quick DASH) score and patient rated elbow evaluation (PREE) were evaluated by an independent assessor at the final follow-up. Any documented complications were identified from the clinical records.

**Results:** In all, 18 had a PLRV, 7 had a PMRV, and 6 had a TOFD pattern. The average follow-up was 3.7 years. The mean age was 50.2 years with 67.7% men. The average waiting time for operation was 22.5 days.

Elbow ROM, grip strength, elbow flexion and extension strength can achieve more than 95% of contralateral side. VAS pain scores at rest, light duty, and heavy lifting were 0.65, 0.94 and 1.42 out of 10. At the final assessment, our patients had MEPS score of 93.6, Quick DASH score of 8.5, and a PREE score of 8.7.

**Discussion and Conclusion:** When using the standard assessment and treatment protocol we proposed, the outcome in three injury patterns does not have a statistically significant difference in ROM, grip strength, pain, and function score. In addition, the time lapse between injury and operation treatment does not affect the functional outcome.

**FP2.16****Clinical features and treatment of mycotic mycetoma: a review****Angus Chao Kun Chan, Shui Wah Man***Department of Orthopaedics and Traumatology, Queen Elizabeth Hospital*

Mycetoma is a chronic subcutaneous infection caused by filamentous bacteria or fungi. It is endemic in tropical regions along the 'mycetoma belt' but very rare in our locality. Correct diagnosis is mandatory for proper treatment as eumycetoma and actinomycetoma carry different prognoses and warrant tailor made treatment plans. Apart from medical therapy, surgical options include debridement, wide local excision, and amputation. We share our experience in managing a case of eumycetoma in a 64-year-old Chinese female with diabetes who complained of a progressive enlarging right ankle eumycetoma. Prolonged anti-fungal therapy was given followed by a delayed wide local excision. The patient had good recovery with no clinical recurrence 8 months after her operation. We recommend proper diagnosis of this pathology and stress the importance of multi-disciplinary approach when formulating a treatment plan.

**FP2.17****Comparing the quality of life in physical component among older adults by six different sarcopenia diagnostic criteria****Qian Wen Wang, Michael Tim-Yun Ong, Chi-Yin Choi, Sai-Chuen Fu, Xin He, Patrick Shu-Hang Yung***Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** Sarcopenia is defined as generalised and progressive loss of skeletal muscle strength and mass among older adults, which brings major adverse consequences with a higher risk of falls, lower quality of life (QoL), frailty, disabilities, and even death. Currently, six diagnostic criteria are commonly used, containing two Asian specifics (ASWG), two European specific (EWGSOP), and two International (IWGS, FNIH) criteria. We aimed to see which diagnostic criteria can have higher sensitivity to detect people with poor QoL in physical health who need to take further treatment.

**Methods:** A cross-sectional study involving 291 female community-dwelling volunteers (mean age=67.9 ± 5.40 years old) was used to define sarcopenia by measuring muscle mass (bioelectrical impedance analysis), handgrip strength, and gait speed performance according to six diagnostic criteria. Quality of life was evaluated using the 36-item Short-Form Health Survey (SF-36). Mann-Whitney U tests were used to compare the mean value of variables between subjects with and without sarcopenia.

**Results:** The percentage of sarcopenia was 28.2%, 28.2%, 22.7%, 3.8%, 31.6%, and 2.75% by AWGS1, AWGS2, EWGSOP1, EWGSOP2, IWGS, and FNIH, respectively. No significance was found in PR in all six criteria. Most of the physical health dimensions of SF-36 have found significant differences between sarcopenia and non-sarcopenia groups according to AWGS1, 2, EWGSOP1, and IWGS.

**Discussion and Conclusion:** In this sample, AWGS, EWGSOP 1, and IWGS have higher sensitivity to detect sarcopenia in people with poor physical components of quality of life.

## FP2.18

### 3D ultrasonographic profile of quadriceps sarcopenia in knee osteoarthritis

**Justin Lok Chun Chan,<sup>1</sup> Ka Ho Ng,<sup>1</sup> Billy So,<sup>2</sup> Yongping Zheng,<sup>1</sup> Chunyi Wen<sup>1</sup>**

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**Objectives:** To introduce image texture descriptors, energy, and entropy, as well as the volumetric measure on the ultrasonography as new biomarkers for the quantification of the compositional and geometric properties of vastus medialis (VM) and rectus femoris (RF) muscles and investigate their values on the characterisation of knee osteoarthritis (KOA).

**Methods:** A total of 43 women aged between 19 to 73 were recruited, with 14 having KOA symptoms, 12 asymptomatic elderly, and 17 healthy young subjects. Their two-dimensional (2D) and three-dimensional (3D) ultrasonography of the VM, RF, cartilage, and medial knee joint gap, together with the gait patterns and isometric quadriceps muscle strength were extracted. Later, the geometric markers including quadriceps area and volume as well as the image texture features, namely entropy and energy were calculated. Correlation analysis was performed to investigate associations between the muscle image markers, knee joint functional, symptomatic, and radiographic parameters.

**Results:** Image energy and entropy measures of VM significantly differentiate the KOA and non-OA subject groups ( $p=0.0103$  and  $p=0.0431$ ). The two image texture measures, energy ( $r=-0.354$ ,  $p=0.083$ ) and entropy ( $r=-0.409$ ,  $p<0.05$ ) of RF show correlations with the osteophyte grade. Whereas the RF volume is negatively correlated with WOMAC disability score ( $r=-0.477$ ,  $p=0.084$ ) and osteophyte grades ( $r=-0.397$ ,  $p=0.055$ ); the volume of VM muscle correlates negatively with cartilage thickness in the lateral compartment ( $r=-0.566$ ,  $p<0.01$ ).

**Conclusion:** In this work, we have identified novel markers based on 2D and 3D ultrasonography to characterise muscle composition and geometry. The muscle image markers of the quadriceps demonstrate associations with symptomatic and structural defects induced by KOA.

## FP2.19

### Superiority of multiple-joint space width over minimum-joint space width approach in the machine learning for radiographic severity and knee osteoarthritis progression

**Justin Lok Chun Chan, Andy Yiu Chau Tam, James Chung Wai Cheung**

Biomedical Engineering, The Hong Kong Polytechnic University

**Introduction:** We compared the prediction efficiency of the multiple-joint space width (JSW) and the mini-mum-JSW on knee osteoarthritis (KOA) severity and progression by using a deep learning approach.

**Methods:** A convolutional neural network (CNN) with ResU-Net architecture was developed for knee X-ray imaging segmentation and has attained a segmentation efficiency of 98.9% intersection over union (IoU) on the distal femur and proximal tibia. Later, by leveraging the image segmentation, the minimum and multiple-JSWs in the tibiofemoral joint were estimated and then validated by ra-diologist measurements in the Osteoarthritis Initiative (OAI) dataset using Pearson correlation and Bland–Altman plots.

**Results:** The agreement between the CNN-based estimation and radiologist's measurement of mini-mum-JSWs reached 0.7801 ( $p<0.0001$ ). The estimated JSWs were deployed to predict the radio-graphic severity and progression of KOA defined by Kellgren-Lawrence (KL) grades using the XGBoost model. The 64-point multiple-JSWs achieved the best performance in predicting KOA progression within 48 months, with the area-under-receiver operating characteristic curve (AUC) of 0.621, outperforming the commonly used minimum-JSW with 0.554 AUC.

**Discussion and Conclusion:** We provided a fully automated radiographic assessment tool for KOA with comparable performance to the radiologists and showed that the fine-grained measurement of multiple-JSWs yields superior prediction performance for KOA over the minimum-JSW.

**FP2.20**

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**Cloud-based deep-learning framework for whole body automatic segmentation**

**Elvis Chun-Sing Chui, Lawrence Chun-Man Lau, Louis Wing-Hoi Cheung, Michael Chu-kay Mak, Xin Ye, Michael Tim-Yun Ong, Patrick Shu-Hang Yung**

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## Free Paper Session III: Basic Science

### FP3.1

#### Establishment of a mouse model of patellar tendinopathy

**Zuru Liang, Shiyi Yao, Patrick Shu-Hang Yung, Pauline Po-Yee Lui**

*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** There is no effective treatment of patellar tendinopathy due to its unclear pathogenesis and development. There is no mouse model of patellar tendinopathy, which impedes the research in this field. This study therefore aimed to establish a mouse model of patellar tendinopathy by collagenase injection to facilitate future research on the disease pathogenesis and treatment.

**Methods:** Collagenase at three different doses or saline was injected over one patellar tendon of each mouse. At week 1, 2, 4, and 8 after injection, the patellar tendons were harvested for histological and radiological analyses. The changes of gait patterns in mice were assessed before and after injection.

**Results:** Our results revealed that all the collagenase doses tested induced histopathological changes in tendons including collagen fibre disruption, matrix degeneration, hypercellularity and cell rounding. Mid-dose (MD) and high-dose (HD) collagenase induced greater neovascularisation, fat infiltration and bone formation in the patellar tendons. microCT imaging showed ectopic bone in the patellar tendons at week-8 post-collagenase injection in all groups, which was more visible in the MD and HD groups. Gait analysis showed that mice with injured patellar tendon induced by collagenase injection exhibited altered walking gait compared to the saline-injected group.

**Discussion and Conclusion:** The mouse model of patellar tendinopathy induced by collagenase injection showed dose-dependent and temporal histopathological and functional gait changes, mimicking the characteristics of human tendinopathy.

### FP3.2

#### **Effect of bioactive decellularised tendon-derived stem cell sheet on early graft healing after anterior cruciate ligament reconstruction**

**Shi-yi Yao, Zu-ru Liang, Angel Yuk-Wa Lee, Patrick Shu-Hang Yung, Pauline Po-Yee Lui**

*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** The graft healing outcome is poor after anterior cruciate ligament reconstruction (ACLR). Our study showed that the tendon-derived stem cell (TDSC) sheet augmented graft healing after ACLR. However, the maintenance of cell viability, stability, and potential uncontrolled actions of transplanted cells create challenges for clinical translation. The decellularisation may overcome these problems since studies reported that the extracellular matrix (ECM) was bioactive and promoted tissue repair. This study examined the effect of decellularised TDSC (dTDS) sheet on early graft healing after ACLR.

**Methods:** TDSC sheets were formed and decellularised. 64 SD rats were divided into two groups: (1) control group and (2) dTDS sheet wrapping group (16/group/time point). At week 2 and week 6 after ACLR, the bone-tendon graft-bone complexes were harvested. Micro-computed tomography, histology and the ultimate failure load were evaluated.

**Results:** Over 90% of dsDNA content in the TDSC sheet was removed and the dTDS sheet expressed BMP-2 and VEGF which are important for graft healing. At week 2 and week 6 after ACLR, in the dTDS sheet group, there was significantly more mineralised tissue in bone tunnels. Sharpey's fibres and stronger Safranin-O staining intensity were observed at the tendon-bone interface. The ultimate failure load of the reconstructed ACL complex was significantly higher in the dTDS sheet group.

**Discussion:** We have successfully produced a bioactive dTDS sheet, the transplantation of which induced bone formation and better graft osteo-integration at week 2, week 6 after ACLR. The dTDS sheet would enhance its acceptability by patients, quality control and translation into clinical practice.

### FP3.3

#### **Doxycycline promotes graft healing and attenuates post-traumatic osteoarthritis after anterior cruciate ligament reconstruction in a rat model**

**Mingde Cao,<sup>1</sup> Shi-yi Yao,<sup>1</sup> Xiaobo Zhu,<sup>2</sup> Michael TY Ong,<sup>2</sup> Yangzi Jiang,<sup>2</sup> Patrick SH Yung<sup>1</sup>**

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### FP3.4

#### **One-step strategy for in situ osteochondral repair using acellular 3D-printed Mg microparticles-functionalised scaffolds in a preclinical rabbit model**

**Liangbin Zhou, Jiankun Xu, Wenxue Tong, Lizhen Zheng, Ye Li, Kevin Kiwai Ho, Ling Qin**

*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

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### FP3.5

#### **Patellofemoral osteoarthritis detection and knee replacement surgery prediction from knee lateral X-ray textures using radiomics**

**Jiang Zhang,<sup>1</sup> Justin Lok-Chun Chan,<sup>2</sup> Tianshu Jiang,<sup>2</sup> Lewis Ping-Keung Chan,<sup>3</sup> Chunyi Wen<sup>2</sup>**

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**Introduction:** This study aimed to explore the feasibility of both Patella-femoral osteoarthritis (PFOA) detection and knee replacement-free survival (KRFS) prognosis from high-throughput texture analysis of lateral patella-femoral joint X-ray.

**Methods:** A total of 2597 patients from two institutions were included from the Multicenter Osteoarthritis Study (MOST) dataset. Patients from one site ( $n=1175$ ) were used for training and the rest for validation ( $n=1422$ ). A rectangular patella bounding box was manually drawn on each image and separated into nine equal sized regions of interest (ROIs). 3720 radiomic features were extracted from each ROI. After feature selection, one PFOA classification and KRFS prognosis model were developed for each ROI. The area under the receiver operating characteristic curve (AUC) and the concordance index (C-index) were adopted to evaluate the model performance.

**Results:** The ROI located at the inferior-posterior corner yielded the highest training and validation performance (training: AUC=0.83, C-index=0.78; validation: AUC=0.80, C-index=0.74). Among all the PFOA positive patients, 70.7% and 81.0% were correctly classified in training and validation. Risk stratification in training achieved a hazard ratio of 4.94 ( $p<0.001$ ) and slightly less (3.58,  $p<0.001$ ) on validation.

**Discussion and Conclusion:** Patella textures extracted from the inferior-posterior subregion on the knee lateral X-rays were effective in PFOA detection and KRFS prognosis with high cross-site generalisability. Our findings may facilitate the further development of accurate automation in the diagnosis of PFOA and early prediction of OA progression that leads to knee replacement surgery.

### FP3.6

#### **Quantitative measurement of joint space width on computed tomography image of knee osteoarthritis**

**Wei Wang,<sup>1</sup> TianShu Jiang,<sup>1</sup> Justin Lok Chun Chan,<sup>1</sup> Lewis Ping Keung Chan,<sup>2</sup> Chunyi Wen<sup>1</sup>**

<sup>1</sup>*Department of Biomedical Engineering, The Hong Kong Polytechnic University*

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The diagnosis of knee osteoarthritis (OA) is based on the comprehensive assessment of the patient's symptoms and structural changes in the radiograph. However, that the features obtained from plain radiograph are the two-dimensional (2D) projection of three-dimensional (3D) structure, there is considerable discordance between radiographic OA and symptomatic OA. The objective of this study is to do the quantitative measurement of joint space width on computed tomography images of knee osteoarthritis and investigate the cross-sectional association between 3D-JSW with preoperative physical function, and surgical recovery for advanced OA patients.

In all, 109 patients who underwent knee replacement were included from Queen Mary Hospital. For all patients, the preoperative computed tomography image, the preoperative and postoperative Knee Society scores (KSS) were collected.

The subchondral surface of the tibia in medial and lateral compartments are extracted respectively, then the 3D-JSW of each patient is measured as the distance between the femur condyle surface and tibia subchondral surface in a direction parallel to the normal of the best-fitting plane of medial, lateral subchondral surfaces.

Based on the preoperative KSS of patients, the patients are divided into two groups: walking with aid and walking without aid. Based on the comparison of the postoperative and preoperative KSS of patients, they are divided into two groups: recovered after surgery, and unrecovered after surgery.

The result suggests that patients walking with aid tend to have smaller JSW in the medial compartment, and patients who recovered after surgery tend to have larger JSW in the lateral compartment.

### FP3.7

#### A self-administrable and interpretable machine-learning-driven knee osteoarthritis prognostic model for early diagnosis

**Lok Chun Chan,<sup>1</sup> Toby Ho-Hin Li,<sup>2</sup> Lewis Ping-Keung Chan,<sup>3</sup> Chunyi Wen<sup>1</sup>**

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##### **Introduction:**

- Osteoarthritis (OA) is the most prevalent joint disease, over half of which is knee OA (KOA).
- Precise aetiology remains unknown and no cure is available.
- Delayed diagnosis often occurs and the knee joint may experience irreversible damage.
- Accurate disease trajectory prediction using Machine Learning (ML) through self-administrable assessment can enhance disease prevention and reduce unwarranted hospital use.

##### **Methods:**

1. Compared the inter-cluster distance of different combinations of KOA progression definition.

Radiographic progression

- a. Joint-space-width progression: Reduction in the minimum knee joint space width by more than 0.7mm.
- b. Kellgren-Lawrence (KL) progression: Any increase in KL grade, except from grade 0 to 1.

Pain progression

Increase in the WOMAC pain score by at least 1.8 points.

2. Developed the prognostic model with the best-performing progression definition.

- An ML model was developed using 2200 knee samples from the Osteoarthritis Initiative dataset.
- End point of prediction: 48-month after the first clinical visit.
- ML algorithm: Self-paced Ensemble for imbalanced classification with a train-test split of 8:2.

3. Visualised feature importance by Shapley Additive Explanations (SHAP).

##### **Results:**

- The composite definition of KL-Pain progression best differentiated the progressor and non-progressor classes with the highest average inter-cluster distance of 0.344 ( $\pm 0.024$ ).
- Prediction performance: AUROC 0.775.
- BMI and KOOS quality-of-life score are the most crucial factors for progression prediction from SHAP analysis.

##### **Conclusion:**

A self-administrable and interpretable ML-driven KOA prognostic model was developed under the KL-Pain progression for early disease detection in the community.

### FP3.8

#### Cadaveric study on bone cut surface roughness after robotic arm assisted versus conventional total knee arthroplasty

**Henry Fu,<sup>1</sup> Mohsen Mohammadi,<sup>1</sup> Steve Cheung,<sup>1</sup> Amy Cheung,<sup>2</sup> Michelle Hilda Luk,<sup>2</sup> Vincent Wai Kwan Chan,<sup>2</sup> Ping Keung Chan,<sup>1</sup> Grace Teng,<sup>1</sup> Kwong Yuen Chiu<sup>1</sup>**

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### FP3.9

#### **Ageing-related sarcopenia along with mitochondrial degeneration in SAMP8 mice model**

**Yufeng Long, Can Cui, Wujian Lin, Simon Kwoon-ho Chow, Ronald Man Yeung Wong, Wing-hoi Cheung**  
*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** Sarcopenia is characterised by declined muscle mass and strength. PGC-1 $\alpha$  is a major factor in mitochondrial biogenesis, while Mfn2 is a key protein in mitochondrial fusion. Additionally, ATP5A1 and cytochrome c represent the level of mitochondrial ATP production. This study aimed to investigate the changes of mitochondria in skeletal muscle during sarcopenia in a senescence-accelerated mouse P8 (SAMP8) model.

**Methods:** Male SAMP8 mice were used, and male senescence-accelerated mouse resistant-1 (SAMR1) mice were used as age-matched non-sarcopenic group. Mitochondrial biogenesis, fusion, ATP production at month 3, 6, 8, 10, 12 were assessed by western blotting. Ex vivo functional assessment, grip strength and morphological analysis of mitochondria by transmission electron microscopy were performed. Data analysis was done with one-way analysis of variance, and the significant level was set at  $p \leq 0.05$ .

**Results:** Grip strength, tetanic force, and twitch force of gastrocnemius decreased from month 8 to 12 ( $p < 0.05$ ) in SAMP8 mice, while those in non-sarcopenic SAMR1 mice had no significant changes. The number, density, and relative area of mitochondria in SAMP8 mice decreased from month 6 to 12 ( $p < 0.05$ ), while those in SAMR1 mice had no significant changes. PGC-1 $\alpha$ , Mfn2, ATP5A1 and cytochrome c in SAMP8 mice decreased from month 6 to 12, while those in SAMR1 mice had no significant changes ( $p < 0.05$ ).

**Conclusions:** PGC-1 $\alpha$ , Mfn2, ATP5A1 and cytochrome c decreased along with mitochondria deterioration during sarcopenia in SAMP8 mice. Furthermore, mitochondria deterioration onset earlier than muscle deterioration in SAMP8 mice.

### FP3.10

#### **CFTR-deficiency accelerates skeletal muscle ageing through interfering autophagy in myogenesis**

**Ziyi Chen,<sup>1</sup> Jiankun Xu,<sup>2</sup> Wei Zhou,<sup>3</sup> Ling Qin<sup>1</sup>**

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Sarcopenia, defined by decreased muscle mass and strength, commonly occurs in the ageing population. It is a progressive skeletal muscle disorder with limited therapeutic options. Accelerated senescence in peripheral musculoskeletal system is one hallmark of cystic fibrosis (CF) in patients with major clinical evidence including exercise intolerance and low life quality. However, the role of CFTR in skeletal muscle remains elusive.

We found that the expression of CFTR in skeletal muscles declined with age in both humans and mice. The DXA assay and ex vivo functional test suggested that the muscle mass and strength (twitch force) were reduced in DF508 mice compared with the paired wild-type mice, which was more obvious in the old-aged group. The intracellular chloride measurement confirmed the ion channel function of CFTR in the primary myoblast. In exploring the molecular mechanisms, gastrocnemii from old-aged DF508 mice showed lower expression of genes key to mitochondrial biogenesis and dynamics, and autophagy, as compared to age-matched wild-types. We next employed the CFTR modulators (VX-809 and VX-770) which promoted in vitro differentiation of myoblasts in a dose independent manner. Moreover, local injection of VX-809 promoted the muscle mass and strength in wild-type mice but not in DF508. The VX-809 treatment also reversed the abnormal expression of markers involved in the autophagy (LC3 $\beta$ ) and inflammation.

In summary, the present results have shown a previously undefined role of CFTR in skeletal muscle differentiation, function, and ageing. Pharmaceutical drugs targeting CFTR may be a new treatment strategy for age-related skeletal muscle weakness.

**FP3.11**

**A novel high-efficiency quantitative control of mitochondrial transfer based on droplet microfluidics and its application on muscle regeneration**

**Jessica Hiu Tung Lo,<sup>1</sup> Jiayu Sun,<sup>2</sup> Lei Fan,<sup>2</sup> Tsz Lam Yiu,<sup>1</sup> Adnan Shakoor,<sup>2</sup> Gang Li,<sup>1</sup> Wayne YW Lee,<sup>1</sup> Dong Sun<sup>2</sup>**

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**FP3.12**

**Mesenchymal stromal cells therapy for sarcopenia: a preclinical in vivo study**

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**FP3.13**

**Anti-RANKL treatment attenuates sarcopenia via suppression of inflammation and macrophage infiltration**

**Ronald Man Yeung Wong, Can Cui, Yufeng Long, Wujian Lin, Chaoran Liu, Simon Kwoon Ho Chow, Wing-Hoi Cheung**

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**FP3.14**

**Senescence-associated secretory phenotype (SASP) profiling and regulation in ageing tissues**

**Chuhan Li, Yang Li**

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### FP3.15

#### **Yin Yang 1 deficiency in skeletal muscle stem cell aggravates muscle fibrosis in Duchenne muscular dystrophy mouse by disrupting muscle stem cell/macrophage/fibro-adipogenic progenitor crosstalk**

**Yang Li**

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Duchenne muscular dystrophy (DMD) is an X-linked recessive deadly disease of muscle characterised by a progressive loss of functional muscle mass and replacement with fibrofatty tissue. Treatments are generally aimed at controlling the onset of symptoms to relieve the aliments and maximise the quality of life. A better understanding of the underlying molecular causes is needed for effective cure of this disease. Adult skeletal muscle stem cells, also called satellite cells (SCs), are universally thought to be responsible for muscle regeneration, which is regarded as an essential target for muscular dystrophy treatment. SC-involved muscle regeneration is orchestrated by a series of intrinsic and extrinsic regulators. Here, we focus on the extrinsic modulations from the microenvironment of muscle, commonly referred as muscle niche. We find the transcriptional factor YY1 is highly repressed in muscles from DMD patients. Further investigation by utilising mdx mouse (a model for DMD) demonstrates that YY1 deletion in SCs leads to upregulated CCL5, which can be secreted to the muscle niche to recruit more macrophages through CCL5/CCR5 axis. Incremental macrophages aggravate inflammation and further promote the accumulation of Fibro-adipogenic progenitors (FAPs), which aggravates dystrophic pathology manifested by exacerbated fibrosis. Inhibition of CCL5/CCR5 axis by Maraviroc injection effectively mitigates muscular dystrophy and enhances the muscle performance in YY1 deletion mdx mouse. Taken together, we conclude that YY1 functions as a mediator of SC/MP/FAP crosstalk in DMD muscle niche; targeting CCL5/CCR5 axis provides a potential novel strategy for DMD therapy.

### FP3.16

#### **The role of dentin matrix protein 1 (DMP1) in LIPUS accelerated osteoporotic fracture healing**

**Michelle Meng Chen Li, Simon Kwoon Ho Chow, Ronald Man Yeung Wong, Ling Qin, Wing Hoi Cheung**

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**Introduction:** Osteoporotic fracture has become a major problem in ageing population and often requires prolonged healing time. Low intensity pulsed ultrasound (LIPUS) can significantly enhance fracture healing through alteration of osteocyte lacuno-canicular network (LCN). Dentin matrix protein 1 (DMP1) in osteocytes is responsible for maintaining LCN and mineralisation. This study aimed to investigate the role of osteocyte-specific DMP1 in enhanced osteoporotic fracture healing in response to mechanical stimulation.

**Methods:** Bilateral ovariectomy was performed in 6-month-old female SD rats to induce osteoporosis. Metaphyseal fracture was created at left distal femur using oscillating micro-saw. Rats were randomised to groups: (1) DMP1 KD; (2) DMP1 KD + LIPUS; (3) LIPUS; or (4) Control, where KD stands for knockdown by injection of shRNA into marrow cavity. Assessments included radiography, microCT, dynamic histomorphometry and immunohistochemistry on osteocyte-specific markers at week 1, 3, and 6.

**Results:** DMP1 KD significantly impaired LIPUS-accelerated fracture healing. The X-ray relative opacity showed significantly less tissue growth at all time points and bone volume fraction was decreased after DMP1 KD at week 3. Mineral apposition rate was lowered after KD. DMP1 KD also significantly altered the expression levels of osteocyte-specific proteins during healing process.

**Discussion and Conclusions:** The lower relative opacity, mineralisation apposition rate and bone volume fraction in DMP1 KD groups indicated that knockdown of DMP1 was associated with poorer fracture healing process. The similar results between knockdown group with and without LIPUS showed that blockage of DMP1 would negate LIPUS-induced enhancement on fracture healing.

**Acknowledgment:** General Research Fund (Ref: 14113018) and Areas of Excellence Scheme (AoE/M-402/20)

### FP3.17

#### **Magnesium containing hybrid fixation system promotes the healing of long bone fractures: a large animal study**

**Yuantao Zhang,<sup>1</sup> Arthur On Fai Woo,<sup>2</sup> Lizhen Zheng,<sup>1</sup> Michael Tim-yun Ong,<sup>2</sup> Ning Tang,<sup>2</sup> Ronald Man-yeung Wong,<sup>2</sup> Wenzhe Tong,<sup>1</sup> Dick Ho Kiu Chow,<sup>1</sup> Jiankun Xu,<sup>1</sup> Ling Qin<sup>1</sup>**

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**Introduction:** Biodegradable magnesium (Mg) is beneficial for fracture healing. However, its applications mainly limited to non-weight-bearing sites as these biometals usually lose their mechanical strength at early stage. We innovatively designed Mg-containing hybrid intramedullary nail (IMN) to maintain the mechanical strength while make good use of the biological effects of Mg. Here we tested the feasibility of our Mg-IMN in the fixation of long bone fracture established in goats, which is essential for broadening clinical applications.

**Methods:** A total of 36 skeletally mature Chinese mountain goats were divided into IMN group and Mg-IMN group. Osteotomy was conducted at the tibial mid-shaft and the fracture models were fixed with either Ti-based IMN or Mg-IMN.

**Results:** No implant failure was found during implementation. X-ray and computed tomography results suggested that Mg-IMN group presented with significantly larger callus at early stage of fracture healing, and enhanced mineralisation and remodelling at late stage, as compared to IMN group. Haematoxylin and eosin and Stevenel Blue-Van Gieson-Alizarin Red staining show more callus formation at week 6 and more regular lamellar bone at week 12 in Mg-IMN group than IMN group. Calcein/xylol double labelling suggest accelerated new-bone formation in the Mg-IMN group at week 6 and accelerated the formation of mature lamellar bone tissue at week 12.

**Discussion and Conclusion:** To our knowledge, this is the first successful attempt to apply the Mg-IMN for long bone fracture established in large animals. Mg-IMN shows superior outcomes in terms of bone formation as well as remodelling than conventional IMN, highlighting the great translational merit.

### FP3.18

#### **Hydrogel delivery of DNase I and liposomal-vancomycin to eradicate fracture-related methicillin-resistant *Staphylococcus aureus* (MRSA) infection and support osteoporotic fracture healing**

**Ronald Man Yeung Wong,<sup>1</sup> Jie Li,<sup>1</sup> Simon Kwoon Ho Chow,<sup>1</sup> Margaret Ip,<sup>2</sup> Shui Yee Sharon Leung,<sup>3</sup> Ning Tang,<sup>4</sup> Chi Yin Tso,<sup>4</sup> Wing-Hoi Cheung<sup>1</sup>**

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**FP3.19**

**A comparison of the efficacy of antiseptic solutions against microorganisms in biofilm: an in vitro testing in microtiter dish biofilm model**

**Ping Keung Chan,<sup>1</sup> Ling Lung Derek Hung,<sup>2</sup> Jeffrey Ho Yu Leung,<sup>1</sup> Vincent Wai Kwan Chan,<sup>3</sup> Amy Cheung,<sup>3</sup> Michelle Hilda Luk,<sup>3</sup> Man Hong Cheung,<sup>1</sup> Henry Fu,<sup>1</sup> Kwong Yuen Chiu<sup>1</sup>**

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**FP3.20**

***Lycium barbarum* extract can enhance functional recovery after decompression in a preclinical rat model of cervical spondylotic myelopathy**

**Kenny Yat Hong Kwan,<sup>1</sup> Kangheng Wang,<sup>2</sup> Rong Li,<sup>3</sup> Guang-Sheng Li,<sup>2</sup> Kwok Fai So,<sup>4</sup> Yong Hu<sup>1</sup>**

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**FP3.21**

**Abnormal morphological features of osteocyte lacunae in adolescent idiopathic scoliosis: a large-scale assessment of 300 000 lacunae by ultra-high-resolution micro-computed tomography**

**Kenneth Guangpu Yang,<sup>1</sup> Elliott Goff,<sup>2</sup> Gisela A. Kuhn,<sup>2</sup> Anubrat Kumar,<sup>3</sup> Raymond Chung-Wai Wan,<sup>3</sup> Jack Chun-Yiu Cheng,<sup>1</sup> Yong Qiu,<sup>4</sup> Ralph Müller,<sup>2</sup> Wayne Yuk-Wai Lee<sup>1</sup>**

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## FP3.22

### Biomechanics of the vertebral body tethering: explaining the tether breakage

**Ogulcan Guldeniz,<sup>1</sup> Christopher CH Yip,<sup>1</sup> Wanis Nafo,<sup>2</sup> Kenneth MC Cheung<sup>1</sup>**

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**Introduction:** Tether breakage is currently the most common complication of vertebral body tethering (VBT). However, compared to the recent biomechanical data in the literature, tensile failure of the polyethylene terephthalate (PET) tether under bodily loads is highly unlikely. At present, the underlying failure mechanisms of the tether breakage are still unknown. The aim of this study was to investigate the failure mechanisms of the VBT to explain the tether breakage and provide a mechanical explanation of how it can be diagnosed radiographically.

**Methods:** Tensile tests were performed for instrumented spinal segments. Failure modes, as well as the true stress-strain and Force-strain curves, were reported.

**Results:** Tensile failure was not observed as slippage occurred at the screw-tether junction. We identified that the load levels causing slippage only corresponded to 4% to 7% of the ultimate tensile limit of PET. Moreover, we observed that the outer layer of the tether is damaged significantly by the locking cap of the screw. On average, the slippage stress, strain, and force were measured as 51.2 MPa, 11.2%, and 577.9 N, respectively. The average initial and second elastic modulus were 376.3 Mpa and 707.2 Mpa, respectively.

**Discussion and Conclusion:** The current VBT design compromises the tensile potential of the PET tether significantly such that the bodily loads occurring on the spine are enough to cause breakage. We observed that the tether elongates 10% to 13% of its original length prior to the breakage, which can be employed as a diagnosis criterion to diagnose the tether breakages radiographically.

## FP3.23

### A novel recombinant spidroin protein for potential orthopaedic applications

**Haozhi Zhang, Jiankun Xu, Bruma Sai Chuen Fu, Patrick Shu Hang Yung, Ling Qin**

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## Free Paper Session IV: Adult Joint Reconstruction I

### FP4.1

#### Prediction of unicompartmental knee arthroplasty sizes with patient demographics, hand, and foot sizes

**Vincent Wai Kwan Chan,<sup>1</sup> PK Chan,<sup>2</sup> Henry Fu,<sup>2</sup> MH Cheung,<sup>2</sup> Amy Cheung,<sup>1</sup> Michelle Hilda Luk,<sup>1</sup> KY Chiu<sup>2</sup>**

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### FP4.2

#### Can patient demographics be used to predict the size of implants for unicompartmental knee arthroplasty?

**Karen Ka Man Ng,<sup>1</sup> Tsz Lung Choi,<sup>1</sup> Yan Ting Lam,<sup>1</sup> King Hang Yee,<sup>1</sup> Lawrence Chun Man Lau,<sup>2</sup> Michael Tim-Yun Ong,<sup>3</sup> Patrick Shu-Hang Yung<sup>3</sup>**

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Unicompartmental knee arthroplasty (UKA) is a treatment option for anteromedial osteoarthritis (AMOA). In this study, we evaluate the correlation between patient demographics, including body mass index, body weight, body height, and the final sizing of different companies' UKA implants as well as the effect on functional outcomes in case of incorrect sizing.

Patients having AMOA with UKA performed in a local joint centre between January 2019 to January 2021 were included. Postoperative knee radiograph was reviewed to look for any implant overhang or underhang to determine the ideal implant size. Statistical analysis was carried out to evaluate the strength of correlation and accuracy of prediction between patient demographics and the implant size. Postoperative knee range of motion and functional outcomes were also reviewed.

In all, 180 cases of Oxford UKA, 13 case of Journey UKA and 14 cases of Mako Restoris UKA were done. For Oxford UKA, there was statistically significant correlation between all patient demographics with both implants size except for body mass index and size of tibial implant. Patient demographics can accurately predict the size of femoral implant ( $\pm 1$  size) in more than 90% of patients. However, for Journey and Mako Restoris UKA, only correlation between body height with femoral and tibial implant size was statistically significant. There was no significant impact on knee range of motion nor functional outcomes in cases of incorrect sizing.

Patient demographics can be used as a reference to guide surgeons to prepare the suitable size of UKA implants.

**FP4.3****Early result of cementless versus cemented Oxford unicompartmental knee arthroplasty—a retrospective study**

**William Kwun-ping Fung,<sup>1</sup> Tsz-lung Choi,<sup>1</sup> Dennis King-hang Yee,<sup>1</sup> Gloria Yan-ting Lam,<sup>1</sup> Lawrence Chun-man Lau,<sup>2</sup> Michael Tim-yun Ong,<sup>3</sup> Patrick Shu-hang Yung<sup>3</sup>**

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**Introduction:** Oxford unicompartmental knee arthroplasty (OUKA) could be performed either in cemented or cementless manner. As opposed to cemented fixation, cementless fixation is deemed to be capable of reducing the incidence of physiological radiolucency that entails subsequent unnecessary revision. This study aimed to compare the early postoperative outcomes of cemented and cementless OUKA.

**Methods:** This is a retrospective analysis of all OUKA performed in Alice Ho Miu Ling Nethersole Hospital from April 2021 to March 2022. Cementless fixation was performed unless small tibial implant size or overhanging tibial condyle was present.

Comparisons were made primarily in terms of patients' postoperative range of motion, function score, and pain score. Operation time, incidence of radiolucent lines, implant subsidence and other complications would also be compared. Data was collected before surgery, and 1 month and 6 months after surgery.

**Results:** A total of 69 cemented and 61 cementless OUKA were studied. One cemented OUKA was excluded, as the tibial tray was very close to the posterior cortex of tibia and was later revised. Only an additional 6 degrees in flexion range of motion was recorded in the cementless group while other parameters showed no statistical difference. No radiolucent line or gross implant subsidence were reported in both groups.

**Discussion and Conclusion:** Cemented and cementless OUKA yielded similar clinical outcomes in the early postoperative period. With careful patient selection, cementless OUKA might be a viable option among our locality. Prolonged observation would be required to assess long-term outcome and complications.

**FP4.4**

**Discharge on day of surgery following unicompartmental knee arthroplasty—physiotherapy can make it possible**

**Hei Yan Yuen,<sup>1</sup> Oi Ling Au,<sup>1</sup> Pui Wan Wong,<sup>1</sup> Chi Keung Ng,<sup>1</sup> Hon Yuen Chow,<sup>1</sup> Sin Wing Wong,<sup>1</sup> Chi Kit Chiu<sup>2</sup>**

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**Introduction:** Unicompartmental knee arthroplasty (UKA) has been becoming popular in managing osteoarthritic knee. Incorporating with the service enhancements in peri-operative management through enhanced recovery after surgery, day of surgery (DOS) discharge becomes feasible. This study aimed at identifying the roles of Physiotherapy and exploring the keys to success of DOS discharge following UKA in Hong Kong regional hospital.

**Methods:** A multi-disciplinary care model was established in United Christian Hospital (UCH) which aimed at DOS discharge after UKA. Physiotherapists provided pre-habilitation before surgery; pain management and mobilisation on DOS, immediate post-discharge tele-care, and early out-patient physiotherapy consultation. Clinical information from total 76 UKA patients during July 2020 to June 2022 was collected prospectively for analysis.

**Results:** Among the 76 patients. 21 cases (27.6%) could be mobilised and were successfully discharged home on D0, and 37 cases (48.7%) were discharged on D1. The average LOS for this study group was 1.57 days. A total of 52 patients (68%) tolerated mobilisation on DOS. The obstacles of DOS mobilisation were “Not the first surgical case” (75%), “Healthcare communication gaps” (16%), “Unstable medical condition after surgery” (4%) and “Postoperative vomiting” (4%). The major reasons of delayed DOS discharge after mobilisation were “Postoperative pain” (32%), “Unstable medical condition” (29%) and “Psychologically unready” (12.9%). All cases with DOS discharge had tele-care on D1/2 for symptom monitoring.

**Conclusion:** The care model demonstrated that DOS discharge for UKA patient is safe and effective. Meticulous patient selection, pre-habilitation, close collaboration with surgeons and intensive physiotherapy on D0 are the keys to success.

**FP4.5****The effect of joint-line obliquity angle on pain and functional outcomes following Oxford unicompartmental knee arthroplasties (OUKA)—a review of 400 cases**

**Kelvin Chin-hei Lo,<sup>1</sup> Gloria Yan-Ting Lam,<sup>1</sup> Dennis King-Hang Yee,<sup>1</sup> Tsz Lung Choi,<sup>1</sup> Lawrence Chun-Man Lau,<sup>2</sup> Michael Tim-Yun Ong,<sup>3</sup> Patrick Shu-Hang Yung<sup>3</sup>**

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**Introduction:** In an attempt to restore the native joint space, the effect of Oxford unicompartmental knee arthroplasties (OUKA) on the joint line is still largely unknown.

**Methods:** Radiological analysis was conducted for patients who received OUCA in Alice Ho Miu Ling Nethersole Hospital from February 2018 to September 2021. Joint-line obliquity angle (JLOA) was measured in both preoperative and postoperative standing anteroposterior X-rays.

**Results:** A total of 289 patients were reviewed with 400 OUCA performed. Pre- and postoperative JLOA were  $0.98^\circ \pm 2.38^\circ$  and  $1.61^\circ \pm 2.93^\circ$ , respectively and the mean change was  $0.63^\circ \pm 3.17^\circ$ . The joint-line became horizontal in 14% knees while medial tilting occurred in 51% knees. Any medial tilting of JLOA  $\geq 4^\circ$  was significantly negatively correlated with the postoperative Oxford knee score (OKS) [ $r=0.52$ ]. 111 patients received bilateral OUCA. 11 patients (10%) had symmetrical JLOA while 34 patients (31%) had bilateral JLOA difference  $\geq 3$  degrees. Significant difference existed between these two groups for Knee Society knee score (98 vs 92.3;  $p=0.007$ ) while there was no difference for Knee Society functional score, OKS or pain score. For surgeons who did more than 50 OUCA, their latest 20 OUCA showed less medial tilting of JLOA compared to their first 20 OUCA ( $1.05^\circ$  vs  $2.93^\circ$ ;  $p=0.026$ ). Tibial cut thickness was larger in medial tilt of JLOA compared to lateral tilt. (5.6 mm vs 4.3 mm;  $p=0.008$ ).

**Discussion and Conclusion:** An excessive medial tilt of the JLOA was associated with poorer postoperative outcomes of OUCA and bilateral difference of JLOA should be kept within  $3^\circ$ .

**FP4.6****Predicting the postoperative limb alignment using simple preoperative valgus stress films in Oxford unicompartmental knee arthroplasties**

**Cheryl Cheuk Wing Kong,<sup>1</sup> Tsz Wai Cheng,<sup>1</sup> Gloria Yan-Ting Lam,<sup>1</sup> Dennis King-Hang Yee,<sup>1</sup> Tsz Lung Choi,<sup>1</sup> Lawrence Chun-Man Lau,<sup>2</sup> Michael Tim-Yun Ong,<sup>3</sup> Patrick Shu-Hang Yung<sup>3</sup>**

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#### FP4.7

### Robotic-arm assisted versus conventional medial unicompartmental knee arthroplasty: a comparative study in the radiological outcomes

**Reena Chow,<sup>1</sup> Ping Keung Chan,<sup>1</sup> Jeffrey Ho Yu Leung,<sup>1</sup> Vincent Wai Kwan Chan,<sup>2</sup> Amy Cheung,<sup>2</sup> Michelle Hilda Luk,<sup>2</sup> Man Hong Cheung,<sup>1</sup> Henry Fu,<sup>1</sup> Kwong Yuen Chiu<sup>1</sup>**

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**Introduction:** In unicompartmental knee arthroplasty (UKA), postoperative alignment is an important element to predict clinical outcomes and complications. Robotic-assisted UKA has been proposed to improve alignment. This study aimed to compare the radiological outcomes between robotic-arm assisted (R) and conventional (C) UKA.

**Methods:** A total of 130 UKAs from an academic institution were reviewed from January 2014 to May 2022, 47 were C and 83 were R. Radiological parameters, including hip-knee-ankle angle (HKAA), femoral tibial alignment (FTA), femoral component coronal angle (FCCA), tibial component coronal angle (TCCA) and posterior tibial slope (PTS), were measured and compared to the generally accepted alignment.

**Results:** R and C patients had a significant difference in alignment measured by HKAA ( $R=4.23^\circ \pm 3.01$ ;  $C=5.16^\circ \pm 4.00$ ,  $p=0.068$ ). Acceptable HKAA  $\leq 7^\circ$  was achieved in 84.3% of R and 63.8% C patients ( $p=0.008$ ). In FCCA,  $R=3.83^\circ \pm 2.46$ ;  $C=5.76^\circ \pm 4.00$ ,  $p<0.001$ ; acceptable alignment  $\leq 3^\circ$  was achieved in 41.0% of R and 30.0% ( $p=0.205$ ) of C patients. In TCCA,  $R=3.83 \pm 2.46$  and  $C=5.76 \pm 3.99$  ( $p=0.013$ ), with an acceptable alignment  $\leq 4^\circ$  in 75.3% of R and 63.8% ( $p=0.248$ ) of C patients. In PTS,  $R=6.04 \pm 2.32$  and  $C=8.39 \pm 3.35$  ( $p<0.001$ ), with acceptable alignment  $4^\circ\text{-}7^\circ$  in 48.2% of R and 34% of C patients ( $p=0.117$ ).

**Discussion and Conclusion:** Robotic-arm assisted UKA demonstrated better radiological outcomes in overall lower limb alignment, femoral and tibial alignment when compared with conventional UKA.

#### FP4.8

### Mobile-bearing unicompartmental replacement versus medial open-wedge high tibial osteotomy in advanced medial unicompartmental knee osteoarthritis in relatively young patients: a mid-term retrospective analysis

**Dennis King-Hang Yee,<sup>1</sup> Pui Kiu Chan,<sup>2</sup> Gloria Yan-Ting Lam,<sup>1</sup> Tszy-Lung Choi,<sup>1</sup> Lawrence Chun-Man Lau,<sup>3</sup> Michael Tim-Yun Ong,<sup>4</sup> Patrick Shu-Hang Yung<sup>4</sup>**

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**FP4.9**

**Coronal tibiofemoral subluxation after Oxford unicompartmental knee arthroplasties (OUKA)—a review of 414 cases**

**Gloria Yan Ting Lam,<sup>1</sup> Kelvin Chin-hei Lo,<sup>1</sup> Cheryl Cheuk-Wing Kong,<sup>1</sup> Dennis King-Hang Yee,<sup>1</sup> Tsz-Lung Choi,<sup>1</sup> Lawrence Chun-Man Lau,<sup>2</sup> Michael Tim-Yun Ong,<sup>3</sup> Patrick Shu-Hang Yung<sup>3</sup>**

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**Introduction:** Residual coronal tibiofemoral subluxation (CTFS) after Oxford unicompartmental knee arthroplasty (OUKA) is a common but rarely reported entity, and its clinical impact is largely unknown.

**Methods:** Radiological analysis was conducted for patients who received OUCA in Alice Ho Miu Ling Nethersole Hospital from February 2018 to November 2022. Degree of CTFS was measured using Nam's method for preoperative and postoperative standing anteroposterior radiographs.

**Results:** A total of 335 patients were reviewed with 414 OUAs performed. The mean reduction in CTFS was  $2.09 \text{ mm} \pm 2.33 \text{ mm}$ . Preoperative CTFS was significantly correlated to the degree of CTFS reduction ( $r=0.65$ ) and postoperative CTFS ( $r=0.63$ ). Post-op CTFS was positively associated with medial pain ( $r=0.25$  and lateral pain ( $r=0.26$ ). In the group of CTFS  $\geq 5 \text{ mm}$ , the correlation with lateral pain was very strong ( $r=0.93$ ) at 6 months and the effect was sustained at both 12 months ( $r=0.48$ ) and 24 months ( $r=0.51$ ). Postoperative CTFS=0 mm, postoperative  $<5 \text{ mm}$ , and postoperative CTFS  $\geq 5 \text{ mm}$  groups, respectively, had no significant differences in terms of Oxford knee score (39.7, 39.6, and 41.2 at 6 months, 39.5, 39.9, and 39.9 at 12 months, 37.4, 39.2, and 42.5 at 24 months) or Knee Society function score (75.5, 81.7, and 79.9 at 6 months, 75.4, 78.9, and 84.1 at 12 months, 72.9, 77, and 80 at 24 months).

**Discussion and Conclusion:** This study was the largest among current literatures and it showed that post-op CTFS was correlated to both medial and lateral pain after OUCA. Functional outcomes were independent of CTFS condition.

#### FP4.10

#### **When things did not go as planned. Incidence and causes of intra-operative switch of decision from UKR to TKR**

**Kit Ci Chan,<sup>1</sup> Dennis King Hang Yee,<sup>1</sup> Gloria Yan Ting Lam,<sup>1</sup> Tsz Lung Choi,<sup>1</sup> Lawrence Chun Man Lau,<sup>2</sup> Michael Tim Yun Ong,<sup>3</sup> Patrick Shu Hang Yung<sup>3</sup>**

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**Introduction:** Intraoperative switch from unicompartmental knee arthroplasty (UKR) to total knee replacement (TKR) occurs occasionally when the knee condition does not satisfy the required condition. This study aimed at evaluating (1) incidence and causes of such switch; (2) association with preoperative radiological factors.

**Methods:** This is a retrospective cohort study of patients satisfying radiographic assessment for medial Oxford partial knee replacement and scheduled for UKR from January 2018 to June 2022. Patients were grouped by the type of operation performed. Reasons for the intraoperative switch were recorded. Preoperative radiological coronal subluxation and mechanical axis were analysed.

**Results:** In 497 knees scheduled for PKR, 76 (15.3%) had TKR performed. TKR switch occurred before and after tibial bone cut in 64 (84.2%) and 12 (15.8%) knees, respectively. Anterior cruciate ligament (ACL) deficiency (n=42) accounted for most TKR switches before tibial bone cut, followed by lateral TFJ cartilage defect (n=15) and PFJ cartilage defect (n=7). Technical issue accounts for TKR switch after tibial bone cut, included intraoperative fracture (n=6), medial collateral ligament injury (n=2), small tibia (n=1), tibial tray mal-seating (n=1), gap balancing issue (n=1), and insert tracking issue (n=1).

Patients who received TKR due to ACL deficiency had more varus preoperative mechanical alignment (167.2 vs 169.0; p=0.023) and worse coronal subluxation (5.695 vs 4.92; p=0.05) compared with the rest of the cohort.

**Conclusion:** In all, 15.3% of patients scheduled for UKR had TKR performed, and ACL deficiency accounted for the majority of the reasons. More varus coronal mechanical alignment and worse coronal subluxation are associated with ACL insufficiency.

#### FP4.11

#### **Extremes of cement mantle thickness associated with increased incidence of radiolucent lines in total knee arthroplasty**

**Michelle Hilda Luk,<sup>1</sup> Chun Hoi Yan,<sup>2</sup> Vincent Wai Kwan Chan,<sup>1</sup> Amy Cheung,<sup>1</sup> Man Hong Cheung,<sup>3</sup> Henry Fu,<sup>3</sup> Ping Keung Chan,<sup>3</sup> Kwong Yuen Chiu<sup>3</sup>**

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#### FP4.12

### A novel image-based machine learning model for knee arthroplasty loosening detection and clinical decision making

**Lawrence Chun Man Lau, Elvis Chun Sing Chui, Michael Tim Yun Ong, Sheung Wai Law, Xin Ye, Kyle Ka Kwan Mak, Wing Hoi Cheung, Kevin Ki Wai Ho, Gene Chi Wai Man, Patrick Shu Hang Yung**

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#### FP4.13

### Comparison of gait analysis between bi-cruciate retaining (BCR) and bi-cruciate stabilised (BCS) total knee arthroplasty

**Ashley Ying-Ying Wong,<sup>1</sup> Michael Tim-Yun Ong,<sup>1</sup> Dennis King-Hang Yee,<sup>2</sup> Tsz Lung Choi,<sup>2</sup> Gloria Yan-Ting Lam,<sup>2</sup> Xin He,<sup>1</sup> Ben Chi-Yin Choi,<sup>1</sup> Cheryl Shu-Ming Chia,<sup>1</sup> Lawrence Chun-Man Lau,<sup>3</sup> Patrick Shu-Hang Yung<sup>1</sup>**

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**Introduction:** Prevalence of total knee arthroplasty is projected to substantially rise. Approximately 20% of patients remain unsatisfied with complaint of knee pain and poor functional outcome, prompting development of new surgical techniques. Bi-cruciate retaining (BCR) total knee arthroplasty (TKA) was designed for more kinematically functional implants by preserving both the anterior cruciate ligament (ACL) and posterior cruciate ligament (PCL). Implant designs that resect the cruciate ligaments has emerged to simplify implantation; such as the newer bi-cruciate stabilised (BCS). BCS substitutes the sacrificed ACL and PCL with a unique dual cam-post mechanism. Improvement of biomechanical properties may provide a solution to patient's dissatisfaction.

**Methods:** This was a retrospective case-control study. The analysis includes gait cycle analysis, sit-to-stand, and stairs. Functional outcomes measured by Knee Society score.

**Results:** A total of 13 patients each were recruited. When separately comparing to normal knees, both had significant difference in maximum valgus movement and range of flexion-extension during walking, and range of internal and external rotation during sit-to-stand. BCR had significantly less internal rotation in sit-to-stand and BCS had significant larger range of valgus and varus during walking, when compared to normal. Bilateral BCR had a trend of requiring less time to rise from sit-to-stand. However, all variables in direct comparison between BCR and BCS TKA did not have any significant difference. Functional outcomes also had no significant difference.

**Conclusion:** Although the BCR TKA retains the ACL and PCL in hopes of normal knee kinematics, the BCS TKA is comparable, revealing that both are acceptable in terms of kinematics and functional outcome.

#### FP4.14

### Comparison of incidence of patellar clunk syndrome in two generations of posterior stabilised total knee arthroplasty

**Sze Ying Chan, Yan Ho Bruce Tang**

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**Introduction:** Patellar clunk syndrome is a known complication in posterior stabilised total knee arthroplasty causing dissatisfaction experience. It describes painful jumping of patella upon knee extension from flexion. The underlying causes are multifactorial. One of the proposed mechanisms is the femoral component design including intercondylar box ratio and depth of trochlear groove. This study compared the incidence of patellar clunk syndrome between PFC Sigma (DePuy Synthes) and Attune (DePuy Synthes) knee system.

**Methods:** We retrospectively reviewed data from the cluster hospital joint registry system. Nonspecific patellar crepitus is excluded from this study. Patellar clunk syndrome was diagnosed by clinical, imaging (ultrasonography or magnetic resonance imaging), or operative finding.

**Results:** A total of 543 PFC Sigma and 453 Attune total knee replacement were performed during 2006 to 2021 with minimal 1-year follow-up in Tuen Mun Hospital and Pok Oi Hospital, Hong Kong. The numbers of patellar clunk syndrome in PFC Sigma and Attune were 19 (3.5%) and 4 (0.88%), respectively. The mean diagnosis time was 19.8 months (3-59) after surgery. Twelve patients were managed conservatively due to tolerable symptoms, with four of them having improvement in symptoms. Eleven patients were managed operatively, with either open or arthroscopic debridement. Symptoms resolved in 9 out of 11 patients (81.8%). Two out of eleven patients (18.2%), who had PFC Sigma performed, reported to have recurrent patellar clunk symptoms.

**Discussion and Conclusion:** The difference of incidence of patellar clunk symptom could be contributed by the improvement of femoral component design of the Attune system.

#### FP4.15

### Outcomes of primary and revision total knee arthroplasty with constrained condylar knee prosthesis: a retrospective review

**Chun Hin Lo, Bruce Yan Ho Tang**

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**Introduction:** The constrained condylar knee (CCK) implants are becoming more frequently used but the long-term outcomes are inadequately reported. A retrospective review of complex primary and revision total knee arthroplasty with use of Legacy Constrained Condylar Knee prosthesis (LCCK; Zimmer) was performed to evaluate the functional and radiological outcomes, complications, and prosthesis survival.

**Methods:** A cohort of 54 primary total knee arthroplasty (TKA) and 37 revision TKA cases were performed between December 2002 to March 2021 using the second-generation CCK prosthesis. The cases without using the constrained insert were excluded. Functional outcome comparison includes range of movement, Knee Society knee score, function score and complications. Survival analysis was performed using revision surgery for any reason as censoring criteria.

**Results:** The mean follow-up duration was 4.8 years (1.0-9.9 years) in primary TKA group and 6.2 years (1.0-18.6 years) in revision TKA group. There was significant improvement of Knee Society knee score and function score in both primary and revision TKA group. The overall complication rate was 7.5% in primary TKA group and 35.1% in revision TKA group. Aseptic loosening was found in six cases and periprosthetic joint infection in five cases. Kaplan-Meier survivorship analysis estimated the overall mean survival was 17.9 years and 10-year survival rate was 93%.

**Discussion and Conclusion:** Complex primary and revision TKA with use of LCCK prosthesis yielded significant reproducible improvement of clinical outcomes. The failure rate was low in primary TKA but relatively higher in revision cases.

#### FP4.16

### Single-dose intravenous dexamethasone reduces early postoperative pain from 8 to 24 hours post total knee replacement: a prospective double-blinded randomised study

Dennis King-Hang Yee,<sup>1</sup> Carson Ka Bon Kwok,<sup>1</sup> Jason Chi Ho Fan,<sup>1</sup> Yuk Wah Hung,<sup>1</sup> Tsz-Lung Choi,<sup>1</sup> Gloria Yan-Ting Lam,<sup>1</sup> Lawrence Chun-Man Lau,<sup>2</sup> Michael Tim-Yun Ong,<sup>3</sup> Christopher Ping Wing Chu,<sup>4</sup> Patrick Shu-Hang Yung<sup>3</sup>

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#### FP4.17

### Tourniquet use only during cementation can improve cement penetration in total knee arthroplasty

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**Introduction:** It has been shown in studies that the use of tourniquet during the whole procedure of total knee arthroplasty can increase the cement penetration. However, it has also been shown that tourniquet use can be associated with complications. The purpose of the study was to find out whether the use of tourniquet only during cementation can increase the cement mantle thickness.

**Methods:** One hundred patients with primary total knee arthroplasty done from June 2020 to March 2021 were retrospectively reviewed. The operating surgeons switched from not using tourniquet to using tourniquet only during cementation for primary total knee arthroplasty during the study period. Fifty patients with the use of tourniquet during cementation were well matched regarding basic characteristics with 50 patients without the use of tourniquet. The primary outcome measure was the cumulative depth of cement mantle penetration of the tibial plateau on postoperative radiographs based on four zones on anteroposterior and two zones on lateral radiographs. Secondary outcome measures included postoperative change in haemoglobin, intra-operative blood loss, and length of stay.

**Results:** The cumulative bone cement penetration averaged 14.35 mm in tourniquet versus 13.42 mm in non-tourniquet groups. The cumulative bone cement thickness was significantly increased in the tourniquet group ( $p=0.038$ ). The intra-operative blood loss, haemoglobin drop, and length of stay revealed similar results between two groups.

**Discussion and Conclusion:** Tourniquet use only during cementation can improve cement penetration significantly. Intra-operative blood loss, haemoglobin drop, and length of stay were not significantly affected by tourniquet use during cementation.

## FP4.18

### Factors affecting successful restrictive kinematic alignment with robotic total knee arthroplasty

**Samuel Yan Jin Fang,<sup>1</sup> Henry Fu,<sup>2</sup> Thomas Wai Kiu Liu,<sup>1</sup> Man Hong Cheung,<sup>2</sup> Amy Cheung,<sup>1</sup> Vincent Wai Kwan Chan,<sup>1</sup> Michelle Hilda Luk,<sup>1</sup> Ping Keung Chan,<sup>1</sup> Kwong Yuen Chiu<sup>2</sup>**

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**Introduction:** Restricted kinematic alignment (rKA) with target mechanical axes between -3° to +6° have been proposed to reduce the impact of outlier knee anatomy on the mechanics and wear of implants. However, there is no consensus for the targets.

**Methods:** All robotic-arm-assisted primary total knee arthroplasty (TKA) for knee osteoarthritis at an academic institution between January 2019 and December 2021 were included. Exclusion criteria included a preoperative valgus alignment. Coronal alignment and osteophyte sizes were measured on preoperative weight-bearing long-films. Intraoperative screen-captures before and after osteophyte removal were collected.

**Results:** A total of 244 consecutive TKAs (194 patients) were included, mean age was  $65.3 \pm 5.6$ . Female-to-male ratio was 1.7:1. The mean preoperative alignment was  $11.9^\circ \pm 5.1^\circ$  varus and the mean alignment after osteophyte removal was  $5.1^\circ \pm 3.4^\circ$  varus, with a mean deformity correction of  $6.8^\circ \pm 3.7^\circ$ . rKA was achieved in 36.9% TKAs at a target of  $\leq 3^\circ$  varus and up to 72.1% at  $\leq 6^\circ$  varus. Preoperative varus deformity was lower in TKAs that achieved rKA across all target alignment ( $p < 0.05$ ) and was positively correlated with degree of deformity correction after osteophyte removal ( $p < 0.01$ ). The mean medial tibial osteophyte size was  $6.1\% \pm 2.9\%$  and was statistically smaller in all groups that achieved rKA across all target alignments ( $p < 0.05$ ). It is positively correlated with preoperative varus alignment ( $p < 0.01$ ) and degree of deformity correction ( $p < 0.01$ ).

**Conclusion:** Preoperative varus deformity and medial tibial osteophyte size are important factors when adopting a rKA protocol. For moderate to severe varus deformities, additional medial soft tissue release or reduction osteotomy should be considered.

**FP4.19**

**Reliability and validity of pre-excision gap balancing assessment in robotic assisted total knee replacement**

**Dennis King Hang Yee,<sup>1</sup> Bernard Wai Tat Yung,<sup>1</sup> Gloria Yan Ting Lam,<sup>1</sup> Tsz Lung Choi,<sup>1</sup> Wai Wang Chau,<sup>2</sup> Lawrence Chun Man Lau,<sup>2</sup> Michael Tim Yun Ong,<sup>2</sup> Patrick Shu Hang Yung<sup>2</sup>**

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**Introduction:** The aim of this study was to determine the intra and inter-observer reliability in performing the gap balancing with the CORI robotic-assisted total knee replacement (TKR).

**Methods:** Data from gap assessment during CORI TKR planning stage in 19 patients with primary knee osteoarthritis were collected prospectively from January 2022 to July 2022. The values for medial and lateral compartment gap during flexion and extension were recorded. Five orthopaedics specialists with at least ten CORI TKR experience (chief surgeon) and five orthopaedics trainees (assistant) participated. The chief surgeon applies varus and valgus force throughout the range of motion. The gap assessment data was labelled as S1, followed by the assistant (A1), and repeated by chief surgeon (S2) again. Intra-rater reliability between the two trials in chief surgeons were analysed using intra-class correlation and 95% confidence interval (CI) and Cohen's Kappa values with 95 CI. Inter-rater reliability were calculated using intra-class correlation in a two-way random-effect model, assuming a single measurement and absolute agreement. Cronbach's alpha was calculated to look for inter-rater agreements.

**Results:** Repeated measurements in surgeons were excellent in extension medial (ICC single measurement=0.901, p<0.01), good in flexion medial and flexion lateral. Agreement was weak in extension lateral. Inter-rater reliability between surgeons and assistants, and among surgeons having two trials and assistant showed excellent agreements in terms of ICC and Cronbach's alpha.

**Discussion and Conclusion:** No significant difference is observed in performing the gap balancing with the CORI robotic-assisted TKR between surgeons and assistants.

#### FP4.20

#### All intraincisional pinning technique for robotic arm assisted total knee arthroplasty

**Holy Ming Hei Chan,<sup>1</sup> Henry Fu,<sup>2</sup> Amy Cheung,<sup>3</sup> Vincent Wai Kwan Chan,<sup>3</sup> Man Hong Cheung,<sup>2</sup> Ping Keung Chan,<sup>2</sup> Kwong Yuen Chiu<sup>2</sup>**

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**Introduction:** Robotic arm-assisted total knee arthroplasty (RATKA) has gained recent popularity. Attachment of reflective arrays requires insertion of additional bone pins over the tibia and femur. Tibial extraincisional (TE) pinning may lead to patient dissatisfaction with an additional wound with risk of pin site infection. We present the early results of a novel all intraincisional (II) technique for RATKA.

**Methods:** This was a retrospective study comparing all II pinning technique versus TE technique on RATKA performed at the Duchess of Kent Children's Hospital Joint Replacement Centre between January 2021 and April 2022 with a minimum follow-up of 3 months. Primary outcome measure was wound complications and Southampton wound score. Secondary outcome measures included postoperative Knee Society knee score (KSKS) and functional assessment score (KSFA).

**Results:** A total of 61 II and 52 TE RATKA cases were reviewed. Overall wound complication rate was 5%. Both II and TE groups each had 3 minor wound complications that required local debridement ( $p=0.38$ ) with TE group showing pin tract related wound problems in 4%. None of the patients experienced early periprosthetic joint infection, severe pin tract infection, pin breakage or tibial fractures. No incidents of bumped tibial arrays occurred in either group. Postoperative KSKS ( $p=0.21$ ) and KSFA ( $p=0.58$ ) at 3 months did not differ between the two groups, while mean postoperative KSKS at 6 months was significantly higher for II group ( $p=0.01$ ).

**Discussion and Conclusion:** Intraincisional pinning technique in robotic surgery omits the need for extra tibial wounds without additional risk.

#### FP4.21

#### Determining the risk factors for hyperglycaemia and glucose variability after total knee arthroplasty with continuous glucose monitoring

**Vincent Wai Kwan Chan,<sup>1</sup> PK Chan,<sup>2</sup> Henry Fu,<sup>2</sup> MH Cheung,<sup>2</sup> Amy Cheung,<sup>1</sup> Michelle Hilda Luk,<sup>1</sup> KY Chiu<sup>2</sup>**

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**FP4.22****What are the reasons and risk factors of 30-day unplanned hospital readmission after primary TKA? A retrospective review from 2001 to 2020**

**Omar Wai Kiu Tsui,<sup>1</sup> Ping Keung Chan,<sup>1</sup> Jeffrey Ho Yu Leung,<sup>1</sup> Vincent Wai Kwan Chan,<sup>2</sup> Amy Cheung,<sup>2</sup> Michelle Hilda Luk,<sup>2</sup> Man Hong Cheung,<sup>1</sup> Henry Fu,<sup>1</sup> Kwong Yuen Chiu<sup>1</sup>**

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**Introduction:** Total knee arthroplasty (TKA) is one of the most common orthopaedic procedures internationally, since there is an increased prevalence of osteoarthritis due to global ageing. Globally, there were many studies focusing on the causes of readmission of TKA-patients post-surgery within 30 days, yet none has been conducted in Hong Kong. Our study aimed to investigate the 30-day readmission rate, causes and risk factors of post-TKA readmission in Hong Kong.

**Methods:** TKA patients who have undergone surgery in a local university-based hospital between 2001 and 2020, were retrospectively reviewed. These patients were identified by the Clinical Data Analysis and Reporting System and Electronic Patient Records. Their data was analysed to find out the 30-day readmission rate, risk factors and causes of readmission.

**Results:** Among all TKA-patients, the female-to-male ratio was 2815:1012 (73.6%:26.4%), with an average age of 71.11 (standard deviation=8.82). Around 3.4% of TKA-patients was readmitted to hospitals through A&E unplanned within 30 days of TKA, the common causes of readmission were knee pain (33.1%), knee swelling (26.2%) and gastrointestinal-related conditions (8.5%). Patients with older age (odds ratio [OR]=1.63, p=0.01), hypertension (OR=2.08, p<0.001) were more likely to be readmitted.

**Discussion and Conclusion:** The readmission rate of the studied hospital was 3.4%, which was comparable to other reported places in literatures. Patient education should be strengthened; peri-operative pain management could be fully optimised to minimise hospital readmission; prevention of fall, cautious prescription of painkillers and enhanced nursing care were suggested to prevent readmissions.

## Free Paper Session V: Paediatric Orthopaedics

### FP5.1

#### **“Toe-sock” dressing for thumb polydactyly patients**

**Jeremiah Seeway Chan, Esther Ching San Chow**

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**Introduction:** Dressing can be challenging after surgical treatment for thumb polydactyly. The patients requiring surgical intervention are usually at age 1 to 2 years, where they tend to loosen and dislodge their dressing after operation with active movement and self-removal of dressing. It is essential to keep a secure and comfortable dressing for the patient to ensure optimal healing. The aim of this study was to review the outcome of “toe-sock” dressing for these cases.

**Methods:** Cases of patients with thumb polydactyly who received surgery from January 2021 to June 2022 were included in this review. A “toe-sock” dressing is applied as the outer layer over a simple boxer glove dressing in all cases. The tip of each “toe-sock” is cut to expose fingertips for observation of circulation. Clinical outcome and parent’s satisfaction were reviewed.

**Results:** There were a total of 9 patients and 13 thumbs operated (4 cases of bilateral involvement). The dressing provided adequate protection and allowed immobilisation without the need for casts or splints. Patient outcome was satisfactory, with no dressing complications such as dressing dislodgement, wound infection, and no reported readmissions. The overall parent satisfaction score was also excellent.

**Discussion and Conclusion:** The “toe-sock” dressing is a cheap and readily available option, whilst still providing adequate protection for the patient. The colourful cartoon over the “toe-sock” not only provides a secure dressing for optimal healing, but allows patients to treat the dressing as a companion and not remove it, improving clinical outcomes and reducing parent anxiety.

### FP5.2

#### **Applying novel use of wide awake local anaesthesia no tourniquet (WALANT) in neuromuscular and syndromic patients requiring complex upper limb surgeries—a feasibility study with technical notes**

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**FP5.3****Juvenile hallux valgus—can we arrest its progression and avoid complex reconstruction in adulthood?****Lucci Lugee Liyeung***Department of Orthopaedics and Traumatology, Prince of Wales Hospital*

Juvenile hallux valgus is a common condition encountered in the paediatric orthopaedics clinic. Traditionally, surgical reconstruction is done at skeletal maturity which involves first metatarsal osteotomy and distal soft tissue realignment. However, due to high recurrence rates, conservative treatment with physiotherapy and braces has been the mainstay, albeit often leading to further deterioration. Guided growth by lateral epiphysiodesis of the first metatarsal base is a minimally invasive method to achieve realignment of the inter-metatarsal angle (IMA) and hallux valgus angle (HVA) in skeletally immature patients. The procedure done at our centre involves creation of a marginal tether at the lateral physis by ablation and eccentric screw fixation. This results in asymmetrical longitudinal growth of the physis, leading to correction of angular deformity over time, thus reducing the chance of requiring a more major operation (osteotomy) at skeletal maturity. This was a single centre early pilot study of the guided growth procedure, done by the same specialist. A total of eight skeletally immature cases were recruited, aged 8 to 13 years at the time of operation. IMA and HVA were measured for both feet before surgery and at each follow-up. They were followed up at 2 weeks, 2 months, 6 months, and 1 year after surgery. The mean improvement at 1 year was 3.75 degrees in IMA; and 5.75 degrees in HVA. There were no complications in all of the cases. It is concluded that the first metatarsal base guided growth procedure is beneficial to skeletally immature patients with symptomatic juvenile hallux valgus.

**FP5.4****A looming challenge for paediatric orthopaedic surgeons: hip instability in SMA type II patients receiving Nusinersen****Evelyn Kuong,<sup>1</sup> Noah So,<sup>2</sup> Hayley Ip,<sup>3</sup> Sophelia Chan<sup>4</sup> Wang Chow<sup>1</sup>**<sup>1</sup>*Department of Orthopaedics and Traumatology, The Duchess of Kent Children's Hospital at Sandy Bay*<sup>2</sup>*Department of Orthopaedics and Traumatology, Queen Mary Hospital*<sup>3</sup>*Department of Paediatrics and Adolescent Medicine, Queen Mary Hospital*<sup>4</sup>*Department of Paediatrics and Adolescent Medicine, The University of Hong Kong*

**Introduction:** Spinal muscular atrophy (SMA) results from insufficient expression of SMN protein. Hip dislocations in SMA type II were of little consequence as all were eventually wheelchair-bound. Nusinersen is a novel drug which promotes the expression of SMN protein. Nusinersen was approved for use in SMA II in Hong Kong by July 2019. This study documents a new natural history of hip instability.

**Methods:** Migration Index was measured from pelvic X-rays in those who never received Nusinersen compared with those that did.

**Results:** Of 15 SMA II patients who never received Nusinersen, all were wheelchair-bound in childhood. Of ten patients who received a mean of 3.17 years of Nusinersen, five had improved ambulation (50%), two had static ambulation (20%), and three patients suffered deteriorating ambulation (30%). Mean age at starting Nusinersen was 6.75 years. In all, 17 untreated hips (56.7%) were reduced, 5 were subluxed (16.7%), and 8 were frankly dislocated (26.6%) by adulthood. Of 20 Nusinersen-treated hips, only 1 hip was reduced (5%). 16 hips were subluxed (80%) and 3 were dislocated before starting treatment (15%). Of the subluxed hips, 9 progressively worsened with Nusinersen (56%).

**Conclusion:** Historically, SMA II patients invariably had deteriorating ambulation. With Nusinersen, 70% of patients maintained or improved their ambulation. In total, 43% of SMA type II patients have hip instability without treatment. With Nusinersen, 95% of hips were unstable after only 3 years of treatment. Despite improvement in overall muscle power by Nusinersen, relatively weaker hip abduction persist. With increased walking tolerance, more hip instability is seen.

## FP5.5

### Adolescent idiopathic scoliosis patients had higher metabolic cost and easier fatigability during high-intensity interval training

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**Introduction:** The complex spinal deformity of patients with adolescent idiopathic scoliosis (AIS) could lead to a lower physical capacity and an increase in energy expenditure. E-Fit exercise intervention (E-Fit), a modified high-intensity interval training (HIIT), was designed for patients with AIS to improve their physical health. The current study aimed to investigate the cardiovascular responses in patients with AIS when performing E-Fit.

**Methods:** Twenty-two females (10 patients with AIS and 12 healthy controls) aged between 10 to 16 were recruited. Subjects were instructed to perform two trials of E-Fit. Demographic data and clinical features of AIS were obtained. Breath-by-breath gas exchange parameters including oxygen consumption (VO<sub>2</sub>) and heart rate (HR) were measured using a telemetric portable gas analyser system. Rate of perceived exertion (RPE) using modified Borg Scale was used to assess physical exertion during exercise.

**Results:** Patients with AIS had earlier onset of menarche ( $p=0.01$ ), higher visceral adipose tissue ( $p=0.04$ ) and percentage body fat ( $p=0.03$ ) as compared to healthy controls. When performing E-Fit exercises, adjusted mean of the highest measured VO<sub>2</sub> was numerically higher than healthy controls reaching statistical significance in the second trial ( $p=0.01$ ) of E-Fit. Patients with AIS were observed to have a decline in HR peak, HR average and RPE in the second trial. Both groups exercised at a similar percentage of VO<sub>2</sub> peak (62.44%-65.94%) in both trials.

**Conclusion:** Patients with AIS showed higher oxygen consumption on average when performing E-Fit which indicated AIS might have a higher metabolic cost and get fatigue sooner than controls.

## FP5.6

### More prevalent and severe low bone mineral density in boys with severe adolescent idiopathic scoliosis than girls: a retrospective cohort study with 798 surgical patients

Zhichong Wu, Kenneth GuangPu Yang, Jack Chun Yiu Cheng, Yong Qiu, Wayne YW Lee, Tsz Ping Lam, Zezhang Zhu

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**Introduction:** A total of 0.1% to 0.8% of patients with adolescent idiopathic scoliosis (AIS) progress to severe stage without clear aetiopathological mechanisms, and girls with AIS are shown to be more vulnerable to curve progression than boys. Recent studies suggest that AIS girls have systemic and persistent low bone mineral density (BMD) which has been demonstrated to be a significant prognostic factor of curve progression. The present study aimed to (1) investigate prevalence of low BMD in patients with severe AIS, and to (2) assess sexual dimorphism of BMD in severe AIS.

**Methods:** A total of 798 patients (140 boys vs 658 girls) with AIS who reached surgical threshold (Cobb  $\geq 40^\circ$ ) were recruited. BMD were assessed using BMD Z-score from dual-energy X-ray absorptiometry (DXA).

**Results:** Overall prevalence of BMD Z-score  $\leq -2$  and  $\leq -1$  were 8.1% and 37.5%, respectively. AIS boys had significantly lower BMD Z-score ( $-1.2 \pm 0.96$  vs  $-0.57 \pm 0.92$ ) and higher prevalence of low BMD (Z-score  $\leq -2$ : 22.1% vs 5.2%,  $p < 0.001$ ; Z-score  $\leq -1$ : 59.3% vs 32.8%,  $p < 0.001$ ) than girls. Male was shown to be an independent risk factor for BMD Z-score  $\leq -2$  (odds ratio [OR]=5.27,  $p < 0.001$ ) and Z-score  $\leq -1$  (OR=2.4,  $p < 0.001$ ).

**Discussion and Conclusion:** The present large cohort of surgical patients with AIS suggest low BMD is more prevalent and severe in boys than in girls with severe curves. Our findings indicate that low BMD could be a more predictive factor for curve progression to the surgical threshold in boys than girls with AIS.

**FP5.7**

**Low baseline serum 25OHD level is associated with better response of bone qualities to vitamin D supplementation during the peripubertal period in adolescent idiopathic scoliosis**

**Kenneth Guangpu Yang, Wayne Yuk-Wai Lee, Alec Lik-Hang Hung, Jack Chun-Yiu Cheng, Tszi-ping Lam**

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**FP5.8**

**Ultrasound for quantitative assessment of spinal curvatures in patients with idiopathic scoliosis—a systematic review and meta-analysis**

**James Haley Young, Jeff Ching Hei Lai**

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**Introduction:** The increased recent attention to the application of ultrasound for quantitative measurement of spinal curvatures has warranted an up-to-date and more comprehensive systematic review on (1) the reliability of ultrasound; (2) the validity of ultrasound using radiographic measurement as gold standard in idiopathic scoliosis patients; and (3) the use of various anatomical landmarks in ultrasound measurement.

**Methods:** Four databases were searched and the QUADAS-2 quality assessment tool was adopted. Intra-class correlation coefficients and Pearson correlation coefficients between ultrasound and radiography results were extracted for meta-analysis of reliability and validity. Subgroup analyses were conducted based on (1) three anatomical landmarks used: spinous process (SP), transverse processes (TP) and centre of lamina (COL); and (2) the two ultrasound planes reported: coronal and sagittal.

**Results:** A total of 29 correlation analyses comprising 2575 subjects were extracted from 17 eligible articles. The mean inter-rater reliability of ultrasound measurement was  $0.93 \pm 0.04$ . Pooled correlation overall was 0.905, exhibiting substantial heterogeneity ( $I^2=94.29\%$ ,  $p<0.001$ ). Subgroup analyses yielded pooled correlations of 0.934, 0.894, and 0.932 for COL, SP, and TP landmarks, respectively, and 0.910 and 0.848 for coronal and sagittal curvatures, respectively. The risk of bias was rated low-to-unclear, with possible publication bias.

**Discussion and Conclusion:** The evidence deems ultrasound a promising non-invasive method with satisfactory validity and reliability for measuring both planes at all studied landmarks. Nevertheless, further development of ultrasound needs to be validated with large-scale studies across different demographics.

## FP5.9

### **Effectiveness of supine direct cast moulding with mechanical frame and workshop custom modification for scoliosis corrective brace fabrication**

**Bobby Kin Wah Ng,<sup>1</sup> Man Wai Wong,<sup>2</sup> Ka Chun Wong<sup>2</sup>**

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**Introduction:** Brace treatment for scoliosis has been shown to be effective in the management of idiopathic adolescent scoliosis in. The brace success also depends on curve correction and brace compliance. This paper aimed to investigate the effectiveness of a supine direct cast mould corrective technique and custom modification workflow in corrective brace fabrication.

**Methods:** We retrieved all patients who had been treated with this workflow to study the change of the curves magnitudes from pre-brace, in cast, in brace and final brace correction. Patient demographics, maturity status, body mass index, curve types and characteristics are retrieved from clinical records for analysis.

**Results:** There are a total of 12 girls and 1 boy. At presentation the mean age is 13.3 (9.9-16.6) years, Year Since Menarche (YSM) 0.83 (0-1.5), BMI 17.5 (13.7-21.3) kg/m<sup>2</sup>, Risser stage 1.62 (0-4). The mean Cobb angles ± SD / percentage correction of 1 thoracic curves are pre-brace 30.8 ± 9.1, in cast 19.6 ± 9.5/37%, in brace 18.9 ± 8.6/39.4% and in brace final 23 ± 10.5/27.9% and of lumbar curves are pre-brace 37.5 ± 9.6, in cast 19.1 ± 9.2/46.6%, in brace 16.3 ± 6.8/ 54% and in brace final 19.6 ± 8.2/45.1%. There are 5 King 2 and 8 King 1 curve types. The length of follow-up 0.53 (0-2) years.

**Discussion and Conclusion:** There has been continuous modification of the moulding frame design and planning of correction strategy. The curve types and number of cases represent common types but limited cases at present.

## FP5.10

### **A novel prediction model for curve progression to surgical threshold in adolescent idiopathic scoliosis derived from unsupervised machine learning of bone microarchitecture phenotypes—a 6-year longitudinal study of 323 patients followed till skeletal maturity**

**Kenneth Guangpu Yang,<sup>1</sup> Wayne Yuk-Wai Lee,<sup>1</sup> Alec Lik-Hang Hung,<sup>1</sup> Anubrat Kumar,<sup>2</sup> Chung-Wai Raymond Wan,<sup>2</sup> Jack Chun-Yiu Cheng,<sup>1</sup> Tsz-Ping Lam<sup>1</sup>**

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## FP5.11

### **Deep learning based adolescent idiopathic scoliosis patients Cobb angles prediction model**

**Elvis Chun-sing Chui, Tsz-ping Lam, Wayne Yuk-wai Lee, Sheung-wai Law, Alec Lik-hang Hung, Kyle Ka-kwan Mak, Hans Chung-heng Au, Yuk-man Chan, Jack Chun-yiu Cheng, Patrick Shu-hang Yung**

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**FP5.12**

**A randomised double-blinded placebo-controlled trial with 6 years of longitudinal follow-up on the effect of 2 years of calcium and vitamin D supplementation on the bone density, bone microarchitectural profiles, and curve progression in 330 girls with adolescent idiopathic scoliosis (AIS)**

**Raymond Chung-wai Wan,<sup>1</sup> Jack Chun-yiu Cheng,<sup>2</sup> Wayne Yuk-wai Lee,<sup>2</sup> Alec Lik-hang Hung,<sup>1</sup> Benjamin Hon-kei Yip,<sup>3</sup> Nelson Leung-sang Tang,<sup>4</sup> Kenneth Kin-wah To,<sup>5</sup> Guangpu Yang,<sup>2</sup> Yong Qiu,<sup>6</sup> Tsz-ping Lam<sup>2</sup>**

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**FP5.13**

**Paediatric anterior cruciate ligament reconstruction—deriving the optimal treatment strategy based on 15-year study**

**Lawrence Chun-Man Lau, Jack Wai-Wang Chau, Alec Lik-Hang Hung, Michael Tim-Yun Ong, Patrick Shu-Hang Yung**

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**FP5.14**

**A novel play-kit for paediatric patients with cast treatment—can cast-related complications be reduced?**

**Lucci Lugee Liyeung**

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The paediatric population has a high risk of cast related complications, including cast anxiety, poor compliance in keeping cast dry, tendency to insert foreign objects or break cast. According to the literature, up to 97% of reasons for unplanned cast change in paediatric patients were due to lack of education regarding cast care. The aim of this study was to develop a system for paediatric patients that increases compliance in cast maintenance. A novel play kit was designed for patients aged <12 years with extremities fractures treated with cast. The content consists of a picture book and cards set. The book features a journey of a patient with forearm fracture treated with cast. It provides education on cast maintenance, advice on activities using the uninjured hand, finger mobilisation exercises, description of the procedure of cast removal, and distraction tips and games. The card set is aimed to motivate the patient to adhere to compliance. It contains collection card for stickers and stamps if the patient accomplishes the goal of compliance. Patients and parents are given a feedback form. Data were collected in the paediatric trauma clinic in one centre in Hong Kong. All of the patients had cast applied for 4 to 6 weeks. Above 90% reported satisfactory feedback and strongly agreed that it provides adequate education on the maintenance of cast, reduced stress, and anxiety on the child during the treatment. Above 50% agreed that the process of stamp collection improved the motivation on compliance. All of the patients enjoyed the play kit.

## FP5.15

### The use of the distal radius ulna (DRU) classification system in predicting final limb length—a user friendly method

**Noah Lok Wah So,<sup>1</sup> Janus Siu Him Wong,<sup>2</sup> Evelyn E Kuong,<sup>1</sup> Prudence Wing Hang Cheung,<sup>2</sup> Jason Pui Yin Cheung,<sup>2</sup> Michael Kai Tsun To,<sup>2</sup> Wang Chow<sup>1</sup>**

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## FP5.16

### One-stage single-cut osteotomy and lengthening in upper limb deformity correction: 2 cases

**Michael Chu-kay Mak, Alec Hung**

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## FP5.17

### Can post-neonatal clinical and sonographic screening parameters effectively predict hip dysplasia in children at their walking age?

**Anubrat Kumar, Alec Lik-hang Hung, Tsz Ping Lam, Kenneth Guangpu Yang**

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## FP5.18

### Common presentations of developmental dysplasia of the hip and their clinical significance: a retrospective review

**Siu On Yip, Ching Man Yeung, Arthur King Hay Ma**

*Department of Orthopaedics and Traumatology, Tuen Mun Hospital*

**Introduction:** Developmental dysplasia of the hip (DDH) is one of the most common paediatric orthopaedic disorders, which if left untreated can lead to accelerated osteoarthritis and disability. In Hong Kong, a selective ultrasound screening programme is adopted. Hip clicks, tight hips and asymmetrical skin crease are the three most common presentations for referral to Orthopaedics. However, their clinical significance in screening of DDH is controversial in the literature.

**Methods:** We reviewed records of 1544 patients referred to the orthopaedics clinic in TMH for screening of DDH in 2015-2020. The reasons for screening were classified into hip clicks, tight hip, asymmetrical skin crease and leg-length discrepancy. Diagnosis of DDH was made by clinical examination and ultrasonography.

**Results:** Among the 1544 infants referred for screening, 14 were diagnosed with DDH. Female to male ratio was 12:2. Among those presented with hip clicks, 1.2% were diagnosed with DDH. In all, 0.79% (5 out of 629) of infants presented with tight hips were diagnosed with DDH, all were female and 4 out of 5 were classified as Graf type III or IV. There is only one case of DDH among those referred for asymmetric skin crease.

**Discussion:** Although often considered a nonspecific finding, among infants presented with hip clicks, there is a significantly higher incidence of DDH (1.2%) as compared to the estimated local incidence of 0.87/1000 live births from previous studies. Moreover, when female infants with DDH presented with tight hips, it is associated with a more advanced disease. Early referral for ultrasound screening should be considered.

## FP5.19

### A decade's review on the ever changing paediatric pyogenic osteomyelitis and septic arthritis in New Territories West Cluster

**Wing Yee Choy, Ching Man Yeung, Arthur King Hay Ma, Alexander Kai Yiu Choi**

*Department of Orthopaedics and Traumatology, Tuen Mun Hospital*

**Introduction:** Paediatric septic arthritis and osteomyelitis are orthopaedic emergencies that require prompt intervention to avoid devastating consequences. This study aimed at updating the epidemiology of paediatric septic arthritis and osteomyelitis in NTWC; as well as evaluating risk factors associated with poor outcomes.

**Methods:** This is a retrospective study evaluating 38 patients aged 0 to 16 years, admitted to hospitals of NTWC between 2011-2020, with diagnosis of osteomyelitis and/or septic arthritis. Patients with incomplete treatment, lost on follow-up, infection related to prior surgery, Mycobacterium infection were excluded. Outcomes including clinical and radiological remission, complications were evaluated.

**Results:** Among the 38 patients identified, there were 17 cases of septic arthritis (44.7%), 16 cases of osteomyelitis (42.1%) and 5 cases of concomitant septic arthritis and osteomyelitis (13.2%). Fever (50%) and elevated WCC (68.4%) may not be sensitive parameters in achieving diagnosis, compared with elevated CRP (78.9%) or ESR (84.6%). Among the culture positive cases, the most common causative organism was MSSA (55%), while emerging MRSA infection (15%) was noted. In all, 28 cases (73.7%) underwent operation, with 10 cases (26.3%) requiring repeated operations. Long-term complications including physeal arrest, joint destruction was identified in eight cases (21.1%), which were associated with delayed presentation and MRSA infection.

**Discussion and Conclusion:** Over the past decade, emerging MRSA infection was observed, which is a risk factor associated with poor outcome. Typical clinical presentation may not be present in all cases. Clinicians should always have a high index of suspicion, together with biochemical and radiological investigations in making prompt diagnosis.

## FP5.20

### Osteochondroma: a clinical and radiological review in a Chinese paediatric cohort

**Sum Lik Cheung, Esther Ching San Chow, Lin Wing Lok, Yung Chak Hsu**

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**FP5.21**

**Paediatric trigger thumb: outcome of conservative treatment**

**Kwing Cham Ng,<sup>1</sup> Tsoi Sze Yuen,<sup>2</sup> Pui Pui Kwok,<sup>1</sup> Arthur King Hay Ma,<sup>1</sup> Alexander Kai Yiu Choi<sup>1</sup>**

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**Introduction:** The study aimed to evaluate the effectiveness of conservative treatment on paediatric trigger thumb, and to propose the duration of conservative treatment before surgical intervention, as well as to identify risk factors for poor prognosis.

**Methods:** Records of all paediatric trigger thumb cases referred to NTWC Department of Physiotherapy from January 2015 to December 2020 were identified. All referred cases received physiotherapy with stretching and strapping. Surgical release was offered if conservative treatment failed. Postoperative, asymptomatic or syndromal cases were excluded.

**Results:** A total of 94 patients with 114 trigger thumbs were included. In all, 76 cases (66.7%) achieved complete resolution with physiotherapy. In total, 15 cases (13%) were eventually treated with surgical release. Three of them had residual triggering and none had residual flexion deformity. Mean duration of physiotherapy for successfully treated trigger thumbs with conservative treatment was 11.4 months (8 months for Grade III and 13 months for Grade IV). Age of onset more than 18 months correlates with a higher rate of failed conservative treatment, while initial flexion deformity for grade IV trigger thumb does not show a significant correlation with clinical outcome.

**Discussion and Conclusions:** Resolution rate of paediatric trigger thumb treated with physiotherapy is 67% in NTWC. We recommend that at least 8 months and 13 months of physiotherapy is suggested for grade III and grade IV trigger thumb, respectively. Surgical release could be offered earlier in patients with age of onset of more than 18 months. Physiotherapy should be suggested for all grade IV trigger thumbs regardless of initial flexion deformity.

## Free Paper Session VI: Sports Medicine II

### FP6.1

#### Impact of COVID-19 on sports and arthroscopic surgery

**Thomas Wai Kiu Liu,<sup>1</sup> Peter Kam To Siu,<sup>1</sup> Wai-Pan Yau,<sup>2</sup> Tak Man Wong<sup>2</sup>**

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**Introduction:** Elective orthopaedic service has been reduced during the COVID-19 pandemic, and sports activities of the population have been minimised due to the social distancing strategies. This study aimed to quantify the change in surgical volume and its distributions before and during the COVID-19 pandemic.

**Methods:** Data, including age and gender of the patients and the types of operation, of all the surgeries performed by the Division of Sports and Arthroscopic Surgery in our institution from September 2017 to June 2022 was retrieved. The first 29 months of the 58 months period were classified as pre-COVID-19, because the Hong Kong SAR Government declared the highest emergency response level on 25 January 2020.

**Results:** A total of 292 operations were performed by the division during the pre-COVID-19 period, while 231 during the COVID-19 period. The total number of sports surgery performed reduced by 20.9%, from  $10.1 \pm 4.0$  to  $8.0 \pm 3.8$  per month ( $p=0.042$ ). The numbers of rotator cuff tear surgery and reverse shoulder arthroplasty (RSA) per month were reduced by 41.6% ( $p=0.022$ ) and 89.3% ( $p=0.043$ ), respectively. Anterior cruciate ligament surgery was reduced by 20.0% ( $p=0.093$ ). There was no difference in the proportions of all types of operations studied between pre-COVID-19 and COVID-19 cohorts, except significant reduction in the proportion of RSA during COVID-19 ( $p=0.044$ ).

**Discussion and Conclusion:** The number of sports surgeries was reduced during COVID-19 pandemic, however, the distribution of the types of operation was similar. Sports-related injuries were reduced due to social distancing policy; therefore, all sports surgeries were affected to various degrees during COVID-19 pandemic.

### FP6.2

#### Physical and biomechanical factors related to postural stability during simulated horse racing in Hong Kong apprentice jockeys

**Xin He,<sup>1</sup> Kam-Ming Mok,<sup>2</sup> Wing Yun Bud,<sup>1</sup> Justin Wai Yuk Lee,<sup>1</sup> Ka Ka Chan,<sup>1</sup> Yue Yan Chan,<sup>3</sup> Benjamin Ka Ki Lau,<sup>4</sup> Herman Mun Cheung Lau,<sup>4</sup> Patrick Shu-Hang Yung<sup>1</sup>**

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## FP6.3

### The incidence and experience of sports related shoulder injuries in cricket

Reshang Goonetilleke,<sup>1</sup> Kam Ming Mok,<sup>2</sup> Patrick Shu-Hang Yung<sup>1</sup>

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<sup>2</sup>Office of Student Affairs, Lingnan University

**Introduction:** Cricket has evolved to become one of the top sports played in Asia and is therefore rapidly gaining popularity in Hong Kong. As more people in Hong Kong start to participate in cricket, they will experience both the ups and downs of the sport. The purpose of this research study was to understand the injury experiences of the local cricketing population.

**Methods:** The study design was an online questionnaire with 51 total subjects. The method of obtaining data was the questionnaire which was divided into seven sections including a consent form, basic information, shoulder injury history, physiotherapy guidance, and a self-reported injury prevention adherence scale.

**Results:** The results were not favourable as the total number of subjects may have been too low causing the odds ratio and confidence intervals to not add up. Conclusions can still be derived although the result was not favourable. The results showed that the participants did not lack education as most of them sought out therapy after obtaining an injury.

**Discussion and Conclusion:** As the study focuses on the injury experience of the cricketing community, this may be valuable data. In terms of clinical relevance, most of the injury data from this study was of minor or overuse injuries and therefore intervention programmes may want to focus more on the prevention of these specific injuries instead of focusing on major injuries of the shoulder such as dislocations and ruptures.

## FP6.4

### The use of foam roller on patellofemoral pain syndrome for Hong Kong recreational and professional runners

Kam Ming Mok,<sup>1</sup> Man-Kiu Li,<sup>2</sup> Patrick Shu-Hang Yung<sup>2</sup>

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**Introduction:** Running had become one of the most popular and practiced sports worldwide. However, 59% of Hong Kong runners including recreational and professional runners suffered patellofemoral pain syndrome. Foam rolling has steadily gained in popularity as an intervention to increase range of motion and reduce pain. Self-myofascial release (SMFR) is an active effect from foam rolling and relatively new technique for mobilising soft tissue. The study was to investigate on the popularity and public awareness of proper usage of foam roller on patellofemoral pain syndrome for Hong Kong recreational and professional runners.

**Methods:** Questionnaire was designed in both Chinese and English version investigating on the popularity and public awareness of proper usage of foam roller on patellofemoral pain syndrome (runner's knee) for Hong Kong recreational and professional runners.

**Results:** Fifty-eight complete data were being collected from the questionnaire. The result showed that close to half of foam roller users (n=25) understand the proper usage of foam roller. Also, they agreed with the combination of stretching exercises and foam roller would have better muscles recovery effects. Data from the questionnaire were being supported by systematic reviews on patellofemoral pain.

**Discussion and Conclusion:** Further studies were needed to investigate on the comparisons of different interventions with comparison of foam rolling. Furthermore, more evidence is needed to investigate if post-exercise foam rolling was better than pre-exercise rolling.

## FP6.5

### Clinical performance of metal-based patient specific instrumentation for high tibial osteotomy, a retrospective study

**Jane Ching-Yin Tsui, Lawrence Chun-Man Lau, Elvis Chun-Sing Chui, Randy Ng, Jack Wai-Wang Chau, Michael Tim-Yun Ong, Patrick Shu-Hang Yung**

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## FP6.6

### Computer-aided high tibial osteotomy (HTO)—a comparative study of commonly used 3D printing technology and navigation application

**Randy Hin-ting Ng,<sup>1</sup> Edmond Wing-fung Yau,<sup>2</sup> Jack Wai-wang Chau,<sup>1</sup> Christian Xin-shuo Fang,<sup>3</sup> Michael Tim-yun Ong,<sup>1</sup> Patrick Shu-hang Yung,<sup>1</sup> Elvis Chun-sing Chui,<sup>1</sup> Lawrence Chun-man Lau,<sup>1</sup> Florence Ou-suet Pang,<sup>1</sup> Kyle Ka-kwan Mak<sup>1</sup>**

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## FP6.7

### Radiological diagnosis of subscapularis tendon tear

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**Introduction:** Integrity of subscapularis tendon is important in maintaining force coupling effect in the axial plane. However, radiological diagnosis of subscapularis tendon tear has got much less attention than supraspinatus tear.

**Methods:** A total of 50 consecutive cases of arthroscopic rotator cuff repair were included from our institute. Preoperative magnetic resonance imaging (MRI) reports, films and operation reports were reviewed retrospectively.

**Results:** Subscapularis tear was present in 37 cases (76%) and all were repaired arthroscopically. Only 13 of the tears (35%) were diagnosed in the MRI report preoperatively. Among the five radiological primary and associated signs of subscapularis tear, the presence of subcoracoid fluid collection got the best sensitivity (0.78) while the presence of subscapularis muscle fatty infiltration got the best specificity (1.00) of diagnosing subscapularis tear.

**Discussion and Conclusion:** Subscapularis tear is frequently missed during MRI reporting. Identifying the primary signs and associated signs are important to properly establish the diagnosis radiologically.

## FP6.8

### **Smoking is associated with poorer outcome after rotator cuff repair**

**Wai Pan Yau**

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**Introduction:** Despite smoking is known to result in higher re-tear rate after rotator cuff repair (RCR), there are still controversies whether smoking affects clinical outcomes.

**Methods:** A prospective case-control study was performed in patients receiving arthroscopic RCR and postoperative MRI to investigate the (1) association between smoking and RCR re-tear; and (2) the impact of smoking on postoperative clinical outcomes. The presence of full thickness re-tear was assessed in postoperative magnetic resonance imaging (MRI) using Sugaya classification. The secondary outcomes were clinical results at final follow-up (VAS, ASES and active forward flexion, FF).

**Results:** One hundred patients, who received arthroscopic supraspinatus repair and postoperative MRI at a duration of 17 months, were recruited. The mean follow-up was 43 months. The 2-year follow-up rate was 96%. There were 26 smokers and 74 non-smokers. In all, 14 full thickness re-tears were identified. The overall RCR re-tear rate was 14%. The incidence of re-tear was higher in smokers (26.9%) than non-smokers (9.5%) with an odd ratio of 3.6 ( $p=0.027$ ). Significant improvement of VAS, ASES and FF were found in both smoker and non-smoker. Better results were noted in non-smokers, when compared with smokers, in all the clinical outcomes in the remaining 86 patients with intact repair (VAS: 1.4 vs 2.7,  $p=0.006$ ; ASES: 80.9 vs 62.4,  $p<0.001$ , FF: 161 vs 147 degree,  $p=0.013$ ).

**Conclusion:** The incidence of retear after RCR was significantly lower in non-smokers (9.5%) than smokers (26.9%). Clinical outcomes (VAS, ASES, FF) of patients with intact repair were also better in non-smokers.

## FP6.9

### **The effect of 6-week community exercise programme on shoulder function in Hong Kong Chinese elderly**

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**Introduction:** High prevalence of shoulder pain has been reported in elderly, especially in those with diabetes, causing significant impact on patients' daily activities. This study aims to detect the effect of a six-week community exercise programme on shoulder function in Hong Kong Chinese elderly.

**Methods:** A total of 133 participants from local elderly centres were recruited in this project. Shoulder range of motion, isometric strength of shoulder and scapular muscles, SPADI score, SF-36 score, and self-perceived social support were compared before and after a six-week community exercise programme, which include shoulder stretching and strengthening exercises. Results were further compared based on participants' physical condition (whether they have diabetics or shoulder pain).

**Results:** The prevalence of diabetic shoulder problem is 30.7% among participants with diabetics. 112 participants completed the baseline and post-programme assessments. Range of shoulder flexion, internal and external rotation increased after programme ( $p<0.001$ ). Strength of middle trapezius increased when compared to the baseline ( $p=0.018$ ). SPADI score decreased ( $p=0.003$ ) while SF-36 physical function score increased after programme ( $p=0.024$ ). There is no statistically significant difference in improvement of muscle strength, shoulder range of motion, SPADI score, SF-36 score and MSPSS score among participants with or without diabetics and shoulder pain ( $p>0.05$ ).

**Discussion and Conclusion:** The six-week community exercise programme is effective in improving shoulder function and quality of life for Hong Kong Chinese elderly in general.

**FP6.10****Mid-term clinical outcomes of subacromial balloon spacer implantation for massive rotator cuff tear**

**Michelle Kar Lam Li, Lawrence Chun Man Lau, Chun-Kwong Lo, Michael Tim-Yun Ong, Patrick Shu-Hang Yung**  
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**Introduction:** This retrospective, single centre study aimed to assess the mid-term pain relief, functional outcome and complications in patients with massive rotator cuff tear treated with implantation of a biodegradable subacromial balloon spacer, beyond its reported duration for degradation at 1-year post-implantation.

**Methods:** From June 2017 to September 2020, 11 patients with symptomatic massive rotator cuff tears were treated with arthroscopic debridement and implantation of biodegradable subacromial balloon spacer. Five patients also received concomitant cuff repair. The average follow up was 33 months (22-61 months). Outcome measures included preoperative and postoperative visual analog scale (VAS) pain score, University of California at Los Angeles (UCLA) score, Constant score, and shoulder range of motion.

**Results:** The mean VAS pain score improved significantly from 5.4 to 1.4 ( $p=0.0008$ ). The mean UCLA improved significantly from 16.7 to 27.7 ( $p=0.003$ ). The mean Constant score improved significantly from 59.3 to 74.4 ( $p=0.04$ ). There was no significant change in shoulder range of motion. There was one case of spacer migration requiring a second operation for removal, and two cases of re-rupture of repaired rotator cuff tear. There were no cases of allergy, infection, stiffness or neurovascular injury. None progressed to conversion to arthroplasty.

**Discussion and Conclusion:** Arthroscopic implantation of a subacromial balloon spacer in patients with massive cuff tear is a simple, quick, and safe procedure with favourable pain relief and clinical outcome at average follow-up of approximately 3 years, either as a stand-alone procedure or as an adjunct to rotator cuff repair.

**FP6.11****Longitudinal change of effectiveness of acupuncture in patients with rotator cuff disease: a systematic review**

**Cyrus Hung, Lawrence Chun-Man Lau, Jack Wai-Wang Chau, Thomas Wai-Him Yuen, Nicole Chun-Hei Leung, Michael Tim-Yun Ong, Patrick Shu-Hang Yung**  
*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** Acupuncture is a type of traditional Chinese medicine that has the potential to relieve pain in patients with chronic shoulder pain. This review aimed to evaluate the effectiveness of acupuncture in patients with chronic shoulder pain due to rotator cuff disease.

**Methods:** Randomised controlled trials (RCTs) evaluating the effectiveness of acupuncture in patients with chronic shoulder pain due to rotator cuff disease, published from inception to 1 May 2022, were obtained from PubMed, MEDLINE, and EMBASE. The selection process and quality assessment (using the Cochrane risk-of-bias tool 2) were performed independently by two reviewers.

**Results:** Among the 264 RCTs obtained, six of them met the inclusion criteria in this review, involving a total of 642 patients. Three of the studies were judged to have a high risk of bias, two of them with 'some concerns' and one study with a low risk of bias.

**Discussion and Conclusion:** Four studies found significant differences in pain improvement between acupuncture group and comparison group, including timepoints of immediately after treatment and at 1, 2, 3, and 6 months from the start of the study. One study found insignificant differences in improvement of pain between patients receiving acupuncture or electroacupuncture plus exercise and those receiving exercise at 6 months. Another study showed no difference in pain improvement between patients receiving acupuncture and ultrasound, at all-time points. More RCTs are required to evaluate the effectiveness of acupuncture in patients with chronic shoulder pain due to rotator cuff disease.

**FP6.12**

**Worldwide incidence and prevalence of shoulder dislocation variation by race and population: a systematic review and meta-analysis of population-based studies**

**Thomas Wai-Him Yuen, Lawrence Chun-Man Lau, Jack Wai-Wang Chau, Nicole Chun-Hei Leung, Cyrus Hung, Michael Tim-Yun Ong, Patrick Shu-Hang Yung**

*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** Shoulder dislocation is a common orthopaedic injury that potentially differ among various races and population in different part of the world due to variation in genetics and social practice. Estimation the difference of epidemiological burden of shoulder dislocation can serve as a basis for better understanding, prevention, and management of this shoulder injuries.

**Methods:** We searched MEDLINE and Embase up to and including 11 April 2022, to identify population-based studies reporting the incidence of shoulder dislocation. A study was regarded as population-based if it involved all residents within a specific area and the patients were representative of that area. Studies that only reported on specific group like athletes, or personnel receiving military training were excluded.

**Results:** We identified 1218 studies from our database search, of which 118 were selected for full-text review, and 18 were eligible for final inclusion in the systematic review. The highest reported incidence values were in Denmark (136 per 100 000).

**Discussion and Conclusion:** A substantial global burden of shoulder dislocation exists. More high-quality epidemiological investigations on shoulder dislocation are needed to better address this global burden of injuries at finer levels of different population.

**FP6.13****Paediatric shoulder dislocation—14 years of experience at Prince of Wales Hospital**

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**Introduction:** Around 40% of shoulder dislocations occur in individuals aged <22 years and are especially common in young athletes. The decision for treating such occurrence in the paediatric population has been controversial, with recent evidence suggesting earlier surgical intervention may be beneficial in lowering risk of future episodes of instability. This study retrospectively reviews the paediatric admissions for shoulder dislocations at Prince of Wales Hospital from 2005 to 2019. Evaluating the rate, indications, and outcome of surgical interventions; possible risk factors for post-op recurrences; as well as a review of overall patient demographics.

**Methods:** A review of 23 paediatric cases was conducted, reviewing patient demographics, associated sport, side of dislocation, number of dislocations prior to surgery, surgery that was done, presence of any associated injuries, as well as postoperative dislocations.

**Results:** The median age was 16 years, ranging from 8-17 years. Fifteen of which had dislocations from a sport-related event. Only two individuals had a single episode of dislocation prior to proceeding with surgery, while the majority had experienced at least 2 to 3 episodes with one experience up to 10. Nineteen of the patients underwent surgery with six experiencing recurrence and only three needing a revision surgery.

**Discussion and Conclusion:** Although conservative treatment avoids surgical risks, in young patients with minimal comorbidities, perhaps earlier surgical intervention may yield greater benefit. Even with significant glenoid defects (up to 20% in our study), a Bankart Repair is an adequate means to stabilise the joint and prevent future instabilities and recurrence.

**FP6.14****Reunderstanding bone loss in shoulder instability based on 17 years' follow-up study of arthroscopic Bankart repair from original Griffith index deriving cohort—functional outcomes worsen with “minimum critical” instead of “subcritical” bone loss**

**Lawrence Chun-Man Lau, Jack Wai-Wang Chau, Randy Ng, Michael Tim-Yun Ong, James Griffith, Patrick Shu-Hang Yung**

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## Free Paper Session VII: Spine

### FP7.1

#### **The value of computed tomography imaging in diagnosing the presence, location and morphology of tether breakages in vertebral body tethering**

**Matthew Hei Yu Yeung, Sandra Wan, Kenny Yat Hong Kwan, Jason Pui Yin Cheung, Kenneth Man Chee Cheung**  
*Department of Orthopaedics and Traumatology, Queen Mary Hospital*

**Background:** Vertebral body tethering (VBT) is a novel non-fusion treatment for adolescent idiopathic scoliosis. Tether breakage can lead to loss of correction, but the current radiological diagnosis using inter-screw angle has low sensitivity. After analysing computed tomography (CT) images, we found that tethers and breakages are clearly outlined. We aimed to describe the value of reconstructed CT in identifying tether rupture and its optimal radiological protocol.

**Methods:** This is a retrospective analysis of VBT patients' CTs with minimum 2-year follow-up. Coronal, sagittal and three-dimensional reconstructions were created, and tether status was observed. Inter-screw angles were measured on posteroanterior standing radiographs immediately postoperative and at CT scanning.

**Results:** In all, 11 curves and 72 segments were evaluated. 15 broken segments (20.8%) were found (9 thoracic and 6 lumbar). A >5 degree change in inter-screw angle predicted 12 out of the 15 breakages (80%). The radiological criteria failed to detect cases with adjacent level tether breakages. Additionally, all thoracic breakages were observed at the screw-tether junction, whereas lumbar breakages were at mid-distance between screws. Eight of the breakages demonstrated clean vertical separation, whereas the other seven had one end angulated away from the tether.

**Conclusion:** Tether integrity can be clearly seen on reconstructed CTs, which is superior to radiographs in identifying tether breakages. Interestingly in our series the location and morphologies of thoracic and lumbar breakages were different suggesting different pathomechanisms maybe involved. We propose that CT scans with reconstruction can be used as a non-invasive alternative method of diagnosing tether breakage.

### FP7.2

#### **Safety of continuing aspirin use in cervical laminoplasty: a propensity score-matched analysis**

**Yu Chung Wong,<sup>1</sup> Tsun Kit Lau,<sup>1</sup> Wai Wang Chau,<sup>2</sup> Kin On Kwok,<sup>1</sup> Sheung Wai Law<sup>2</sup>**

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**FP7.3****Vertebral body tethering results in progressive improvement in coronal Cobb but deterioration in axial rotation, a three-dimensional analysis****Teenie Kwan Tung Wong, Kenny Kwan, Jason Pui Yin Cheung, Kenneth Man Chee Cheung***Department of Orthopaedics and Traumatology, The University of Hong Kong*

**Introduction:** Vertebral body tethering (VBT) has shown improvements in coronal and sagittal planes, but axial correction overtime has not been assessed in patients with adolescent idiopathic scoliosis (AIS). Three-dimensional (3D) spine reconstruction was used to analyse the progression of correction in VBT surgery.

**Methods:** VBT treated patients with AIS,  $\geq 1$ -year of follow-up, and 3D spine reconstructions created from biplanar radiographs were studied. Coronal, sagittal, and axial planes measurements were made and compared at preoperative, immediate postoperative, 1-year and 2-years follow-up.

**Results:** Seven patients (6 female, 1 male) with a mean age of  $13.1 \pm 1.1$  years with right thoracic AIS (mean,  $50.2^\circ \pm 8.7^\circ$ ) had a mean follow-up of  $18.6 \pm 4.6$  months. Based on 3D reconstruction, the mean coronal Cobb angle correction was  $29.7^\circ$ ,  $21.2^\circ$  and  $15.5^\circ$  at immediate postoperative, 1-year, and 2-year follow-up, respectively. There was minimal change in thoracic kyphosis and lumbar lordosis, which measured  $36.2^\circ$ ,  $38.6^\circ$ ,  $34.8^\circ$  and  $40.9^\circ$  for kyphosis;  $47.1^\circ$ ,  $44.0^\circ$ ,  $41.8^\circ$  and  $48.5^\circ$  for lordosis at preoperative, immediate postoperative, 1-year, and 2-year follow-up. Apical axial rotation improved from  $-4.9^\circ$  ( $\pm 5.0$ ) at preoperative to  $-0.5^\circ$  ( $\pm 4.5^\circ$ ) at immediate postoperative, then deteriorated to  $-2.5^\circ$  ( $\pm 4.5^\circ$ ) at 1 year.

**Discussion and Conclusion:** This is the first 3D reconstructed VBT study to describe progression in axial rotation correction despite improvement in coronal curvature and suggests that VBT may not be able to control changes in axial plane. More studies with larger samples and longer-term follow-up are needed to investigate axial correction overtime in VBT patients.

**FP7.4****Vertebral body tethering of main thoracic curve results in spontaneous correction in untethered proximal thoracic Cobb and shoulder balance: a three-dimensional analysis****Teenie Kwan Tung Wong, Kenny Kwan, Jason Pui-Yin Cheung, Kenneth Man-Chee Cheung***Department of Orthopaedics and Traumatology, The University of Hong Kong*

**Introduction:** Vertebral body tethering (VBT) has shown to improve tethered thoracic Cobb for patients with adolescent idiopathic scoliosis (AIS) but spontaneous correction of untethered proximal thoracic curve has not been assessed. This study aimed investigate the radiological and three-dimensional corrections at proximal thoracic curve after VBT surgery.

**Methods:** Patients with AIS with main thoracic VBT and three-dimensional spinal reconstructions were studied. Proximal and main thoracic Cobb, apical axial rotation, shoulder height, clavicle angle, and T1 tilt were assessed preoperatively and immediate postoperatively. Shoulder imbalance was defined as radiological shoulder height of  $> 2$  cm.

**Results:** Nineteen patients (16 females, 3 males; mean preoperative age  $12.1 \pm 1.1$  years) with thoracic idiopathic scoliosis were assessed. All and 18 (95%) patients had main and proximal thoracic Cobb angle correction, respectively. The mean Cobb angles of the proximal and main thoracic curves are  $28.3^\circ$  ( $\pm 11.8^\circ$ ) and  $48.9^\circ$  ( $\pm 9.0^\circ$ ) preoperatively and  $20.5^\circ$  ( $\pm 8.8^\circ$ ) and  $23.4^\circ$  ( $\pm 9.1^\circ$ ) postoperatively. The mean axial rotation angle at proximal and main thoracic curve apexes are  $8.5^\circ$  ( $\pm 7.9^\circ$ ) and  $-8.1^\circ$  ( $\pm 11.6^\circ$ ) preoperatively and  $6.2^\circ$  ( $\pm 5.6^\circ$ ) and  $-4.5^\circ$  ( $\pm 8.7^\circ$ ) postoperatively. Clavicular angle and T1 tilt angle were  $-2.1^\circ$  ( $\pm 2.3^\circ$ ) and  $2.9^\circ$  ( $\pm 4.7^\circ$ ) preoperatively and  $-0.8^\circ$  ( $\pm 2.9^\circ$ ) and  $6.5^\circ$  ( $\pm 7.5^\circ$ ) postoperatively. Preoperatively, 9 (47%) patients had shoulder imbalance averaged at  $19.4^\circ$  ( $\pm 11.6^\circ$ ). Postoperatively, 5 (26%) patients had shoulder imbalance averaged at  $13.9^\circ$  ( $\pm 12.6^\circ$ ).

**Conclusion:** Proximal thoracic Cobb correction in 95% and shoulder balance correction from preoperative 26% to 47% postoperatively highly reflects the potential of spontaneous correction of proximal thoracic curve following main thoracic VBT.

## FP7.5

### Prospective, randomised controlled trial evaluating Floseal, a Gelatin and Thrombin-based haemostatic matrix, in postoperative drain output and blood transfusion rate in transforaminal lumbar interbody fusion (TLIF) surgery

**Eugene Pak Lin Ng, Yip Siu Leung, Kam Lung Tung, Michael Siu Hei Tse, Tik Koon Kwok, Kam Kwong Wong**  
*Department of Orthopaedics and Traumatology, Kwong Wah Hospital*

**Introduction:** Floseal is a gelatine-thrombin matrix sealant used for surgical haemostasis. It has been shown to reduce intraoperative and postoperative haemorrhage in surgery. However, there is a lack of data demonstrating its efficiency in Chinese patients undergoing transforaminal lumbar interbody fusion (TLIF) surgery. This is the first prospective RCT evaluating its use in TLIF.

**Methods:** Prospective randomised controlled trial comparing Floseal with control in patients undergoing ≤2 level TLIF surgery. Exclusion criteria includes infection, revision surgery, >3 level TLIF, or patients with bleeding diathesis. Primary outcomes include transfusion rate and drain output. Secondary outcomes include days of drain placement, postoperative haemoglobin level, length of stay, and infection.

**Results:** Fifty patients were recruited into two groups of 25 patients each. All patients received TLIF surgery. Preliminary results are as follows: There were no baseline characteristic differences between the groups. Mean intraoperative blood loss was 630 mL. Median drain placement was 3 days. There were no significant differences in postoperative transfusion requirement, drain output and days of drain placement between the groups.

**Discussion and Conclusion:** Preliminary conclusion as follows: Floseal was not shown to be superior to conventional techniques of surgical haemostasis in terms of postoperative transfusion rate, drain output and secondary outcomes.

## FP7.6

### Physical performance test is valid in assessing degenerative cervical myelopathy

**Karlen Ka-pui Law, Kenney Ki-lee Lau, Graham Ka-hon Shea, Kenneth Man-chee Cheung**  
*Department of Orthopaedics and Traumatology, The University of Hong Kong*

**Introduction:** Far from the history, degenerative cervical myelopathy (DCM) is predominantly diagnosed with myelopathy signs and radiological imaging. Until 1980, the modified Japanese Orthopaedic Association (mJOA) score was adopted as a supplementary scoring worldwide. Physical performances later became another critical concern, but no global compromise can be obtained so far. This study aimed to (1) identify valid physical performance tests (PPT) for DCM; (2) investigate correlations among cord compression, functional and physical performances; and (3) establish local cut-off values for Hong Kong Chinese DCM.

**Methods:** Valid PPTs were identified through systematic review. DCM who had no previous cervical surgery were recruited at a single centre. Pearson's correlation test was implemented to study relationships among mJOA, PPT, sagittal-diameter (SD) and transverse-area (TA) of the most stenotic cervical cord. The cut-off values for Hong Kong population were determined by receiver operating curve (ROC) analysis.

**Results:** There were five PPTs identified in the systematic review: 10-s grip and release test, nine-hole peg test, 10-s stepping test, foot-tapping test and 30-m walking test. The Pearson's correlations were assessed among 142 DCM (84-male, 58-female) with mean age 62.46 in male and 62.26 in female. Significant correlations among PPT, SD (-0.310–0.548, p<0.001), TA (-0.389–0.637, p<0.001) and mJOA (-0.611–0.754, p<0.001) were achieved. Only the 10-s grip and release test, foot-tapping test and 10-s stepping test demonstrated significant area under the ROC curve with cut-off values as 18, 25, and 12 correspondingly.

**Discussion and Conclusion:** The use of PPT was proven to be effective in detecting DCM substantiated by significantly high correlations with the degree of cord compression and severity of myelopathy. With the establishment of local cut-off values, compromises in diagnosing DCM in Hong Kong or even worldwide will then be on the horizon.

**FP7.7**

**Mechanical characterisation and design of biomaterials for nucleus pulposus replacement and regeneration**

**Zhuoqi Li, Qiuji Lu, Sandra Hiu-Tung Wan, Kenneth Man-Chee Cheung**

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**FP7.8**

**Adolescent idiopathic scoliosis with spinal proprioceptive deficits are associated with curve magnitudes of over 45 degrees**

**Kenney Ki Lee Lau,<sup>1</sup> Kenny Yat Hong Kwan,<sup>1</sup> Jason Pui Yin Cheung,<sup>1</sup> Wang Chow,<sup>2</sup> Karlen Ka Pui Law,<sup>1</sup> Arnold Yu Lok Wong,<sup>3</sup> Daniel Hung Kay Chow,<sup>4</sup> Kenneth Man Chee Cheung<sup>1</sup>**

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**FP7.9**

**The effectiveness of robotic-assisted upper limb rehabilitation to improve upper limb function in patients with cervical spinal cord injuries—a scoping review**

**Jocelyn Sze Wing Ho**

*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** To explore available evidence and studies regarding the effectiveness of robotic-assisted therapy for individuals with cervical spinal cord injuries (cSCI) in improving upper limb (UL) function, identify current research gaps and future research directions.

**Methods:** Searches were repeated between November 2021 and January 2022 using CINAHL complete, Medline, Embase, APA PsycInfo, PubMed, and hand searching. Author screening ensured all studies chosen met the eligibility criteria. The JBI Critical Appraisal checklist was used to assess the study quality.

**Results:** Seven articles (one RCT, three case series, and two quasi-experimental studies) were included, with four studies using exoskeleton and three using end-effector robotic devices. Participants were aged between 18 to 75 and ranged from 4 to 34 subjects. The quality of chosen studies varied between JBI scores of 4 to 8. Several studies lacked blinding and a control group, affecting internal validity. Four out of seven studies demonstrated statistically significant improvements in outcome measures measuring upper limb function and strength after robotic therapy (RT), while other studies could not draw correlations between RT and UL function. Results are limited by small sample sizes, lack of randomised trials, and heterogeneity.

**Discussion and Conclusion:** This review provided mixed evidence regarding the effectiveness of RT. Although it is safe, feasible, and efficient in improving UL function in participants with cSCI, the credibility of the studies' findings remains inconclusive. Further research is needed to investigate the long-term effects, service users' perceptions, optimal robotic design, cost-effectiveness, and accessibility of RT amongst allied healthcare professionals.

## FP7.10

### A deep learning-based motion video analysis for scoliosis screening

**Dong Chan, Yong Hu, Kenneth MC Cheung**

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**Introduction:** Gait analysis is prevalent for analysing scoliosis impacts on humans' balance and movement. Based on the prior knowledge, we proposed a machine learning-based method for early scoliosis screening by utilising features extraction from gait videos.

**Methods:** The primary experiment includes 239 videos of patients and 65 videos of controls. Each video involves a single subject repeatedly walking back and forth in the deterministic distance. The fundamental features of the human body are extracted from gait videos by utilising pose estimation technologies. Then, a deep learning model is used for training the reprocessing time-series data to predict whether the subjects have scoliosis.

**Results:** The whole screening process for a subject would take a few minutes. The primary results can reach 80% accuracy in total. Specifically, the performances show 65% specificity and 84% sensitivity, and the precision, which is describing the ratio of correct positive predictions to the total predicted positives, is 89% in patient groups and 55% in control groups.

**Discussion and Conclusion:** This project combines pose estimation technology and gait analysis to build an AI-assisted rapid screening system, which is essential to develop digital medical treatment. It has the ability to screen at high throughput in the hospital without the child having to undress. Moreover, the potential is also promising to classify different types of scoliosis in the future.

## FP7.11

### Inter-screw index: a novel method for identifying tether breakage in vertebral body tethering

**Sandra Hiu-Tung Wan, Ogulcan Guldeniz, Matthew Hei-Yu Yeung, Jason Pui-Yin Cheung, Kenny Yat-Hong Kwan, Kenneth Man-Chee Cheung**

*Department of Orthopaedics and Traumatology, The University of Hong Kong*

**Introduction:** Tether breakage in vertebral body tethering (VBT) has been defined as a 5° increase in inter-screw angle without rational scientific support with poor sensitivity. Our tensile tests demonstrated tethers consistently elongate 10% to 13% before they break. Thus, we propose a novel definition to diagnose breakage using inter-screw length.

**Methods:** This is a prospective cohort study in patients with AIS who underwent VBT at our centre. Computed tomography (CT) scans of subjects were reviewed to identify tether breakages. Sensitivity of inter-screw angle was compared to our proposed definition of breakage, which is an increase in inter-screw distance beyond 13% from postoperative to follow-up.

**Results:** A total of 94 segments were reviewed on CT. The mean number of instrumented levels were  $7.9 \pm 1$  and the mean preoperative Cobb was  $52 \pm 9^\circ$  and at 1-year FU was  $32 \pm 12^\circ$ . Tether breakage was observed in 15 segments. An increase in inter-screw distance correctly identified 14 broken segments (93%), whereas  $\geq 5^\circ$  increase in inter-screw angle was observed in 12 broken segments only (80%).

**Discussion and Conclusion:** This is the first report of using inter-screw distance as a method of diagnosing tether breakage. The method can be easily applied by calculating the percentage increase in inter-screw distance. An increase of more than 13% would suggest tether breakage. Not only is this approach more sensitive, the methodology is also supported by mechanical testing results. We propose that the inter-screw index should be universally adopted in future studies to identify radiographic tether breakage.

## FP7.12

### Why are some intervertebral discs more prone to degeneration? Insights into isolated thoracic 'dysgeneration'

**Samuel Tin Yan Cheung, Prudence Wing Hang Cheung, Jason Pui Yin Cheung**

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## FP7.13

### Self-reported physical activities in patients with adolescent idiopathic scoliosis—a cross-sectional observational study

**Chrysanne Hiu Lam Chow,<sup>1</sup> Amanda Liu,<sup>2</sup> Kenny YH Kwan<sup>2</sup>**

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**Introduction:** The impact of adolescent idiopathic scoliosis (AIS) on physical activity (PA) level is not well documented. This study aimed to assess self-reported PA level in patients with AIS.

**Methods:** All patients with AIS under observation were recruited between January and June 2021, and filled out the validated Paffenbarger PA Questionnaire (PPAQ). Information regarding stair-climbing, walking, frequency, intensity and duration were recorded. A Physical Activity Index (PAI) in kcal/week was calculated, from which the total energy expenditure was estimated. This was correlated with their demographic and radiographic data.

**Results:** A total of 27 males (age=14.6 ± 1.84) and 86 females (age=13.2 ± 1.46) were included. The mean BMI of male patients was 17.3 ± 2.26 kg/m<sup>2</sup>, and 18.1 ± 3.07 kg/m<sup>2</sup> for females. The mean Cobb angle for males was 20.6° ± 8.6°, and 28.2° ± 10.2° for females. A total of 51.3% participated in yearly PA excluding physiotherapy and physical education classes, and 40.7% in weekly PA that caused sweating, increased heart rate and shortness of breath. Of those who did not participate in any PA, 30% reported "lack of time" and 16.3% reported "laziness" as reasons. No patients attributed their lack of exercise to AIS. The mean PAI was 2344.0 ± 4272.5 kcal/week. There was no statistically significant correlation between BMI, gender, Cobb and PAI.

**Discussion and Conclusion:** Patients diagnosed with AIS showed low levels of PA compared with a local healthy cohort, and much lower than the WHO recommended guidelines. However, low PA was not related to gender, BMI nor Cobb angle. Further studies to address reasons for inactivity and methods to improve PA levels in patients with AIS are needed.

#### FP7.14

### Outcome results after 200 consecutive single portal full endoscopic unilateral laminotomy for bilateral decompression for lumbar spinal stenosis

**Sze Hung Wong**

*Private Practice*

**Introduction:** Lumbar spinal stenosis is a common aetiology of neurogenic claudication, radiculopathy and back pain in elderly. Traditional open or minimal invasive laminectomy is commonly performed in Hong Kong, but with more soft tissue trauma, blood loss and postoperative length of stay. Single portal Full endoscopic unilateral laminotomy for bilateral decompression LE-ULBD was used with aim to provide comparable results with less tissue trauma.

**Methods:** This study retrospectively reviewed 200 consecutive patients who underwent LE-ULBD. The preoperative and postoperative VAS, blood loss and complication was analysed.

**Results:** There is a definite learning curve in endoscopic spine surgery. The initial average operation time for the first 50 cases was 50% longer than the subsequent 150 cases. The mean length of stay after surgery was 1 day, with mean blood loss of less than 20 mL, and drain output of less than 50 mL. No mortality and major morbidities encountered.

**Discussion and Conclusion:** Single portal full endoscopic unilateral laminotomy for bilateral decompression for lumbar spinal stenosis is a safe approach that minimise tissue trauma. The advantage includes reduce blood loss and shorten length of stay. Since lumbar spinal stenosis is popular in elderly population in Hong Kong, endoscopic technique can benefit the healthcare system by reducing the length of stay, reduce blood transfusion requirement. Elderly who receives the surgery can be discharge the next day and save a lot of precious hospital bed in public hospital.

#### FP7.15

### Male SpA patients in later disease have less severe disc degeneration due to higher mSASSS scores than female—A propensity-score matched comparison with the population

**Jason Pui Yin Cheung,<sup>1</sup> Samuel Tin Yan Cheung,<sup>1</sup> Helen Hoi Lun Tsang,<sup>2</sup> Prudence Wing Hang Cheung<sup>1</sup>**

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#### FP7.16

### Incidence of neural axis abnormality and neurosurgical intervention after screening MRI in early onset scoliosis

**Herng Ee Chiang**

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#### FP7.17

### Osteosarcopenia in elderly vertebral compression fracture patients

**Marco Cho Sang Chui, Tsz Ching Chau, Koko Shaa Yiu Ko, Simon Kwoon Ho Chow, Wing Hoi Cheung, Sheung Wai Law, Ronald Man Yeung Wong**

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## FP7.18

### Canonical correlation analysis between surface topography and spinal three-dimensional reconstruction in adolescent idiopathic scoliosis

**Jack Zijian Wei, Kenneth Man-Chee Cheung**

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**Introduction:** Surface topography has been widely researched to reduce the reliance on radiographs for managing adolescent idiopathic scoliosis (AIS). However, only poor-to-moderate correlations have been demonstrated between surface and radiographic measures. This study aimed to investigate the maximum correlation between surface and spinal profiles in AIS subjects using principal component analysis (PCA) and canonical correlation analysis (CCA).

**Methods:** Patients with AIS were recruited. Biplanar spine radiographs were taken with three-dimensional vertebral rotation (VR) computed using the sterEOS workstation. Subject's back was measured at forward bending using a handheld device, SpineScan3D (Avalon SpineCare Ltd., Hong Kong), which continuously captured the surface tilt angles (STAs). Dimensionality reduction of the obtained data was performed using PCA, followed by pairwise CCA to determine the correlations between surface and spinal measures.

**Results:** A total of 126 patients were enrolled at a mean age of 12.8 years with 86 females and 40 males. 5, 3, 3, 5 PCs were extracted for coronal, sagittal and axial VR, and STAs, respectively. The maximised correlations between different canonical variates were 0.71 ( $p<0.001$ ) for STAs and coronal VR, 0.31 ( $p>0.05$ ) for STAs and sagittal VR, 0.79 ( $p<0.001$ ) for STAs and axial VR, 0.80 ( $p<0.001$ ) for STAs and combined VR.

**Discussion and Conclusion:** We demonstrated strong linear correlations between radiographic and surface measures in AIS in a global manner. Therefore, an integration of multiple surface measures is recommended when assessing scoliosis using surface topography. Further studies are needed to assess surface contours in more dimensions and its effectiveness in monitoring curve progression.

## FP7.19

### A survival probability tool (SMEW) based on 10 537 patients with spinal metastases in Hong Kong using a machine learning-based model

**Isaac Tai,<sup>1</sup> Baoli Hao,<sup>2</sup> Qingchen Wang,<sup>2</sup> Kenny Yat Hong Kwan<sup>1</sup>**

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## FP7.20

### Fukuda-Utenberger stepping test: ability to reflect proprioception deficit and relation with the severity of degenerative cervical myelopathy

**Cody Tsz-san Ng, Kenneth Man-chee Cheung, Karlen Ka-pui Lam, Kenney Ki-lee Lau**

*Department of Orthopaedics and Traumatology, The University of Hong Kong*

**Introduction:** Proprioceptive deficit is one of the predominant symptoms in degenerative cervical myelopathy (DCM). Up to present; no easy-to-use and quantitative test is available for assessing the integrity of proprioception in DCM. Fukuda-Utenberger-Stepping-Test (FUST) was demonstrated as valid proprioceptive assessment in other diagnostic groups, but not in DCM. Hence, this study is aimed to (1) study the usefulness of FUST in DCM; (2) explore the correlation between FUST and the severity of myelopathy.

**Methods:** Thirty subjects were recruited in Adult Spine Clinic of a single centre. All DCM underwent Finger-to-Nose-Test (FNT), Romberg Test (RT), FUST and modified-Japanese-Orthopaedic-Association-Scoring-for-Cervical Myelopathy (mJOA); and subjects were labelled with proprioceptive deficits (PD) by RT as RT-positive (RT+) and RT-negative (RT-) for statistical analysis.

**Results:** There were 14 male and 16 female (mean age=64). 13 RT+ and 17 RT- were tested with independent sample *t*-test and Pearson correlation coefficient. The mean FUST-angles-of-rotation and FUST-displacement were 58.6 degree and 80.0 cm respectively. Significant differences was demonstrated in FUST-angles-of-rotation between RT+ and RT-groups ( $p=0.040$ ). Significant correlations were revealed in FUST-angle-of-rotation-mJOA ( $r=-0.495$ ,  $p=0.005$ ) and in FUST-displacement-age ( $r=-0.504$ ,  $p=0.005$ ) comparisons.

**Discussion and Conclusion:** DCM usually has asymmetrical cord compression leading to uneven PD over the body. DCM with PD, i.e. RT+ showed inability to precisely land both their feet on ground, leading to an axial deviation of the body in FUST. The greater the proprioceptive deficits, the lower will be the mJOA which could explain a greater FUST-angle-of-rotation in those with worse PD and mJOA.

## FP7.21

### Review of halo immobilisation for cervical spine injury in elderly

**Chi Kuen Wong, Chun Kong Wong, Ka Kin Li**

*Department of Orthopaedics and Traumatology, Queen Elizabeth Hospital*

**Objective:** To evaluate the outcomes and complications of halo-vest immobilisation in geriatric patients with cervical spine injury at a trauma centre in Hong Kong

**Methods:** A retrospective evaluation of all patients above 65-year-old with application of halo-vest fixator from 2008 to 2018 based on electronic patient record, case notes, notes from allied health professionals. Past medical history, injury mechanism, type of cervical spine injury, outcomes, complications, and mortality of patients with halo-vest were collected and analysed.

**Results:** A total of 101 patients with halo-vest immobilisation were identified, and 68 (67.3%) of them had traumatic cervical spine injury. Among these patients, 30 (44%) of them were aged  $\geq 65$  years with average age of 79.5 years. In this geriatric group of patients, 90% of them had cervical spine fracture due to low energy trauma-fall from level ground, and almost all of them had  $\geq 1$  medical comorbidity. The successful rate of halo-vest immobilisation was 50% with satisfactory bone union and cervical dynamic stability. 63.3% of the patients developed halo related complications. 3-month mortality rate after halo immobilisation was 23% and it was mainly contributed by chest infection.

**Conclusion:** The use of halo immobilisation is still a valid treatment modality for cervical spine injury in geriatric patients.

**FP7.22****Immediate versus gradual brace weaning in the clinical management of adolescent idiopathic scoliosis—a randomised controlled trial**

**Prudence Wing Hang Cheung,<sup>1</sup> Hao Wu,<sup>1</sup> Marcus Kin Long Lai,<sup>1</sup> Lester Po Kwan Wong,<sup>1</sup> Vincent Yeng,<sup>2</sup> Lawrence Chi-kwan Chan,<sup>2</sup> Jason Pui Yin Cheung<sup>1</sup>**

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**FP7.23****Radiological and clinical outcome of expandable lordotic cage in transforaminal lumbar interbody fusion (TLIF) for degenerative lumbar spinal pathology**

**Jimmy Kit Yan Lau,<sup>1</sup> Siu Man Leung,<sup>1</sup> Chun Man Ma<sup>2</sup>**

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**Introduction:** Spinopelvic harmony was emphasised these days in spinal fusion in maintaining an upright posture and preventing adjacent segment degeneration. We aimed to determine the effectiveness of expandable lordotic cage to restore lumbar lordosis (LL), segmental lordosis (SL) and disc height, and its clinical relevance in open transforaminal lumbar interbody fusion (TLIF).

**Methods:** A retrospective single-centre review of patients who underwent 1- or 2-level open TLIF for degenerative lumbar spinal pathology from January 2020 to June 2021, with at least 1 year follow-up, was conducted. Standing lateral radiographs before and after operation were analysed in terms of change and maintenance of LL, SL, LL/PI matching and disc heights. Clinical outcomes were assessed using visual analog scale (VAS) and Oswestry disability index (ODI).

**Results:** A total of 31 cases were included. Back pain was present in 17 patients (54.5%) and leg pain in all patients. Preoperatively, average disc height was 8.7 mm and 20 (64.6%) patients had LL/PI mismatch. Postoperatively, there was an average gain of 3 mm in disc height, increase SL of 5.29° and increase LL of 7.4°. Six (15.9%) patients had residual LL/PI mismatch. VAS improved from 8.3 to 2.1 and ODI from 42% to 22%. Four cases had wound infection requiring debridement. At 1-year follow-up, adjacent segment degeneration, subsidence or failure of implants were not encountered.

**Discussion and Conclusion:** To conclude, expandable lordotic cage was a good alternative for open TLIF with significant clinical improvements and effective restoration of spinopelvic harmony.

**FP7.24****Prospective clinical validation of MSKalign: a radiation-free portable alignment analysis system and device for scoliosis**

**Teng Zhang, Nan Meng, Kwan-Yee Wong, Moxin Zhao, Jason Cheung**

*Department of Orthopaedics and Traumatology, The University of Hong Kong*

Adolescent idiopathic scoliosis (AIS) is the most common type of spinal disorder affecting children. Clinical screening and diagnosis require physical and radiographic examinations, which are either subjective or increase radiation exposures. Recent ultrasound technology examining scoliosis is radiation free but stationary. MSKalign is our in-house developed device takes an RGBD image of a nude back as input and synthesises a radiograph-comparable image (RCI) for spine alignments analysis. It is a radiation-free portable system and device utilising light-based depth sensing and deep learning technologies to analyse AIS by landmark detection and image synthesis. Prospective clinical validation was conducted for spine deformity visualisations. We validated MSKalign's performance prospectively on 300 patients with AIS. The synthesised RCI for AIS spine visualisation contains sufficient anatomical information that can quantify disease severities and curve types. Our portable system and device have the potential to facilitate fast and accurate AIS analysis without radiation.

## Free Paper Session VIII: Foot & Ankle, Rehabilitation, Tumour

### FP8.1

#### The clinical effectiveness of pulsed electromagnetic field therapy on patient-reported pain and physical function in patients with hallux valgus: pilot study

**Cheryl Shu Ming Chia, Julian Alexander Chan, Tsz On Chan, Patrick Shu-Hang Yung, Samuel Ka-Kin Ling**

*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** Hallux valgus (HV) is manifested by lateral deviation of the great toe and the destabilisation of the first metatarsophalangeal (MTP) joint which affects foot cosmesis and impairs function. Current conservative treatment regimens do not completely reduce symptoms; thus, a novel alternative non-invasive treatment is welcome. Pulse electromagnetic field (PEMF) therapy is a non-invasive biophysical stimulation proven for musculoskeletal pain and accelerate bone and soft tissue healing.

**Aim:** This is the first study to investigate the effect of PEMF in the treatment of HV.

**Methods:** In this pilot case series, five HV female patients were recruited from Prince of Wales hospital and received PEMF treatment twice a week for 2 months. Visual analog scale (VAS) pain score and foot and ankle outcome score questionnaire was collected at baseline (week 0), second and fourth week.

**Results:** PEMF therapy could reduce self-reported pain at the metatarsalgia site, improved quality-of-life and pain subscale scores as assessed by the VAS pain score and FAO score questionnaire after PEMF treatment in week 2 and 4, respectively. In contrast, no improvements on the subscale scores were elicited for the General symptoms, Activity Daily Living and Sports and Recreational Activities in FAO questionnaire.

**Discussion:** PEMF therapy could reduce self-reported pain and improve quality of life, but not in other subscales. This may be due to the small sample size and short intervention timeframe.

**Conclusion:** PEMF may be a potential symptomatic treatment for HV, but future larger-scale studies are warranted.

**FP8.2**

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**Muggle quidditch injury analysis**

**Sin Kiu Tang, Cheuk-Ming Lau, Wai-Kuen Lam, Cheryl Shu-Ming Chia, Patrick Shu-Hang Yung, Samuel Ka-Kin Ling**

*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** Quidditch, originating from the Harry Potter novels, has been adopted into a non-magical contact sport played by thousands of players in over 40 countries. As a novel sport, little is known about its injury epidemiology; this study aimed to evaluate injury patterns, understand possible causes, and discuss potential measures to improve game safety.

**Methods:** Participants were recruited through the Hong Kong Hydras Quidditch Club. An online self-reporting survey adapted from Oslo Sports Trauma Research Centre Overuse Injury Questionnaire (OSTRC-H2) survey was distributed to record their injury history retrospectively between 2017 to 2021. Data collection included player demographics, location, type, severity, and mechanism of injury. Injury incidence rates were calculated as injuries per frequency of athlete exposure (AEs).

**Results:** An overall injury incidence rate of 4.07 injuries per 1000 Aes were found. The most common mechanisms were jumping/landing from a jump (28.6%) and running/cutting (28.6%). The most common injury site was joints and ligaments (44.4%). Contact injuries amounted to the majority (83.3%) of all injuries, with injuries during practice more common than in-game/in-tournament injuries.

**Discussion:** Most participants reported injuries sustained during Quidditch games, but no significant risk factors were identified from this small dataset.

**Conclusion:** Quidditch is a novel contact sport with a low injury incidence of 4.07 per 1000 Aes. There are minimal published papers regarding Quidditch, and larger, more substantial investigations are required to understand the injury epidemiology better.

### FP8.3

#### **Prevalence of ankle instability in a hypermobile yoga population**

**Samuel Ka-Kin Ling, Titus Chung, Patrick Shu-Hang Yung**

*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** The relationship between hypermobility and instability has always been an interesting and debated topic. The practise of yoga is often characterised by participants holding body positions requiring joint positions exceeding a "normal" range. This study investigates the prevalence of ankle instability in this hyper-mobile population.

**Methods:** This is a cross-sectional study using convenience sampling of a yoga population. Yoga practitioners were defined as practising the sport for at least 60 minutes each week 4 over one year. Outcome measures included General demographics and history of ankle injuries, the Cumberland ankle instability tool (CAIT), numeric pain rating scale (NPRS) and function using the single-leg balance test.

**Results:** A total of 30 yoga practitioners completed the virtual assessment. In all, 43.3% had a history of ankle sprain, and 16.7% were classified as symptomatic chronic ankle instability. There was a positive correlation between the functional and the pain and a trend of less instability with more yoga experience.

**Discussion:** Although the sample size was adequate, there was an assumption that experienced yoga practitioners had hypermobile ankles. Future studies should incorporate a formal clinical examination to document the range of motion and mechanical stability on stress examination.

**Conclusion:** The prevalence of ankle instability in an active yoga population was lower than in similar sports at 17%. The results reinforce the concept that chronic ankle instability is not merely a mechanical problem but is associated with sensory neural/motor deficits; however, the exact mechanism requires further investigation.

### FP8.4

#### **Clinical effects of pulsed electromagnetic field therapy on self-reported pain and function in patients with Achilles tendinopathy**

**Violet Man-Chi Ko, Cheryl Shu-Ming Chia, Ngo-Nam Lau, Jihong Qiu, Xin He, Sai-Chuen Fu, Patrick Shu-Hang Yung, Samuel Ka-Kin Ling**

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**FP8.5**

**Tibial cortex transverse transport accelerates wound healing via enhanced angiogenesis and immunomodulation**

**Yongkang Yang,<sup>1</sup> Yucong Li,<sup>1</sup> Qi Pan,<sup>1</sup> Shanshan Bai,<sup>1</sup> Haixing Wang,<sup>1</sup> Xiaohua Pan,<sup>2</sup> Ka-Kin Ling,<sup>1</sup> Gang Li<sup>1</sup>**

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<sup>2</sup>*Department of Orthopaedics and Traumatology, Shenzhen Bao'an People's Hospital*

**Introduction:** Treatment for delayed wound healing resulting from peripheral vascular diseases and diabetic foot ulcers remain a challenge. A novel surgical technique named Tibial Cortex Transverse Transport (TTT) has been developed for treating peripheral ischaemia, with encouraging clinical effects. However, its underlying mechanisms remain unclear. In present study, we aimed to explore the wound healing effects after undergoing this novel technique via multiple ways.

**Methods:** A novel rat model of TTT was established with a designed external fixator and effects on wound healing were investigated. All rats were randomised into three groups, with 12 rats per group: sham group (negative control), fixator group (positive control) and TTT group. Laser speckle perfusion imaging, vessel perfusion, histology and immunohistochemistry were used to evaluate the wound healing processes.

**Results:** Gross and histological examinations showed that TTT technique accelerated wound closure and enhanced the quality of the newly formed skin tissues. In TTT group, HE staining demonstrated a better epidermis and dermis recovery, while immune-histochemical staining showed that TTT technique promoted local collagen deposition. TTT technique also benefited to angiogenesis and immunomodulation. In TTT group, blood flow in the wound area was higher than that of other groups according to laser speckle imaging with more blood vessels observed. Enhanced neovascularisation was seen in the TTT group with double immune-labelling of CD31 and  $\alpha$ -SMA. The M2 macrophages at the wound site in the TTT group was also increased.

**Discussion and Conclusion:** TTT technique accelerated wound healing through enhanced angiogenesis and immunomodulation.

## FP8.6

### Investigation on the prognostic predictors following arthroscopic microfracture for osteochondral lesions of the talus

**Kendrew Yu-Hei Choi,<sup>1</sup> Cheryl Shu-Ming Chia,<sup>2</sup> Esther Man-Wai Chow,<sup>1</sup> Lucci Lugee Liyeung,<sup>1</sup> James Francis Griffith,<sup>3</sup> Patrick Shu-Hang Yung,<sup>2</sup> Samuel Ka-Kin Ling<sup>2</sup>**

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<sup>3</sup>*Department of Imaging and Interventional Radiology, The Chinese University of Hong Kong*

**Introduction:** Arthroscopic microfracture chondroplasty has been widely published as a treatment for osteochondral lesions of the talus (OLT). However, the clinical outcomes are inconsistent and prognostic predictors following arthroscopic microfracture for OLT are unknown. This study aimed to investigate clinical and magnetic resonance imaging (MRI) prognostic outcome predictors after microfracture chondroplasty treatment of OLT.

**Methods:** This is a retrospective study investigating patients who received arthroscopic microfracture for OLT between 2011 and 2021. The clinical function was evaluated using Foot and Ankle Outcome Scores (FAOS) and Visual Analog Scale. Pre- and postoperative MRI findings, including the size of the defect, lesion location, bone marrow oedema, cysts, effusion, and integrity of the cartilage were recorded. Multivariate regression models were used to evaluate factors affecting the clinical and radiological outcomes.

**Results:** Total of 21 patients was included in the study (14 men and 7 women) with a mean age of 57 years (range, 45-62). Mean follow-up was 4.2 years, and long-term postoperative and pre- and early postoperative MRI results were compared. The mean FAOS pain significantly improved from a baseline  $41.7 \pm 11.1$  to  $69.4 \pm 16.7$  postoperatively. The mean VAS improved from 7 to 3 postoperatively. Male gender ( $p=0.008$ ), smoker ( $p=0.017$ ), atraumatic ( $p=0.038$ ), were risk factors for a poor outcome. However, there was no significant correlation between MRI parameters and clinical outcomes.

**Conclusion:** Arthroscopic microfracture provided satisfactory clinical outcomes. Gender, smoking history, and trauma history are independent predictors of clinical outcome, but no MRI parameters were identified as useful prognostic predictors.

## FP8.7

### The morphological differences of intrinsic foot muscles in active distance runners with and without plantar fasciitis

**Fannie On-Yue Lau,<sup>1</sup> Daniel Tik-Pui Fong,<sup>2</sup> Patrick Shu-Hang Yung,<sup>1</sup> Samuel Ka-Kin Ling<sup>1</sup>**

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**FP8.8****Can pulsed electro-magnetic field (PEMF) therapy enhance calf muscle function in healthy individuals**

**Chun Ho Lau, Sze Wai Lau, Man Chi Law, Violet Man Chi Ko, Patrick Shu Hang Yung, Samuel Ka Kin Ling**  
*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** Since recent studies have proven that pulsed electro-magnetic field (PEMF) has positive effects on myogenesis and mitochondriogenesis, this study aimed to investigate the effectiveness of PEMF therapy on calf muscles of healthy individuals with different activity levels.

**Methods:** All subjects underwent the same PEMF intervention on the right calf, consisting of 8 sessions over 4 weeks. Each PEMF session was 20 minutes with the PEMF exposure set at 1.5 mT and 10 Hz, summing up to 160 minutes of PEMF exposure. Basic demographics and the Tegner activity scores based on physical activity level were obtained from each participant. Functional outcomes of the calf muscles including calf circumference, number of heel rises and calf strength were measured at baseline and also at the end of the treatment course. The change in the functional outcomes will be compared between subjects with different Tegner activity levels.

**Results:** Eleven healthy individuals aged 18-35 were recruited with a body mass index 18.5-22.9. For participants with low physical activity level (0-5), there were statistically significant increases in terms of calf circumference ( $p=0.011$ ), calf raise ( $p=0.018$ ) and calf strength ( $p=0.05$ ). For participants with high physical activity level (6-10), no statistical significant differences were found in all outcomes.

**Discussion and Conclusion:** A 160-minute course of non-invasive PEMF effectively enhances calf muscle mass, endurance, and strength especially in the less physically active population. Therefore, PEMF could possibly become a useful treatment modality for sarcopenic or sedentary individuals or patients undergoing rehabilitation. Further investigations are required to determine the optimal dosage and clinical application of PEMF.

**FP8.9****Clinical outcomes of a standardised rehabilitation protocol for meniscal repair**

**Gavin Cho-wai Lam, Ramon Lo Yiu, Yuen-fai Leung**  
*Department of Orthopaedics and Traumatology, Tseung Kwan O Hospital*

**Introduction:** To examine clinical and functional outcomes of patients who underwent meniscal repair with a modified accelerated rehabilitation programme.

**Methods:** This study represents a case series of patients who underwent meniscal repair from 2017 to 2019. The mean patient age was 26.6 (range, 15-47) years. Of the 28 total patients, 22 had concomitant ACL tears that were treated with single-bundle hamstring reconstruction at the time of meniscal repair. All patients were enrolled in a standardised rehabilitation programme, allowing early-phase protected weight-bearing and knee mobilisation. Patient-reported symptoms, the McMurray test and the International Knee Documentation Committee (IKDC) were used to evaluate outcomes. The mean follow-up period was  $13 \pm 3.1$  (range, 9-20) months.

**Results:** Of the participating patients, 75% (22 of 28) returned to their original sports activities. Most patients displayed satisfactory clinical outcomes with significant improvements of IKDC scores. No re-tears were detected.

**Discussion and Conclusion:** Early protected weight-bearing with progressive early knee mobilisation is a safe rehabilitation option after meniscal repair.

## FP8.10

### **Hereditary neuropathy with liability to pressure palsy presenting with footdrop**

**Kenneth Yiu, Chor Yin Lam**

*Department of Orthopaedics and Traumatology, The University of Hong Kong*

**Introduction:** Hereditary neuropathy with liability to pressure palsy (HNPP) is a rare peripheral nerve disorder. It is inherited in an autosomal dominant pattern. The typical presentation is a series of recurrent, episodic, and transient nerve palsy at multiple entrapment sites.

**Methods:** Case report of an individual with HNPP. The case is a 68-year-old construction site worker who had a trivial contusion of his right shin and noted left ankle and foot weakness afterwards. He had history of bilateral carpal tunnel syndrome and cubital tunnel syndrome diagnosed by a private doctor previously. He received right carpal tunnel release and anterior transposition of right ulnar nerve 2 years before the index episode with no clinical improvement noted.

Nerve conduction test performed at our centre revealed conduction slowing of multiple peripheral nerves compatible at typical entrapment sites and hence the diagnosis of HNPP was made.

**Discussion and Conclusion:** We present a case of HNPP which was previously diagnosed as and operated for carpal tunnel syndrome and cubital tunnel syndrome. When a patient presented with multiple nerve entrapment, HNPP should be one of the differential diagnoses.

## FP8.11

### **What do individuals with spinal cord injury want the most?—A survey of functional recovery priorities in Hong Kong**

**Chor Yin Lam,<sup>1</sup> Paul Aarne Koljonen,<sup>2</sup> Christopher Chun Hei Yip,<sup>1</sup> Ivan Yuen Wang Su,<sup>3</sup> Yong Hu,<sup>1</sup> Yat Wa Wong,<sup>2</sup> Kenneth Man Chee Cheung<sup>1</sup>**

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**Introduction:** Spinal cord injury (SCI) causes devastating and permanent impairments. Knowing the areas of functional recovery which SCI individuals value most is important in clinical care, planning of rehabilitation service, and development of research. Such information is not available in the local population.

**Methods:** We conducted a survey on the priorities of functional recovery for SCI individuals in Hong Kong with a self-administered questionnaire on an online platform to collect the opinions of clients of an SCI follow-up clinic, a self-help association, and a non-government organisation from 1 September to 31 December 2021.

**Results:** In total, 74 individuals with SCI (48 tetraplegic, 26 paraplegic) responded to the survey. Tetraplegics rated recovery of arm/hand function as the highest priority of functional recovery, followed by upper trunk/body strength and balance, and bladder/bowel function. Paraplegics viewed bladder/bowel function as the most important area of functional recovery, followed by walking movement, upper trunk/body strength and balance, elimination of chronic pain, and regaining normal sensation. There was no statistically significant difference among the top priority areas ( $p>0.05$ ). In contrast to previous studies done in Western populations, sexual function was rated as the lowest by both tetraplegics and paraplegics.

**Discussion and Conclusion:** This is the first study specifically looking into the functional recovery priorities of individuals with SCI in Hong Kong. The findings are useful as a reference for future research and services for the SCI community.

## FP8.12

### The current usage of 3D-printed hand wrist orthoses: a systematic review

**Yiwen Zheng, Sze Wing Ho**

*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** Benefiting from the development of three-dimensional (3D) printing technology, an alternative method is provided to solve the shortage of orthoses in rehabilitation. However, it is still unclear whether it will be a better option than manual production in terms of effectiveness, patient acceptance, and expenditure. This systematic review aimed to investigate the present design of 3D printed hand wrist orthoses in rehabilitation and compare them to applications made by conventional approaches.

**Methods:** Using a scoping review framework, the systematic literature search was conducted in four electronic databases (Ovid Medline, Ovid EMBASE, Cochrane databases, and Web of Science) for all indexed literature up to December 2021. Studies depicting 3D printed hand wrist orthoses with actual patients and clinical measures were included.

**Results:** Fifteen studies met the inclusion criteria. Statistical results from across the selected studies did not show a significant difference between 3D printed hand wrist orthoses and conventionally fabricated orthoses in improving hand function. In addition, most patients graded higher scores to 3D printed hand wrist orthoses in fit.

**Conclusions:** The current 3D printed hand wrist orthoses are mainly designed for static fixation. Firstly, no statistical difference between 3D printed hand wrist orthoses and conventionally fabricated orthoses improves hand function in the included studies. However, the heterogeneity of different studies makes them difficult to have a fair comparison. Therefore, the prospective studies are suggested to have reasonable group allocations, a larger sample size, long-term follow-up, and standardised scales. Secondly, the 3D printed hand wrist orthoses are more comfortable than orthoses built in conventional methods.

## FP8.13

### A pilot hybrid programme with tele-care for patients with carpal tunnel syndrome

**Charles Cheuk Sang Lam,<sup>1</sup> Adrian Kam Yiu Leung,<sup>2</sup> Frances Tsui Man Louie,<sup>3</sup> Ngan Chung Leung,<sup>2</sup> Phoebe Cheuk Yin Kwan,<sup>2</sup> Joanna Tsz Ching Lui,<sup>2</sup> Annie Hiu Yan Wong<sup>2</sup>**

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**FP8.14**

**Return to community and become active again—exercise training programme for patients with knee osteoarthritis in MacLehose Medical Rehabilitation Centre**

**Shun Shing Yeung,<sup>1</sup> Chi Chung Tsang,<sup>1</sup> Chi Kwan Wong,<sup>1</sup> Kit Wai Siu,<sup>2</sup> Yan Lai Ng,<sup>3</sup> Ping Keung Chan,<sup>4</sup> Kwong Yuen Chiu<sup>4</sup>**

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**Introduction:** Since 2016, Comprehensive Osteoarthritis Management (COME) programme for patients with knee osteoarthritis (OA) began in the MacLehose Medical Rehabilitation Centre. It consists of multidisciplinary education, ten physiotherapy exercise sessions and six occupational therapy sessions of coping skills.

**Methods:** Patients with Kellgren-Lawrence Grade I to III were recruited and assessed at baseline, 6 weeks, 3 months and 1 year with telephone follow-up. Outcomes assessed: physical performance with one-minute chair-stand test and quadriceps strength with dynamometer; pain on walking or stairs climbing; weekly time on physical activities and exercise training; functional status with Patient Specific Function Score (PSFS) and self-efficacy with Self-Exercise Efficacy Scale (SEE); quality of life (QOL) with Euro-QoL five dimensions in three levels (EQ5D3L) and health with EQ5D3L VAS scale (EQ-VAS), Knee injury and osteoarthritis outcome score (KOOS).

**Results:** A total of 228 patients completed programme with one-year follow-up. Significant improvements observed: One-minute chair-stand test increased by  $13.1 \pm 10.1$  repetitions, quadriceps strength increased by  $3.5 \pm 5.4$  and  $4.6 \pm 7.1$  kgf in left and right side, respectively at 3 months ( $p < 0.001$ ). Pain reduced by  $1.1 \pm 2.7$  points, time spent on training and physical activities increased by  $41.1.0 \pm 46.0$  and  $81.0 \pm 123$  minutes, PSFS improved by  $3.6 \pm 2.8$  points, SEE improved by  $1.7 \pm 2.2$  points, EQ5D3L increased by  $1.3 \pm 0.2$  points, EQ-VAS improved by  $7.1 \pm 18.9$  points, KOOS improved by  $16.2 \pm 15.2$  points at 1 year ( $p < 0.001$ ). In all, 80% of patient would continue exercise at fitness rooms of Leisure and Cultural Services Department.

**Discussion and Conclusion:** The COME is effective to improve patients' physical performance, quality of life and self-efficacy to maintain exercise habit.

**FP8.15****Can a structured home-based rehabilitation programme reduce dorsal central wrist pain?****Lai Fan Tse, Wai Wang Chau, Clara Wing Yee Wong***Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** Peri-scapholunate (peri-SL) ligament injury can lead to dorsal central wrist pain and result in declined functional performance. Conservative management includes education, immobilisation, SL stabilising muscle strengthening, and proprioception re-training. The identification of the ligamento-muscular reflex and SL-stabilising muscles formed the rationale for rehabilitation training. We have devised a 16-week treatment programme for patients with dorsal central wrist pain associated with acute peri-SL ligament injury. We speculated that the programme can effectively reduce pain and improve functional performance.

**Methods:** Subjects were recruited from orthopaedic specialist clinics of CUHK Medical Centre and Prince of Wales Hospital. Subjects underwent the 16-week home-based programme, which included immobilisation and rehabilitation exercise. Follow-up was arranged every 4 weeks for progress monitoring. Outcome measures included Visual Analog Scale (VAS), total pain score, power grip, pinch grip, wrist range of motion (ROM), and total performance score.

**Results:** Eight subjects (eleven wrists) completed the programme. Mean VAS improved by 5.1 ( $p<0.01$ ) and total pain score improved from 13.8 to 19 out of 20 ( $p<0.01$ ). Power grip and pinch grip increased by 43.7% and 53.6% ( $p<0.05$ ), respectively. The improvement in ROM in flexion-extension and radioulnar deviation were 20.7% ( $p=0.02$ ) and 27.0% ( $p<0.05$ ), respectively. The total performance score reached 39 out of 40, which indicated near-normal wrist function.

**Discussion and Conclusion:** Results show the 16-week programme significantly improves patients' wrist pain, strength and ROM. Standardised wrist rehabilitation can be taken as a reference treatment modality, providing an evidence-based and non-invasive treatment option for clinicians and therapists.

**FP8.16****Application of machine learning models in developing a predictive model on length of hospital stay in geriatric fragility fracture patients****Prudence Kwan Lam Mok,<sup>1</sup> Ivan Chun Hei Lai,<sup>1</sup> Wai Wang Chau,<sup>1</sup> Koko Ko,<sup>1</sup> Kelvin Kam Fai Tsoi,<sup>2</sup> Sheung Wai Law<sup>1</sup>**<sup>1</sup>*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*<sup>2</sup>*Jockey Club School of Public Health and Primary Care (JCSPPHC), The Chinese University of Hong Kong*

**Introduction:** The rate of geriatric hip fracture in Hong Kong is increasing steadily and associated mortality in fragility fracture is high, posing a high pressure on hospital bed demand. Hence, this study aims to develop a predictive model on the hospital length of stay (LOS) of geriatric fragility fracture patients using artificial intelligence and machine learning (ML) techniques.

**Methods:** In this study, we use the basic information, such as the gender, the age, the residence type etc., and medical parameters of patients, such as the modified functional ambulation classification score (MFAC), elderly mobility scale (EMS), modified Barthel index (MBI) etc, to predict whether the length of stay would exceed 21 days or not.

**Result:** Our results are promising despite the relatively small sample size of 8000 data. The AUC was 0.73 and F1 score was 0.67. Moreover, we found that "type of residence before admission", "MFAC", "age", and "MoCA5" were the four most impactful factors to predict length of hospital stay. We also developed some models with custom built artificial neural network (ANN), yielding an accuracy score of 0.76 and an F1 score of 0.6.

**Conclusion:** Inconsistent data collection method and missing data has proven to be undesirable for ML training, yet this study shows the high feasibility of ML for predictive medicine despite various limitations. By identifying patients with higher probability of lengthy with machine learning models, doctors can make better use of limited resources and proactively manage them to allow risk-stratified care management.

**FP8.17**

**Effectiveness of Schroth exercise in adolescents with idiopathic scoliosis: a systematic review**

**Subrina Su Ching Chan**

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**Introduction:** Adolescent idiopathic scoliosis (AIS) is a three-dimensional torsional deformity of the spine with an unknown aetiology and is the most common structural spinal deformity occurring in adolescents. AIS may lead to physical and mental health concerns. It may also decrease the adolescents' quality of life. Schroth exercise, the most widely studied and used scoliosis-specific exercise, demonstrated promising results in reducing the progression of AIS.

**Objective:** This review aimed to identify and evaluate best current evidence available on the effectiveness of Schroth exercise to reduce the Cobb angle and Angle of Trunk Rotation (ATR), as well as improve Quality of Life (QOL) compared to non-surgical management in patients with AIS.

**Methods:** A systematic literature review was conducted using the following databases, Medline, Embase, PEDro and PubMed, to identify papers published in or after 2015. The methodological quality of the study was critically appraised according to the PEDro scale.

**Results:** A total of six RCTs with an average PEDro score of 6.33/10 were included in this review. Results showed that Schroth exercise could significantly decrease Cobb angle ( $p<0.05$ ) and ATR ( $p<0.001$ ) compared to non-surgical management. There was insufficient evidence to support positive effects on Schroth exercise in improving QOL.

**Conclusion:** Level II evidence suggested that Schroth exercise programme showed significant effectiveness in improving the Cobb angle as well as the ATR in patients with AIS, when compared to other non-surgical management. However, the effect of Schroth exercise programme in improving the QOL in patients with AIS remains controversial.

**FP8.18****Effect of sarcopenia in elderly women with vertebral compression fracture on global sagittal alignment and its relationship with quality of life**

**Cheuk-Kin Kwan,<sup>1</sup> Koko Shaau-Yiu Ko,<sup>1</sup> Leo Tsz-Ching Chau,<sup>2</sup> Zongshan Hu,<sup>1</sup> Ying-Yang Law,<sup>3</sup> Winnie Chiu-Wing Chu,<sup>4</sup> Gene Chi-Wai Man,<sup>1</sup> Sheung-Wai Law<sup>1</sup>**

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**Introduction:** Vertebral compression fracture (VCF) is the most common type of osteoporotic fracture, while Sarcopenia is characterised by the degenerative loss of muscle mass and quality. In this study, we wish to investigate whether VCF patients with sarcopenia have more severe global sagittal alignment (GSA) imbalance, and whether such changes are associated with quality of life, disability, and pain.

**Methods:** Chinese female patients with VCF aged >60 years were recruited to this study, then classified into sarcopenic or non-sarcopenic groups. Whole-body standing radiographs were acquired for evaluating GSA from spine to lower limb. Parameters include thoracic kyphosis (TK), lumbar lordosis (LL), pelvic incidence (PI), pelvic tilt (PT), sagittal vertical axis (SVA), T1 pelvic angle (TPA), knee flexion angle (KA) and, ankle dorsiflexion angle (AA). Quality of life was assessed with the Oswestry Disability Index (ODI), Short-form (SF)-12 and The Numerical Pain Rating Scale (NPRS).

**Results:** In total, 36 sarcopenic and 26 non-sarcopenic VCF patients were recruited. There was a significant difference in KA ( $p=0.046$ ) between sarcopenic and non-sarcopenic VCF patients. An increase in KA also showed a positive correlation with more severe back pain ( $r=0.22$ ). In VCF patients with sarcopenia, LL was found to be negatively correlated with ODI scores.

**Discussion and Conclusion:** Current findings may imply the worsening of sagittal imbalance and increase in pain may be due to the increase of muscle frailty. The identification on these GSA changes may be a potential prognostic indicator for conservative management in improving the disability for VCF patients with sarcopenia.

**FP8.19****The ageing population—the need to improve efficiency of geriatric hip fracture care**

**Linus Chee Yeen Lee, Wai Wang Chau, Koko Shaau Yiu Ko, Simon Kwoon Ho Chow, Wing-Hoi Cheung, Ronald Man Yeung Wong, Sheung Wai Law**

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## FP8.20

### Risk factors for fixed flexion deformity redevelopment after total knee replacement: a guide to rehabilitation

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**Introduction:** Fixed flexion deformity (FFD) following total knee replacement (TKR) significantly hinders patient's rehabilitation. There are no studies in the literature to date conducted to identify risk factors for FFD redevelopment despite intra-operatively corrected neutral sagittal alignment. It is believed the identification of these risk factors will shed light on postoperative rehabilitation programme.

**Methods:** Retrospective study conducted at Tseung Kwan O Hospital Joint Replacement Centre, all patients with preoperative FFD >15 degree who underwent primary TKR with intra-operatively corrected neutral sagittal alignment, from July 2017 to June 2019, were identified and followed up postoperatively for 1 year. A total of 53 patients constituted this sample size. Over 20 demographic and clinical variables were recorded and analysed statistically using Chi squared test and independent *t*-test, comparing postoperative FFD group vs postoperative no FFD group.

**Results:** In all, 31 out of 53 patients had no FFD at 1-year postoperative (Group A), while 22 had redevelopment of FFD (Group B). At 2 weeks postoperative, Group A had 24/31 patients achieving full knee extension, 30/31 patients with quadriceps power >4, pain score average 1.87. In comparison, Group B had 2/22 (*p*<0.001), 16/22 (*p*=0.01), and 4.91 (*p*<0.001), respectively.

**Discussion and Conclusion:** This study showed early (2-weeks) postoperative range of motion, quadriceps power and pain score are significant predicting factors for FFD redevelopment after TKR. It is advised that a more intensified mobilisation exercise regime, quadriceps training and optimised peri-op pain control targeted at the critical early postoperative period would lower the risk of FFD redevelopment.

## FP8.21

### Outcome of limb salvaging procedure for bone tumour using liquid nitrogen technique: a case series of 23 patients

**Chun Wai Cheng,<sup>1</sup> Anderson Siu Ming Leung,<sup>2</sup> Raymond Ching Hin Yau,<sup>2</sup> Kenneth Wai Yip Ho,<sup>2</sup> Ying Lee Lam<sup>2</sup>**

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**Introduction:** Autologous bone graft treated with liquid nitrogen is an option for limb salvage procedure in patients with bone tumours. In the case series, we studied the outcome of the biological reconstruction in terms of functional outcome, local recurrence rate, and prognosis.

**Methods:** From 2015 to 2021, 23 patients with bone tumours using liquid nitrogen treated autologous bone graft were recruited. During operation, all the soft tissue of the excised bone was removed. The autograft was immersed in liquid nitrogen for 20 minutes and thawed at room temperature for 10 minutes. After that the autograft was immersed in distilled water for 15 minutes before being incorporated into the reconstruction. All of them were at least one year post operation.

**Results:** The mean union time was 21.7 months (from 11 to 31 months). The mean MSTS score was 21.4 (from 12 to 30). The mean follow-up time was 34.8 months (from 4 to 64 months). Local recurrence rate was 13% (3/23).

**Conclusion:** Autologous bone graft treated with liquid nitrogen is a safe option for patients with bone tumours for limb salvage procedure. It provides satisfactory outcomes with low local recurrence rate, as well as comparable complications with other reconstruction methods.

## Free Paper Session IX: Adult Joint Reconstruction II

### FP9.1

#### Blood flow restriction training of quadricep muscles in advanced osteoarthritis of the knee: a randomised controlled study

**Vincent Wai Kwan Chan,<sup>1</sup> Shun Shing Yeung,<sup>2</sup> PK Chan,<sup>3</sup> Henry Fu,<sup>3</sup> MH Cheung,<sup>3</sup> Amy Cheung,<sup>1</sup> Michelle Hilda Luk,<sup>1</sup> Raymond Chi Chung Tsang,<sup>2</sup> KY Chiu<sup>3</sup>**

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### FP9.2

#### The effect of physiotherapist-supervised exercise programme on the muscle function for patients with end stage knee OA

**Kendrew Yu-Hei Choi,<sup>1</sup> Wai-Wang Chau,<sup>2</sup> Kwok-Yan Ng,<sup>3</sup> Lawrence Chun-Man Lau,<sup>1</sup> Gloria Yan-Ting Lam,<sup>4</sup> Tsz-Lung Choi,<sup>4</sup> Dennis King-Hang Yee,<sup>4</sup> Michael Tim-Yun Ong,<sup>2</sup> Patrick Shu-Hang Yung<sup>2</sup>**

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**Introduction:** Knee osteoarthritis (KOA) is a chronic progressive disease. It has widely accepted that patients with end stage KOA will eventually pursue total knee replacement as the only viable option, and exercise has low efficacy in reduction of pain and disability. In this study, we aimed to evaluate the effectiveness of a physiotherapist-supervised exercise programme in patients with end stage KOA as regards functionality, physical performance.

**Methods:** This study investigating patients recruited to the Structured non-surgical treatment programme (SNTP) in our centre. It is an 8-week group exercise programme designed and led by physiotherapists. The outcomes were assessed with Numeric Pain Rating Scale (NPRS), Knee Society score (KSS), Knee Society functional assessment (KSFA), Knee injury and Osteoarthritis Outcome Score (KOOS); physical performance assessed with Timed Up and Go test (TUG) and 30-s chair stand test.

**Results:** A total of 156 patients were included in the study with a mean age of 69 years attended completed course of exercise programme. Participants had statistically significant reduction in pain intensity (NPRS 5.3-4.9), and improvement in function (KSFA 59.6-62.3, and TUG 14.2 s-12.9 s). It revealed a trend toward greater improvement in group of patients with poor mobility (walking tolerance <1 hour; limping gait) and obese patients.

**Conclusion:** Physiotherapist-designed exercise programme on muscle function has definite benefits in terms of functional and physical performance in patient with end stage KOA. Patients with more functional limitation and higher body mass index showed better improvement after a course of exercise programme.

**FP9.3**

**The association between vitamin D status and muscle function for patients with OA knees**

**Michael Tim-Yun Ong,<sup>1</sup> Daniel Kam-Wah Mok,<sup>2</sup> Chi-Yin Choi,<sup>1</sup> Qian-Wen Wang,<sup>1</sup> Lawrence Chun Man Lau,<sup>3</sup> Dennis King-Hang Yee,<sup>4</sup> Tsz Lung Choi,<sup>4</sup> Gloria Yan Ting Lam,<sup>4</sup> Patrick Shu-Hang Yung<sup>1</sup>**

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**Introduction:** Osteoarthritis (OA) knee patients often adopt a sedentary lifestyle to avoid joint pain, resulting in muscle atrophy or even sarcopenia. Vitamin D is effective on musculoskeletal health. Therefore, we aimed to investigate the association between vitamin D status, postural stability, muscle function, and knee symptoms.

**Methods:** Pressure mat was used for postural stability (COP) and a hand-held dynamometer was used for isometric knee strength, KOOS, IPAQ, and SF-36 were evaluated in Vitamin D-deficient group (G1, n=11, 14.7 ± 3.97) and Non-vitamin D-deficient group (G2, n=14, 27.6 ± 3.17). An independent t-test was used to compare all the parameters in two groups. Spearman's correlation was used to determine the association among all the parameters.

**Results:** G1 showed significantly worse isometric knee extension, self-reported social functioning, and physical functioning, compared to G2 ( $p<0.05$ ). Seven possible sarcopenia and sarcopenia patients (28%) were only found in G1 with significantly worse handgrip strength, knee extension strength and COP ( $p<0.05$ ).

A significant positive correlation was detected between vitamin D level and the 30-s sit-to-stand test ( $r=0.50$ ). The handgrip strength correlated with knee flexion ( $r=0.71$ ), extension ( $r=0.42$ ) and COP-squat ( $r=-0.52$ ).

**Discussion and Conclusion:** Vitamin D deficiency patients have worse physical functioning, social functioning, and knee extension strength. As the handgrip strength correlated with knee strength and COP, the difference in muscle function cannot be fully explained by the pain due to the severity of the OA knees. We recommend vitamin D supplement as a routine treatment for OA knee patients.

**FP9.4****A comparison between MRI Osteoarthritis Knee Score (MOAKS) and KL Grading on reflecting severity of clinical symptoms in osteoarthritic patients**

**Stephanie Wing Sum Tso,<sup>1</sup> Michael Tim-Yun Ong,<sup>2</sup> Lawrence Chun-Man Lau,<sup>1</sup> Gloria Yan-Ting Lam,<sup>3</sup> Tsz-Lung Choi,<sup>3</sup> Dennis King-Hang Yee,<sup>3</sup> Jun-Ru Zhong,<sup>4</sup> Wei-Tian Chen,<sup>4</sup> Patrick Shu-Hang Yung<sup>2</sup>**

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**Introduction:** Osteoarthritis knee has a global prevalence of 86.7 million people as of 2020. The KL (Kellgren and Lawrence) Grading remains the gold standard for classifying its severity radiologically. However, recent studies have started to investigate the use of semi-quantitative magnetic resonance imaging (MRI) scoring (i.e. magnetic resonance imaging osteoarthritis knee score [MOAKS]) from 5-minute pulse sequences. In this study, we aimed to compare MOAKS against the reference standard KL grading on correlating clinical severity of OA knee.

**Methods:** A total of 40 patients with radiographic features of OA knee were recruited and grouped by KL grade. The MRI scans were taken for the same knees between 2020 to 2021, and two radiologists performed structural grading based on the Osteoarthritis Initiative (OAI) reference for each subject. Scores were generated for each feature as described in MOAKS and paired with the patients' Knee Society Score (KSS) and Knee Function Score (KFS), with reference to phenotype definitions, and was analysed using Spearman's correlation test.

**Results:** There was significant correlation between KSS with KL grading (-0.753, p<0.05), and KSS with each MOAKS feature: Cartilage, subchondral bone, osteophyte and meniscus (-0.705, -0.652, -0.758, -0.45, -0.703; p<0.05). The MOAKS cartilage and combined score outperforms the KL grade correlation (-0.645, -0.613 against -0.556; p<0.05) for patients with KL grade 2 and 3.

**Discussion and Conclusion:** MOAKS can effectively distinguish the features of early changes in pathological knees when compared to the gold standard, which supports the potential of this modality as the imaging tool of the future for OA knee

## FP9.5

### Constitutional varus in Chinese patients with knee osteoarthritis

**Thomas Wai Kiu Liu,<sup>1</sup> Henry Fu,<sup>2</sup> Samuel Yan Jin Fang,<sup>1</sup> Man Hong Cheung,<sup>2</sup> Amy Cheung,<sup>1</sup> Vincent Wai Kwan Chan,<sup>1</sup> Michelle Hilda Luk,<sup>1</sup> Ping Keunng Chan,<sup>2</sup> Kwong Yuen Chiu<sup>2</sup>**

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**Introduction:** Kinematic alignment total knee arthroplasty (KA-TKA) aimed to restore the pre-arthritis constitutional alignment. Restricted kinematic alignment (rKA) employs an algorithm and a safety range for patients with more extreme constitutional alignment. This study will evaluate the constitutional varus mechanical alignment and the proportion of osteoarthritic knees in Chinese patients that can achieve KA-TKA without further realignment.

**Methods:** This is a retrospective case series of patients with preoperative varus aligned osteoarthritic knee who underwent TKA with Mako robotic-arm assisted technology at our hospitals between January 2019 and December 2021. Only varus aligned knees were included.

The post-osteophyte removal mechanical axis was measured by the Mako system at full extension with valgus stress applied after osteophyte removal.

**Results:** The mean residual varus mechanical axis was  $5.1 \pm 3.4$  degrees. The varus alignment was significantly greater in male ( $5.82 \pm 3.19$ ) than female ( $4.69 \pm 3.47$ ) [ $p=0.012$ ]. In all 36.9%, 48.0%, 63.1% and 72.1% of the operated knees had post-osteophyte removal varus mechanical axis less than or equal to 3-, 4-, 5- and 6-degrees, respectively. 25.6% (23/90), 34.4% (31/90), 53.3% (48/90) and 60.0% (54/90) of male patients were less than or equal to 3-, 4-, 5- and 6-degrees, respectively. 43.5% (67/154), 55.8% (86/154), 68.8% (106/154) and 79.2% (122/154) of female patients were less than or equal to 3-, 4-, 5- and 6-degrees, respectively.

**Discussion and Conclusion:** Chinese patients, especially male, with osteoarthritic varus knee tend to have more severe varus constitutional alignment. By increasing the acceptable varus mechanical axis to 5-degrees, more Chinese patients would be suitable for KA-TKA.

## FP9.6

### Adaptive fusion of deep learning with statistical shape model for robust patella segmentation from CT images

**Jiachen Zhao,<sup>1</sup> Tianshu Jiang,<sup>2</sup> Yi Lin,<sup>1</sup> Justin Lok Chun Chan,<sup>2</sup> Lewis Ping Keung Chan,<sup>3</sup> Chunyi Wen,<sup>2</sup> Hao Chen<sup>1</sup>**

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Knee osteoarthritis (KOA), a leading joint disease, can be decided by examining the shape of the patella to spot potential abnormal variations. To assist doctors in the diagnosis of KOA, a robust automatic patella segmentation method is highly demanded in clinical practice. Deep learning methods, especially convolutional neural networks (CNNs) have been widely applied to medical image segmentation in recent years. Nevertheless, poor image quality and limited data still impose challenges to segmentation via CNNs. On the other hand, statistical shape models (SSM) can generate shape priors that give anatomically reliable segmentation to varying instances. Thus, in this work, we propose an adaptive fusion framework, explicitly combining deep neural networks and SSM for robust patella segmentation. Our adaptive fusion framework will accordingly adjust the weight of segmentation candidates in fusion based on their segmentation performance. We also propose a voxel-wise refinement strategy to make the segmentation of CNNs more anatomically correct. Extensive experiments and thorough assessments have been conducted on various mainstream CNN backbones for patella segmentation, which demonstrate that our framework can be flexibly attached to a CNN model, significantly improving its performance, especially when input image data are of poor quality (e.g. low contrast, artifacts) and labelled training data are limited.

**FP9.7****Prevalence and factors of hypercalcaemia after the use of Stimulan absorbable calcium sulphate beads in lower limb arthroplasty**

**Ka Yau Li,<sup>1</sup> Ping Keung Chan,<sup>1</sup> Jeffrey Ho Yu Leung,<sup>1</sup> Vincent Wai Kwan Chan,<sup>2</sup> Amy Cheung,<sup>2</sup> Michelle Hilda Luk,<sup>2</sup> Man Hong Cheung,<sup>1</sup> Henry Fu,<sup>1</sup> Kwong Yuen Chiu<sup>1</sup>**

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**Introduction:** Stimulan (Biocomposites Ltd., Keele, UK) is a synthetic antibiotic-loaded calcium sulphate dissolvable bead. Hypercalcemia is a concern following its use. This study aimed to examine the safety profile of Stimulan in arthroplasty and determine the course and factors related to hypercalcemia after Stimulan use.

**Methods:** This was a retrospective study involving patients undergoing arthroplasty between September 2021 and June 2022. Patients' demographics, medical history, indication and region of surgery, volume of Stimulan applied and antibiotic load were recorded. Any postoperative complications, including hypercalcemia and wound complications, were also recorded. Results of serum calcium level and estimated glomerular filtration rate (eGFR) were obtained from before operation till postoperative D14.

**Results:** A total of 25 patients (11 males and 14 females; age:  $70.84 \pm 10.51$ ) underwent joint arthroplasty using Stimulan. Mean volume of Stimulan used was  $18.40 \text{ cc} \pm 11.06$ . Five cases (20%) of hypercalcemia were observed in five hip arthroplasties after reviewing the laboratory results and medical records. Hypercalcemia was detected earliest on D2. Four out of five cases of hypercalcemia were diagnosed  $\leq D3$ . In all cases, the serum calcium level was normalised  $\leq D9$ . No wound complication was observed. Older age ( $p=0.027$ ) and higher Stimulan volume ( $p=0.049$ ), but not region of surgery ( $p=0.140$ ) or preoperative eGFR ( $p=0.381$ ), had significant effect on the presence of hypercalcemia.

**Discussion and Conclusion:** The prevalence of hypercalcaemia after Stimulan use is 20% in this study. Among patients with hypercalcemia, higher Stimulan volume and older age were observed. Monitoring of serum calcium level for high-risk patient on D2 and D3 is crucial.

## FP9.8

### How much waste do we generate? Steps towards greener arthroplasty

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**Introduction:** Healthcare waste is a major contributor of waste. Operating theatre related waste has been found to account for approximately 20% to 33% of hospital waste. Total joint replacement procedures are a very common procedure performed to address end stage joint arthritis where significant surgical instruments and disposable packaging may be employed. However, the amount of waste produced has not been well quantified. It may be apt to explore this issue in the current era of climate change, global warming and as such procedures will only be performed with increasing frequency in the coming years due to population ageing.

**Methods:** A waste audit was performed on ten knee replacement procedures: five total knee replacements (TKR) and five unicompartmental replacements (UKR). All waste generated from each surgical procedure, including that used for anaesthesia was categorised, recorded and weighed at the end of each procedure. The amount of overage (opened but unused items) was also recorded.

**Results:** On average, each TKR and UKR generated 14.3 kg and 14 kg of waste, respectively. In all, 26 pieces of clean blue wrap were used for each TKR, which can be repurposed in the clinical setting. Biohazard waste accounted for an average of 22.8% of the total amount of waste generated from each procedure.

**Conclusion:** Substantial amounts of waste are generated from knee replacement procedures. Strategies to help alleviate the impact of waste generated from such common surgical procedures should be developed to lessen the impact of joint replacement procedures on the environment.

## FP9.9

### Factors determining outcome while on waiting list for and after joint replacement surgery

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**Introduction:** By year 2039, 30% of the population of Hong Kong will be aged  $\geq 65$  years. Therefore, it can be expected that the demand for joint replacement procedures will correspondingly increase. This study sought to identify factors related to adverse outcome while on waiting list for and after joint replacement surgery.

**Methods:** All patients who had been put on waiting list for primary joint replacements in our cluster of hospitals from November 2009 till March 2020 were included for analysis. Age, duration of time on waiting list, sex, and Charlson Comorbidity Index (CCI) was collected. The results of 23 common laboratory parameters were recorded. Outcome measures including 30- and 90-day mortality and emergency readmission within 28 days were assessed. The number and days of all-cause admission during the waiting period was recorded.

**Results:** Logistic regression was carried out to assess the effect of age, CCI, sex, Hb, urea, Ca, PO4 and TSH. The overall model was statistically significant when compared to the null model, ( $X^2 (8)=16.923$ ,  $p=0.018$ ), explained 34.9% of the variation of 90-day mortality (Nagelkerke R2) and correctly predicted 99.4% of cases. Age was significantly correlated with length of stay ( $p<0.01$ ) and all-cause admission during the waiting period ( $p=0.017$ ). CCI was significantly correlated with LOS and all-cause admission during the waiting period ( $p<0.01$ ).

**Conclusion:** Age and CCI are significant factors determining all-cause admission while on waiting list and LOS after joint replacement surgery.

**FP9.10****Universal fructosamine and haemoglobin A1c screening in primary hip and knee arthroplasties****Vincent Wai Kwan Chan,<sup>1</sup> PK Chan,<sup>2</sup> Henry Fu,<sup>2</sup> MH Cheung,<sup>2</sup> Amy Cheung,<sup>1</sup> Michelle Hilda Luk,<sup>1</sup> KY Chiu<sup>2</sup>**<sup>1</sup>*Department of Orthopaedics and Traumatology, Queen Mary Hospital*<sup>2</sup>*Department of Orthopaedics and Traumatology, The University of Hong Kong*

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**FP9.11****Use of non-invasive wound closure device for total joint replacement surgery achieve at least comparable cosmesis outcome as subcuticular suture: A retrospective single-blinded study****Man Hong Cheung,<sup>1</sup> Judy Chun Wai Ng,<sup>2</sup> Kwong Yuen Chiu,<sup>1</sup> Ping Keung Chan,<sup>1</sup> Henry Fu,<sup>1</sup> Amy Cheung,<sup>3</sup> Vincent Wai Kwan Chan,<sup>3</sup> Michelle Hilda Luk<sup>3</sup>**<sup>1</sup>*Department of Orthopaedics and Traumatology, The University of Hong Kong*<sup>2</sup>*Department of Surgery, Queen Mary Hospital*<sup>3</sup>*Department of Orthopaedics and Traumatology, Queen Mary Hospital*

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**FP9.12****Outcomes of total knee replacement for end stage osteoarthritis before and after COVID-19 outbreak in Hong Kong****Leo Chung-hei Wong,<sup>1</sup> Michael Tim-yun Ong,<sup>2</sup> Jason Churk-yan Mok,<sup>3</sup> Yuk-chuen Siu,<sup>3</sup> Lawrence Chun-man Lau,<sup>2</sup> Wing-yan Chan,<sup>4</sup> Chun-ming Chan,<sup>3</sup> Wing-yi Leung,<sup>3</sup> Patrick Shu-hang Yung<sup>2</sup>**<sup>1</sup>*Department of Orthopaedics and Traumatology*<sup>2</sup>*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*<sup>3</sup>*Department of Orthopaedics and Traumatology, North District Hospital*<sup>4</sup>*Department of Physiotherapy, North District Hospital*

**Introduction:** Rehabilitation after total knee replacement (TKR) for osteoarthritis of knee was well acknowledged. However, with COVID-19 outbreak locally, service in hospitals has been severely affected. Outcomes of patients receiving elective TKR during COVID outbreaks are to be explored. The study objective is to evaluate difference in clinical and functional outcomes in patients with elective TKR before and during COVID pandemic.

**Methods:** We define cases affected by COVID as TKR surgeries after 25 January 2020 when Emergency Response Level was announced by Hospital Authority. Data including demographics, knee ROM, Oxford knee score (OKS), MFAC and 6-minute walking test (6MWT) for TKR patients in North District Hospital from January 2017 to December 2021 were retrospectively collected and compared with outcomes 4 months after surgery.

**Results:** A total of 554 TKR entries from 2017-2021 have been retrieved (pre-COVID:post-COVID=334:220). Before COVID, 151/334 patients (45.2%) completed post-TKR rehabilitation, while only 64/220 patients (29.1%) completed rehabilitation after COVID outbreak. When comparing between the pre-COVID and post-COVID groups who have both completed TKR rehabilitation, differences in improvement of knee AROM, MFAC and walking aid status were not significant. Nonetheless, post-COVID patients show less favourable improvement in post-rehabilitation 6MWT (pre-COVID:post-COVID = +29.88 m vs +6.86 m; p<0.026).

**Discussion and Conclusion:** Attendance rate of post-TKR rehabilitation was significantly lower in COVID period. Within both groups who completed rehabilitation, clinical improvement in terms of 6MWT was also less prominent for post-COVID TKR patients. Results might reveal inadequacy of the current TKR rehabilitation to rebuild TKR patient's functional ambulation during COVID times.

**FP9.13**

**Has the bacteriology of periprosthetic joint infection after total knee arthroplasty changed over the years? A retrospective cohort study of 2171 patients**

**Jun Ren Khoo,<sup>1</sup> Ping Keung Chan,<sup>1</sup> Jeffrey Ho Yu Leung,<sup>1</sup> Vincent Wai Kwan Chan,<sup>2</sup> Amy Cheung,<sup>2</sup> Michelle Hilda Luk,<sup>2</sup> Man Hong Cheung,<sup>1</sup> Henry Fu,<sup>1</sup> Kwong Yuen Chiu<sup>1</sup>**

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**Introduction:** Periprosthetic joint infection (PJI) is a severe condition complicating total knee arthroplasty (TKA). A retrospective cohort study conducted at our institution reported an incidence of 1.34% after TKA between the years 1993 and 2013. This study aimed to determine the change in the incidence of PJI at our hospital, and to assess for any changes in the microbial landscape.

**Methods:** A total of 2171 primary total knee arthroplasties were conducted at a local academic institution between the 1 January 2014 and the 31 December 2021. All cases of PJI were identified by applying the criteria published by the Musculoskeletal Infection Society. Patient demographics, occurrence of PJI, and microbiological data were recorded and compared to the previously published findings of the 1993-2013 PJI cohort.

**Results:** The incidence of PJI after total knee arthroplasty was 0.64% between 2014 and 2021; this represents a significant decrease from the previously reported 1.34% at our institution between 1993 and 2013 ( $p=0.018$ ). No significant differences in the incidence of early-onset infection were observed ( $p=0.095$ ). Methicillin-sensitive *Staphylococcus aureus* was the most common causative organism of PJI, affecting 57% ( $n=8$ ) of our cohort and 27% ( $n=9$ ) of the earlier cohort.

**Discussion and Conclusion:** The significant reduction in the incidence of PJI has demonstrated the effectiveness of our institutions guidelines to reduce infection. Minimal differences in the microbiological pattern of PJI between the two cohorts was noted.

**FP9.14****Are there any differences in the bacteriology of periprosthetic joint infection after total knee arthroplasty and total hip arthroplasty: a retrospective study of 2773 patients**

**Jun Ren Khoo,<sup>1</sup> Ping Keung Chan,<sup>1</sup> Jeffrey Ho Yu Leung,<sup>1</sup> Vincent Wai Kwan Chan,<sup>2</sup> Amy Cheung,<sup>2</sup> Michelle Hilda Luk,<sup>2</sup> Man Hong Cheung,<sup>1</sup> Henry Fu,<sup>1</sup> Kwong Yuen Chiu<sup>1</sup>**

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**Introduction:** Periprosthetic joint infection (PJI) is an uncommon but devastating complication of total joint arthroplasties. Notable differences in the microbiological profiles of PJI have been observed in different joint locations; however, limited comparative studies exist. This study aimed to analyse and compare the different microbiological profiles between knee and hip PJI.

**Methods:** The Hong Kong Hospital Authority's electronic database was utilised to retrieve all total knee (TKA) or total hip arthroplasties (THA) conducted at our institution between the 1 January 2014 and the 31 December 2021. After the initial screening, the Musculoskeletal Infection Society (MSIS) criteria was applied to identify all periprosthetic joint infections within this cohort. Patient demographics, occurrence of PJI, and microbiological data were recorded.

**Results:** A total of 2773 cases (2171 TKAs, 602 THAs) were recruited. The incidence of PJI was significantly greater amongst those receiving THA (1.49%) compared to TKA (0.64%) ( $p=0.042$ ). Early-onset infection occurred more frequently after THA than TKA ( $p=0.009$ , Chi-square test), arising at a mean of 44 days (interquartile range, 9-86 days) after the index operation. Methicillin-sensitive *Staphylococcus aureus* was the most common causative organism of PJI in both TKA (64%) and THA (48%), followed by streptococcus species in TKA (14%) and methicillin-resistant coagulase-negative staphylococci in THA (22%).

**Discussion and Conclusion:** Methicillin-sensitive *Staphylococcus aureus* was the most common causative organism amongst both cohorts. The incidence of PJI after THA was significantly higher compared to those undergoing TKA. Further interventional measures should be considered to reduce the infection rate amongst those undergoing THA.

## FP9.15

### A matched cohort comparison of clinical outcomes following one-stage and two-stage revision for peri-prosthetic joint infection after total knee arthroplasty

**Cheuk Yun But,<sup>1</sup> Ping Keung Chan,<sup>1</sup> Jeffrey Ho Yu Leung,<sup>1</sup> Vincent Wai Kwan Chan,<sup>2</sup> Amy Cheung,<sup>2</sup> Michelle Hilda Luk,<sup>2</sup> Man Hong Cheung,<sup>1</sup> Henry Fu,<sup>1</sup> Kwong Yuen Chiu<sup>1</sup>**

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**Introduction:** One-stage and two-stage revision strategies are two major options in managing established chronic peri-prosthetic joint infection (PJI). However, it is uncertain which is the best treatment option. This study aimed to compare clinical outcomes of one-stage and two-stage revision for PJI after total knee arthroplasty (TKA).

**Methods:** In this retrospective cohort study, all patients who underwent revision in our academic institution from January 2013 to July 2022, with culture positive post-TKA PJI, graded by the Musculoskeletal Infection Society (MSIS) criteria, were reviewed. Data extracted from the institutional database consisted of perioperative management parameters including operation duration and length of hospital stay, surgical outcomes including reinfection rate, and knee functional outcomes recorded on the most recent follow-up.

**Results:** Twelve included patients (5 males, 7 females; mean age=71.6 years) were matched by age, comorbidities and PJI causative organism (*Staphylococcus*). Four patients underwent one-stage revision, and eight patients underwent two-stage revision. Patients after one-stage revision had 21.4% ( $p=0.017$ ) greater knee range (active flexion-extension), and regarding the American Knee Society score, a 10.5% ( $p=0.029$ ) higher Knee Score and a 71.4% ( $p=0.045$ ) higher functional score than those receiving two-stage revision. All patients in both cohorts had no re-infection. In other perioperative, surgical, and functional outcomes, no statistical differences were found between two cohorts.

**Discussion and Conclusion:** Patients after one-stage revision had better knee range and functional outcomes, and there was no difference in the reinfection rate between two cohorts. Therefore, one-stage revision is a safe and feasible option in the management of PJI.

## FP9.16

### Beta-lactam antibiotic allergy is a newly identified, independent and treatable risk factor for periprosthetic joint infection following TKA: a 28-year retrospective cohort study of 4800 cases

**Man Hong Cheung,<sup>1</sup> Martin Shun Sing Cheng,<sup>2</sup> Philip H Li,<sup>3</sup> Valerie Chiang,<sup>4</sup> Kwong Yuen Chiu,<sup>1</sup> Ping Keung Chan,<sup>1</sup> Henry Fu,<sup>1</sup> Amy Cheung,<sup>2</sup> Vincent Wai Kwan Chan,<sup>2</sup> Thomas Chak Ming Tang<sup>1</sup>**

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## FP9.17

### Comparison of the diagnostic accuracy of joint fluid in blood culture bottles (BACTEC) to conventional culture for the diagnosis of prosthetic joint infection

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**FP9.18****Do wear rates of highly crosslinked polyethylene in total hip arthroplasty change over time? A study over two decades**

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**Introduction:** Whether time dependent in-vivo oxidation affects the wear properties of highly crosslinked polyethylene is still poorly understood with few studies examining this relationship. The aim of this study was therefore to examine the in-vivo wear rates of HXLPE liners in total hip arthroplasty throughout different periods of time after implantation.

**Methods:** In all, 60 hips in 47 patients with more than 15 years of follow-up were included for analysis. Age, sex, and Charlson Comorbidity Index (CCI) and need for revision surgery was recorded. Linear and volumetric wear was determined using the Martell method. Rates of wear were determined for the entire duration of follow-up and for the first- and second-decade postoperatively.

**Results:** Median duration of follow-up was 18.19 years. Overall revision rate was 2.4% over the study period. Overall, the mean linear wear rate was 0.0374 mm per year ( $0.0160 \pm 0.0268$ ). In the first decade after implantation, mean rates of linear and volumetric wear were 0.0466 mm ( $0.0113 \pm 0.0320$ ) and 10.535 mm<sup>3</sup> ( $0.281-99.696$ ) per year. Mean rates of linear and volumetric wear in the second decade after implantation were 0.0357 mm ( $0.021 \pm 0.0328$ ) and 11.606 mm<sup>3</sup> ( $0.549-57.638 \pm 12.922$ ) per year. No significant difference was found in the rates of both linear and volumetric wear in the first compared to second decade after implantation ( $p=0.096$  and  $p=0.762$ , respectively).

**Conclusion:** Clinical and wear properties of highly cross-linked liners are excellent at long-term follow-up. Time related changes in rates of wear do not appear to be a cause for concern at this juncture.

**FP9.19****Prospective cohort study on a novel oxidised zirconium modular dual mobility total hip arthroplasty**

**Henry Fu,<sup>1</sup> Amy Cheung,<sup>2</sup> Vincent Wai Kwan Chan,<sup>2</sup> Man Hong Cheung,<sup>1</sup> Michelle Hilda Luk,<sup>2</sup> Ping Keung Chan,<sup>1</sup> Kwong Yuen Chiu<sup>1</sup>**

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**Introduction:** Dual mobility total hip arthroplasty (THA) combines the principles of Charnley's low friction arthroplasty with McKee's large femoral head arthroplasty to reduce dislocation. While some dual mobility systems have reported early complications of trunionosis, liner malseating and intraprosthetic dislocation. This study evaluates the safety and effectiveness of a novel oxidised zirconium modular dual mobility system.

**Methods:** This prospective cohort study included all patients undergoing primary or revision THA using a novel oxidised zirconium dual mobility system (OR3OTM Smith & Nephew, Memphis, TN, USA) from October 2021 to June 2022 in Queen Mary Hospital. Institutional review board approval was sought prior to the start of study. Postoperative radiographic evaluation of inclination and anteversion angles. Harris hip scores and complications were prospectively recorded.

**Results:** Fifteen OR3O dual mobility THAs were analysed. Mean age was 66 years (range, 49-82) and mean BMI was 25.8. Average follow-up was 6 months. Diagnosis included primary osteoarthritis (9), AVN (4) and aseptic loosening of previous THA (2). Mean acetabular cup size was 52 mm (range, 48-60) and mean liner outer diameter was 40 mm (range, 36-50). All components were well fixed upon latest follow-up. Radiographic analysis showed mean cup inclination of 43°(range, 33°-50°) and mean cup anteversion of 24.8°(range, 13°-36°). Mean Harris Hip scores improved significantly from preoperative 42 to 78 at 6 weeks ( $p<0.0001$ ). No complications including dislocations, implant loosening or malseated liner occurred.

**Conclusion:** The early results from a novel modular dual mobility THA system utilising an advanced bearing material are promising.

**FP9.20**

**Long-term follow-up of an uncemented hydroxyapatite-coated femoral stem beyond 20 years—survivorship and radiographic measurements**

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**Introduction:** This study evaluated the long-term performance of an uncemented, hydroxyapatite-coated femoral component (Secure fit HA, Osteonics). Rate of re-operations, survivorship free from aseptic loosening, and radiographic findings were evaluated with a minimum follow-up of 20 years.

**Methods:** This is a retrospective, single-centre study. Between March 1991 and December 1999, 165 total hip arthroplasties (THAs) in 138 patients were performed with Secure fit HA femoral stem. At a minimum of 20 years, 91 patients (65.9%) with 113 hips (68.4%) were available for follow-up. Survival was analysed using the Kaplan-Meier (KM) method. Radiographic analysis was performed at regular intervals. Engh classification for stability of uncemented femoral stems was referenced.

**Results:** In all, 7 stems out of 165 were revised up; that included one case of aseptic loosening with revision done at 15 years. At 20 years, survivorship with revision of the femoral component for any cause as the end point was 96.0% (95% confidence interval [CI]=92.6%-99.5%). Survivorship with revision for aseptic loosening as the end point was 98.4% (95% CI=96.2%-100%). Radiographic findings of stable bony fixation, including spot welding and stress shielding, were seen in 86 hips (81.1%) at 20 years. On the other hand, pedestals were found in four hips (3.8%), and implant migration with subsidence >1 cm in one (0.9%).

**Discussion and Conclusion:** This study is the first to report on the long-term performance of Secure fit HA, Osteonics. It incorporates a considerable sample size with more than 20 years of follow up and regular radiographic measurements.

## Free Paper Session X: Trauma

**FP10.1**

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### **The effect of non-steroidal anti-inflammatories prophylaxis on heterotopic ossification after elbow trauma surgery**

**Hoi Tung Lam, Ka Chi Lau**

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**Introduction:** The formation of heterotopic ossification (HO) is a known complication following surgery for elbow trauma. The use of non-steroidal anti-inflammatories (NSAID), especially Indomethacin, as HO prophylaxis has been widely discussed in total hip arthroplasty, but is deficient following elbow trauma surgery. Our study aimed to investigate the effect of postoperative NSAID on the development of HO in patients receiving surgery after elbow trauma associated with joint dislocation or subluxation.

**Methods:** Patients who received surgery following elbow trauma involving joint dislocation or subluxation from February 2015 to February 2022 in Tseung Kwan O Hospital were included. Radiographs and clinical notes were retrospectively reviewed in the Clinical Management System to determine the injury pattern, prescription of NSAID, and the incidence of HO. A Fisher exact test was performed to investigate the association between use of different NSAID regimens and HO.

**Results:** A total of 24 patients were identified. Fifteen Patients received NSAID postoperatively. In the NSAID group, the duration of NSAID prescription ranged from 2 weeks to 3 months, with various types of NSAID used. Only ten patients received a NSAID prophylaxis immediately after operation. Fisher exact test showed that HO was the most significantly reduced when an immediate postoperative prophylactic course of NSAID, not limited to Indomethacin, was used ( $p=0.0129$ ). There was no significant difference when NSAID prophylaxis was delayed ( $p=0.408$ ).

**Discussion and Conclusion:** This study supports the use of immediate postoperative NSAID prophylaxis in patients following elbow trauma surgery involving joint dislocation or subluxation to prevent HO occurrence.

## FP10.2

### Is Barrack and Harris Cement Grading System correlate with clinical outcome of cemented hip hemiarthroplasty in geriatric fracture neck of femur patients?

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**Introduction:** Cemented hip hemiarthroplasty is standard treatment for geriatric patients with displaced neck of femur fractures. Barrack and Harris Cement Grading System is often used for assessment of the cementation quality. However, it was originated from assessing risk of aseptic loosening in total hip arthroplasty in patients aged 50 or below. Does it correlate with clinical outcome of geriatric patients undergoing cemented hip hemiarthroplasty?

**Methods:** We retrospectively reviewed 93 patients with displaced fracture neck of femur undergoing cemented hip hemiarthroplasty from January to December 2020. Patients were classified according to cement grading on the first postoperative X-ray. Their baseline characteristics, surgical details and clinical outcomes were compared using analysis of variance (ANOVA) or Chi-square test. Their ambulatory status (MFAC) and pain (NPRS) were longitudinally compared before surgery, on discharge, and at 3, 6, and 12 months after operation using ANOVA and post hoc Bonferroni corrections.

**Results:** Grade A cementation was achieved in 32 (34.4%) patients, grade B in 58 (62.4%) patients, grade C in 3 (3.2%) patients and none in grade D. Their baseline characteristics, surgical details and clinical outcomes were similar. MFAC and pain was significantly improved between on admission and other time points until 1-year postoperative in higher cement grading group, but not in Grade C. In Grade C, lower percentage of patients were discharged home (33.3%), without complication (66.7%) and higher mortality (33.3%) within study period.

**Discussion and Conclusion:** Achieving higher Barrack and Harris Cement Grading corelate with better clinical outcome of geriatric patients undergo cemented hip hemiarthroplasty.

## FP10.3

### Three-dimensional navigation guided percutaneous trans-sympphyseal screw for mechanically unstable pubic symphysis diastasis

**Angus Chao Kun Chan, King Him Chui, Kin Bong Lee, Wilson Li**

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**Introduction:** Minimally invasive trans-sympphyseal screw (TSS) for pubic symphysis diastasis was recently advocated and its feasibility and reproducibility under 3-dimensional-navigation guidance is explored.

**Methods:** Fifteen cases between 2016 to 2021 with background of pubic symphysis diastasis are retrospectively reviewed in this case series. Inclusion criteria are poor local soft tissue condition, those with concomitant complicated fractures or visceral injuries requiring extensive dissection and open pelvic fractures. We excluded patients who are medically unfit for definitive fixation. Radiological outcomes including pubic symphysis distance, screw back out distance and clinical outcomes such as pain and functional outcomes (Marjeed score and Multicenter Study Group Pelvic Outcome Score) were reviewed.

**Results:** A total of 22 TSS were inserted with an average Injury Severity Score of 35.3. In all, 60% received one-stage procedure including fracture reduction, intra-operative three-dimensional imaging and planning followed by execution. The mean operative time and blood loss was 132 minutes and 160 mL, respectively. Average fracture healing was 5.8 months with 2 delayed union at 9 months. The pubic symphysis distance was maintained in all cases at 6 months postoperative. The average Marjeed score, Multicenter Study Group Pelvic Outcome Score and Numeric pain rating scale were 60.2, 6.5 and 2.7, respectively.

**Discussion and Conclusion:** We conclude that 3D-navigation guided percutaneous TSS restores pelvic stability and provides satisfactory pain control thus a safe and effective alternative to open reduction internal fixation.

**FP10.4**

**Safe zone for implant placement in olecranon**

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**FP10.5**

**Fixation of patella fracture with non-metallic implant**

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**Introduction:** Patella fracture fixations were traditionally done using metallic implants with tension band technique. However, complications associated with metallic implants causing soft tissue irritation are not infrequent. One alternative is based on braided sutures, which may be used in combination with metallic implants. We reviewed the results of patella fixation using metal, all sutures and hybrid methods with subgroup analysis of midpole patella fracture alone.

**Methods:** A total number of 53 patients with operated fracture patella were reviewed in a 2.5-year period. Fixation method was determined by surgeons intra-operatively based on fracture configuration. Primary outcomes include operation time, time for fracture union and postoperative knee function. Secondary outcomes include reoperation rate, follow-up duration and rehabilitation protocol.

**Results:** There was no statistically significant difference for time for fracture union, operation time and postoperative functional knee score between the three methods. Reoperation rate was higher in hybrid (7/12, 58.3%) and metal group (7/13, 53.8%), and was lowest in suture group (0/28, 0%). Metal implant breakage and soft tissue irritation which warrant removal were the main reoperation reason, which was significantly lower in suture group ( $p<0.0003$ ). Subgroup analysis for midpole patella fracture showed similar results in which all primary outcomes showed no statistically significant difference between metal and suture group, while reoperation rate was higher in metal group ( $p<0.003$ ).

**Discussion and Conclusion:** Suture fixation for patella fracture achieved similar outcomes when compared with traditional metal implants with lower reoperation rate, which does not limit to a certain fracture configuration.

**FP10.6**

**Percutaneous cerclage wiring as an adjunct to intramedullary nailing for fixation of subtrochanteric fractures**

**Arnold Nicholas Tai Chi Leung, Yan Kit Mak, Wing Yuk Mok**

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**Introduction:** Fixation of subtrochanteric fractures using intramedullary nailing alone can prove difficult due to fracture pattern and deforming forces. Mini open reduction and cerclage wiring can be used as an adjunct in challenging fracture patterns, although concerns still exist regarding the theoretical violation of biological principles resulting in non-union and other sequelae.

**Methods:** We retrospectively analysed subtrochanteric (AO32) and unstable intertrochanteric fractures with subtrochanteric extension (AO 31A2, 31A3) who underwent intramedullary nailing with percutaneous cerclage wiring between September 2014 and October 2021 in a regional hospital. Cases with <6 months of follow-up, atypical, and pathological fractures were all excluded. Quality of reduction was assessed using Baumgaertner Reduction Quality Criteria and fracture healing was documented by means of RUSH score.

**Results:** Total of 35 patients (23 females and 12 males, mean age=77) were included. Mean operative time was 134 minutes with 424 mL blood loss. With adjunct cerclage usage, the quality of reduction was good in 28 (80%) and satisfactory in 8 (20%). No poorly reduced cases were found. RUSH scores were 21.5 and 27.1 at 6 and 12 months, respectively. In all, 33 (94.3%) cases of union were established, with 1 case (2.9%) of non-union, and 1 incident (2.9%) of implant failure.

**Conclusion:** Cerclage wiring can be beneficial as an adjunct to intramedullary fixation in reduction and fixation of complex subtrochanteric fractures. The percentage of union suggests that additional cerclage does not detrimentally affect fracture healing, while potentially conferring benefits such as improved reduction, decreased operative time and blood loss.

## FP10.7

### Hip fracture caregiver empowerment programme to enhance transitional rehabilitation at home—The Home Sweet Home 1 (HSH1) randomised control trial

**Christian Xinshuo Fang,<sup>1</sup> Colin Shing-Yat Yung,<sup>2</sup> Rebecca Kit Yuk Chan,<sup>1</sup> Tak Man Wong,<sup>1</sup> Tak Wing Lau,<sup>2</sup> Frankie Ka-Li Leung<sup>1</sup>**

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**Introduction:** Development and randomised controlled trial of a Caregiver Empowerment Programme (CEP) for geriatric hip fracture patients.

**Methods:** A total of 125 geriatric hip fracture patients with identifiable caregivers were recruited and block randomised (Control: 64 and Intervention:61). The CEP consists of multimedia and training sessions with patient's caregivers by allied health therapists, including transfer, bed mobility and walking. Baseline characteristics: age, sex, abbreviated mental test and modified Barthel index (MBI) were compared. Co-primary outcomes include global health, quality of life assessments, functional and physical assessments using EQ-5D-5L questionnaire, VAS-QOL score, MBI score and Timed-Up and Go test (TUG) at discharge, 2-month, 6-month and 12-month interval. Secondary outcomes include mortality, readmission rates, length of stay and subsequent fractures.

**Results:** Baseline characteristics showed no differences. The global health measures with EQ-5D-5L and VAS-QOL showed improvement in the CEP group at all timepoints with statistically significant difference at 6-months for VAS-QOL (control: 56.5 vs. intervention: 69.9, p=0.03) and 12 months for EQ-5D-5L (control:8.40 vs. intervention: 6.33, p=0.03). Functional improvement with higher MBI scores were seen at all timepoints. Improvements were most pronounced in mid-term results with MBI statistically higher at 6-months (control:76.1 versus intervention: 87.7, p=0.03). Physical assessment showed mid-term improvements with TUG test (control: 175 seconds vs intervention: 78.8 seconds, p<0.01) at 6 months. A NNT of 3.11 was achieved for improved physical assessment. Secondary outcomes were not significantly different.

**Discussion:** CEP leads to significantly better perceived general health, functional and physical improvements. The implementation of a structured CEP is highly recommended to all rehabilitation institutions for geriatric hip fractures.

## FP10.8

### Prevalence and effect of osteosarcopenia in Chinese hip fracture patients

**Christopher Ian Lam, Hiu Wun Wong, Ning Tang, Chi Yin Tso, Wing Hong Liu, Simon Kwoon Ho Chow, Wing-Hoi Cheung, Ronald Man Yeung Wong**

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## FP10.9

### Outcome comparison of the presence or absence of associated ulnar fractures in middle aged patients with operated distal radius fractures

**Jason Long Ying Ho, Emily Ka Yan Yip**

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**Introduction:** Distal radius fractures (DRFs) commonly associate with ulnar styloid fractures and occasionally involve proximal extent such as the ulnar head or neck region. The clinical outcomes of these fractures have been shown controversial by multiple different studies.

**Methods:** This retrospective study included patients aged 50 to 65 years in our cluster between 2018 and 2020 with an operated DRF and we aimed to compare the clinical outcome of absence or presence of associated ulnar fractures and different extent of ulnar fractures subgroup analysis. The outcome included visual analog scale (VAS), joint range, disability of the arm, shoulder and hand score (DASH), and changes on radiograph.

**Results:** A total of 145 patients were recruited. Results showed the clinical and radiological outcome had no significant differences between the two groups of absence or presence ulnar fracture. However, when comparing the subclass, class III (ulnar styloid base fracture) had a significantly higher DASH score at 3 months and class IV (ulnar head or neck fracture) had a significantly higher VAS score at 6 months, when compared to those without ulnar fracture.

**Discussion and Conclusion:** We concluded that there was no significant difference in clinical and radiological outcomes when comparing between the absence and presence of associated ulnar fractures regardless of the subclass for patients aged 50 to 65 years with operated DRF.

## FP10.10

### Outcomes and peri-operative management of COVID-19 positive geriatric hip fractures during the fifth wave pandemic

**Brian Hok Wai Leung,<sup>1</sup> Wai Ming Chan,<sup>1</sup> Chun Fung Chan,<sup>1</sup> Ka Wing Ko<sup>2</sup>**

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**Introduction:** COVID-19 pandemic affected the healthcare system worldwide, significant proportion of local population got infected during the fifth wave pandemic. From January to March, there were more than one million population got infected in Hong Kong while the elderly patient accounted for the majority of mortality. While hip fracture is a common orthogeriatric issue, it was believed that mortality of hip fracture is higher in patient diagnosed with COVID-19 peri-operatively. The aim of this study was to evaluate the mortality, morbidity and management of hip fracture during COVID-19 pandemic in a local trauma centre in Hong Kong.

**Methods:** Geriatric patients admitted to our centre for hip fracture from February 2022 to April 2022 were reviewed. The mortality rate, length of stay, days to surgery, readmission rate and discharge destination were reviewed and compared between the COVID group and control group.

**Discussion and Conclusion:** A total of 76 patients were admitted for hip fracture. In all, 33 patients were diagnosed to have COVID-19, while 43 patients were not. The 30-day mortality rate of COVID + group and control group were 15.2% and 2.3%, respectively ( $p=0.16$ ). The length of stay of COVID + group and COVID - group were 30.1 and 22.5 days, respectively ( $p=0.019$ ). The days to surgery in COVID + group and COVID - group were 7.1 and 2.4, respectively ( $p<0.0001$ ). The readmission rate of COVID + group and COVID - group were 9.1% and 2.3%, respectively ( $p=0.31$ ). The mortality of hip fracture in patients diagnosed with COVID-19 is compatible to studies in other countries.

**FP10.11****Modern results of conservative treatment for pectrochanteric and neck of femur fracture for patients with ultra-high comorbidities: a propensity score matched analysis****Cheuk Yin Tam,<sup>1</sup> King Hang Yee,<sup>1</sup> Kwan Hung Moya Tsui,<sup>2</sup> Ronald Man Yeung Wong<sup>3</sup>**<sup>1</sup>*Department of Orthopaedics and Traumatology, Alice Ho Miu Ling Nethersole Hospital*<sup>2</sup>*Department of Orthopaedics and Traumatology, Prince of Wales Hospital*<sup>3</sup>*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** Most literatures advocate operation for hip fracture as it secures better survival than conservative management. However, potential bias may present as patients received conservative management are usually considered poorer in medical condition. Our study aimed to compare the survival of conservative treatment for geriatric hip fracture with ultra-high comorbidities with a cohort of propensity score matched operated patients.

**Methods:** A retrospective cohort study of proximal femur fracture admitted to two regional trauma centres from 2012 to 2021 was performed. Patients were identified in CDARS and divided into operative and conservative group by cases review and ICD-9 procedure code. Elixhauser comorbidity score (ECI) was calculated by patients' comorbidities. We excluded patients with ECI lower than the group's 75th percentile to identify the subgroup of most comorbidities. Propensity score matching of the subgroups was performed with XLSTAT with covariates: ECI, age and sex. The log-rank test was used to compare the Kaplan-Meier estimate curves for mortality. Adjusted analyses for the outcome of mortality were performed using Cox regression models to estimate hazard ratios (HRs) with corresponding two-sided 95% confidence intervals (CIs), considering sex, age, ECI as confounders.

**Results:** A total of 1789 patients were operated while 330 patients received conservative treatment. The 75th percentile ECI is 8.5 and cases with ECI smaller than 8.5 were excluded. The matched group of operative management has better survival than conservative (log-rank  $p<0.001$ ; adjusted HR=0.452 [95% CIs=0.332-0.615];  $p<0.01$ ).

**Discussion and Conclusion:** Even in patients with multiple comorbidities, operative management provides better survival than conservative management.

**FP10.12****Identification of osteosarcopenia by high-resolution peripheral quantitative computed tomography (HR-pQCT)****Ronald Man Yeung Wong,<sup>1</sup> Keith Yu-Kin Cheng,<sup>1</sup> Simon Kwoon-Ho Chow,<sup>1</sup> Vivian Wing-Yin Hung,<sup>1</sup> Ling Qin,<sup>1</sup> Sheung Wai Law,<sup>1</sup> Benjamin Hon-Kei Yip,<sup>2</sup> Wing-Hoi Cheung<sup>1</sup>**<sup>1</sup>*Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*<sup>2</sup>*JC School of Public Health and Primary Care, The Chinese University of Hong Kong*

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## FP10.13

### Retrospective comparative study between reverse shoulder arthroplasty and open reduction internal fixation in geriatric patients with comminuted proximal humerus fracture—an early experience from a district general hospital

**Wing Leong Chan, Ryan Lok Tin Moy, Tin Shui Ko, Keith Hay-Man Wan, Christine Yuen Shan Lai, Eugene Pak Lin Ng, Richard Hin Lun Lee, Hing Cheong Wong, Kevin Kwun Hung Wong, Kam Kwong Wong**  
*Department of Orthopaedics and Traumatology, Kwong Wah Hospital*

**Introduction:** To compare the functional outcomes and complications of three-dimensional-printing assisted reverse shoulder arthroplasty (RSA) with open reduction internal fixation (ORIF) in geriatric patients with comminuted proximal humerus fractures.

**Methods:** A retrospective review of geriatric patients with acute comminuted proximal humerus fractures with RSA or ORIF done in our institution from May 2019 to December 2021. Early functional outcomes and complications at postoperative 6 months were reviewed.

**Results:** A total of 24 patients were included with 10 patients in the RSA group and 14 patients in the ORIF group. The mean age was  $78.4 \pm 6.9$  years for the RSA group and  $78.9 \pm 11.9$  years for the ORIF group ( $p=0.42$ ). The mean abduction range was  $117.9 \pm 35.5$  degree for the RSA group and  $105.8 \pm 24.2$  degree for the ORIF group ( $p=0.19$ ). The mean forward flexion range was  $118 \pm 23.1$  degree for the RSA group and  $112.3 \pm 24.2$  degree for the ORIF group ( $p=0.31$ ). The mean postoperative haemoglobin drop for RSA group was  $1.61 \pm 0.9$  g/dL and  $1.69 \pm 0.9$  g/dL for the ORIF group ( $p=0.32$ ). There was one case of postoperative wound infection in the ORIF group (7.1%). For the RSR group, no case of infection was noted (0%) [ $p=0.20$ ].

**Discussion and Conclusion:** Compared with ORIF, RSA was able to achieve a better clinical outcome in the early postoperative period, with no increase in the postoperative complication.

## FP10.14

### Compliance to 11 clinical markers of BOAST 4 guidance for treating open fractures in a major trauma centre in Hong Kong

**Ho Tung Lam,<sup>1</sup> Michael TL Wong,<sup>1</sup> Wilson Li,<sup>2</sup> WY Shen,<sup>2</sup> KB Lee,<sup>2</sup> Tim KH Chui,<sup>2</sup> Janice CK Lau,<sup>1</sup> Jackie SF Lo<sup>1</sup>**  
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<sup>2</sup>*Department of Orthopaedics, Queen Elizabeth Hospital*

**Introduction:** Optimal management of open fractures requires timely multidisciplinary management. The consequences of infection can be great both for the individual patient and the community. Trauma networks and hospitals require the appropriate pathways and infrastructure, to manage these patients, to enable optimum recovery and to minimise the risk of infection. Until recently there has not been any widely adopted guideline for open fracture management. The British Orthopaedic Association (BOAST) guideline, published in 2017, was one of them.

**Methods:** This is a cohort study including 16 cases of open fracture admitted to Queen Elizabeth Hospital from 2017 to 2019. We accessed clinical management system to review clinical note, operation record, follow up progress, to assess adherence of management to the BOAST guideline. Adaptation due to difference in scope of practice of different specialty in Hong Kong compared to that in the United Kingdom was made, for example microsurgical repairs in 3C fractures are usually performed by orthopaedic surgeons instead of plastic surgeons here.

**Results:** Regarding the injury to first debridement time, administration of antibiotics and early soft tissue coverage with definitive fixation, we observed most of cases can adhere to the BOAST-4 standard. For those domains with lower compliance, possible reasons will be discussed.

**Discussion and Conclusion:** High compliance rate was observed in most of the eleven clinical markers of BOAST 4 guidance for treating Open Fractures in our hospital.

**FP10.15**

**Muscle plays more superior role than fat in bone homeostasis: a cross-sectional study**

**Linus Chee Yeen Lee, Chaoran Liu, Simon Kwoon-Ho Chow, Vivian Wing-Yin Hung, Wing-Hoi Cheung, Ling Qin, Sheung Wai Law, Ronald Man Yeung Wong**

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**FP10.16**

**COVID-19 hip fracture outcomes in a city with one of the highest death rates: cycle threshold values have no prognostic role**

**Moya Kwan Hung Tsui,<sup>1</sup> Wai Wang Chau,<sup>2</sup> Wing Hong Liu,<sup>1</sup> Cheuk Yin Tam,<sup>3</sup> Dennis King Hang Yee,<sup>3</sup> Chi Yin Tso,<sup>1</sup> Ning Tang,<sup>1</sup> Ronald Man Yeung Wong<sup>2</sup>**

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**FP10.17**

**The ORACLE study: open fracture risks associated with infection—a cohort longitudinal evaluation study of 517 open fractures across 20 years**

**Ching-yau Wong,<sup>1</sup> Janus Siu-him Wong,<sup>1</sup> Alfred Lok-hang Lee,<sup>2</sup> Colin Shing-yat Yung,<sup>3</sup> Tak-man Wong,<sup>1</sup> Christian Xinshuo Fang,<sup>1</sup> Frankie Ka-li Leung<sup>1</sup>**

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## Electronic Poster Presentations

P01

### Anterior acetabular sector angle is a potential indicator for identifying subchondral fatigue fracture of the femoral head

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**Introduction:** Subchondral fatigue fracture of the femoral head (SFFFH) is a rare condition in the general population, yet not uncommon in soldiers and athletes. The symptoms of SFFFH include hip pain and collapse of the femoral head which is the same as traumatic osteonecrosis of the femoral head (TONFH). We aimed to discover existing indicators that can help the orthopaedist distinguish between SFFFH and TONFH.

**Methods:** In all, 24 TONFH and 98 SFFFH patients who were affiliated with the Chinese People's Liberation Army were reviewed. Besides the age, height, weight, and body mass index, acetabular anteversion of the superior acetabulum (AVsup), acetabular anteversion of the centre of the acetabulum (AVcen), anterior acetabular sector angle (AASA), posterior acetabular sector angle (PASA), neck-shaft angle (NSA) and inferior iliac angle (IIA) were calculated. Then, logistics regression was performed to analyse the above data to obtain potential indicators via comparing the odds ratio (OR) and p value.

**Results:** Age (OR=1.33; 95% confidence interval [CI]=1.12-1.65; p=0.0031) could be considered as the indicator. AVcen (p=0.0334), AASA (p=0.0002), NSA (p=0.0007), IIA (p=0.0316) were considered to be statistically significant. Further, AVcen (OR=1.41; 95% CI=1.04-1.95) and AASA (OR=1.44; 95% CI=1.21-1.77) should be paid much more attention due to the higher OR than other indicators.

**Conclusion:** The diagnosis of SFFFH should be considered when a military soldier or an athlete presents with hip pain. What's more, AASA and AVcen should be analysed to distinguish SFFFH and TONFH.

**P02****Hong Kong College of Orthopaedic Surgeons position statement on management of osteoarthritis of knee: a Delphi study****Wai Pan Yau,<sup>1</sup> Chi-kit Chiu,<sup>2</sup> Man-hong Cheung,<sup>3</sup> Amy Yim-ling Cheung<sup>4</sup>**<sup>1</sup>*Department of Orthopaedics and Traumatology, The University of Hong Kong*<sup>2</sup>*Department of Orthopaedics and Traumatology, United Christian Hospital*<sup>3</sup>*Department of Orthopaedics and Traumatology, Gleneagles Hong Kong Hospital*<sup>4</sup>*Department of Orthopaedics and Traumatology, Queen Mary Hospital*

**Introduction:** Osteoarthritis of knee is one of the commonest causes of chronic pain and disability in Hong Kong. For the benefit of the public, it is the responsibility of the Hong Kong College of Orthopaedic Surgeons to prepare a position statement on management of OA knee.

**Methods:** Taking reference of international guidelines and the practice of orthopaedic surgeons in Hong Kong, 26 potential interventions for management of OA knee are included into the position statement. A literature review was conducted in early 2022. Summaries of the best available evidence were prepared according to the Oxford Centre for Evidence-Based Medicine. A Delphi survey was distributed to an expert panel formed by 106 fellows of the College in June 2022. The results of the Delphi survey form the recommendations of the College in this position statement.

**Result:** The College RECOMMENDS patient education, land-based exercise, water-based exercise, self-management programme, weight reduction, cane, paracetamol, topical NSAID, oral NSAID, high tibial osteotomy, total knee arthroplasty as treatment of OA knee; and does not recommend lateral wedge insole, denervation therapy and arthroscopic lavage. The College is unable to advocate for or against the use of thermotherapy, transcutaneous electrical nerve stimulation, pulsed electromagnetic wave therapy, acupuncture, valgus off-loading knee brace, knee sleeve, opioid analgesics, intra-articular steroid injection, intra-articular hyaluronic acid injection, intra-articular platelet rich plasma injection, oral supplements, and partial meniscectomy.

**Conclusion:** The College presents a position statement on management of osteoarthritis of knee. These recommendations are in line with other international guidelines and represent the best clinical practice in OA knee available in Hong Kong.

**P03****Magnesium-based intramedullary nail enhanced fracture healing of type II diabetic mice****Shian Zhang, Wenxue Tong, Ling Qin, Dick Ho Kiu Chow***Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

Patients with type 2 diabetes (T2D) have poor bone quality, increased fracture risk, impaired fracture healing, and are associated with magnesium (Mg) deficiency. Serum concentration of Mg ions is an important regulator of insulin sensitivity and decrease in serum Mg ions increases insulin resistance in T2D. Our previous study showed that Mg ions were released during degradation from Mg-containing intramedullary nail (Mg-IMN) and induced periosteum-dependent new bone formation. Therefore, the objective of the current study is to investigate the effect of Mg-IMN on fracture healing in T2D mice. Closed femoral fracture was established on the right femur of T2D mice model (db/db), which resulted from an autosomal recessive mutation of the lepr gene that codes for the leptin receptor. Twenty-eight-week-old mice (db/db mice for T2D group and db/m mice for non-diabetic group, n=5) were used. Fractures were fixed with stainless steel (SS) needles or Mg-IMN. Right femurs were harvested at week 8 postoperatively. The quality of fracture callus healing was assessed by radiographs, micro-computed tomography scans, four-point bending testing, and histological analysis. For diabetic fracture healing, compared to db/m+SS group, db/db+SS showed a 33.96% decrease in bone volume ratio (BV/TV), 64.55% decrease in failure load, 65.12% decrease in stiffness, and 58.27% decrease in energy-to-failure. Mg increased the bone volume (BV), BV/TV, failure load, stiffness, energy-to-failure by 57.79%, 44.80%, 104.5%, 110.9%, and 187.9% in db/db+Mg compared to db/db+SS group, respectively. Diabetes impaired fracture healing when compared to non-diabetic controls. Our innovative bioactive Mg-IMN significantly promoted fracture healing in diabetic mice.

**P04**

**The effect of low-magnitude high-frequency vibration on Wnt/β-catenin signalling pathway in C2C12 myoblasts**

**Wujian Lin, Can Cui, Yufeng Long, Ronald Man Yeung Wong, Simon Kwoon Ho Chow, Wing Hoi Cheung**

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**Introduction:** Low-magnitude high-frequency vibration (LMHFV) was found to significantly increase muscle strength and suppress adipogenesis of muscle-derived stem cells in sarcopenia animal model, whereas Wnt/β-catenin signalling pathway may be the principal mechanism. However, the mechanism how LMHFV affects Wnt pathway in muscle remains unclear.

**Methods:** Myogenic differentiation induction of C2C12 myoblastic cell line was performed. 20 000 cells per well were randomly allocated to the vibration group or the control group. The vibration group received LMHFV (35 Hz, 0.3 g, 20 min/day for 10 days). Samples were collected on Day 1, 5 and 10. Polymerase chain reaction and western blot were used to examine the Wnt-related markers expression.

**Results:** Wnt10b, LRP5, β-catenin and TCF/LEF decreased ( $p<0.02$ ), while FRZB, AXIN2, GSK3β and APC did not change ( $p>0.62$ ) on Day 5 compared with Day 1. The inhibition-markers including FRZB, AXIN2 and APC significantly increased ( $p<0.02$ ) from Day 5 to 10, yet the activation-markers including Wnt10b, LRP5 and β-catenin resumed to the initial level ( $p<0.03$ ) on Day 10 compared to Day 1. After 10-day intervention, LMHFV significantly increased Wnt10b, LRP5, FZD1, β-catenin and TCF/LEF ( $P<0.01$ ) but decreased FRZB and GSK3β ( $p<0.05$ ).

**Discussion and Conclusion:** After 5-day induction, the activation-markers of Wnt pathway were down-regulated and the inhibition-markers up-regulated, yet more inhibition-markers were up-regulated at the end. LMHFV was found to enhance the Wnt pathway expression after 10-day treatment. These results support that the Wnt pathway inhibited by myogenic differentiation could be restored and enhanced by LMHFV. These revealed the beneficial effect of LMHFV on Wnt/β-catenin signalling pathway of myoblasts.

**P05**

**The effect of platelet-rich plasma injections on people with Achilles tendinopathy: a systematic review and meta-analysis**

**Clarence Tsz-kit Mak, Patrick Shu-Hang Yung, Samuel Ka-Kin Ling**

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**Introduction:** Achilles tendinopathy is commonly occurring among various populations. Platelet-rich plasma (PRP) injection was suggested, but its effectiveness is controversial. This systematic review and meta-analysis reviews the current evidence of the effect of PRP injection on Achilles tendinopathy.

**Methods:** This review follows the PRISMA guidelines. CINAHL via EBSCOhost, Cochrane Library, and PubMed were searched for RCTs comparing PRP injection to another conservative treatment on VISA-A score or max AT thickness. Risk of bias assessment was done with RoB2. Meta-analysis was performed with Revman 5.3.

**Results:** Six studies including 422 participants suffering from chronic mid-portion Achilles tendinopathy were identified. Two, one and three of them were with low risk, some concerns and high risk of bias, respectively. There were no statistically significant differences between PRP injection and control at all time-points for VISA-A score (short-term: MD=2.28, 95% confidence interval [CI]=[-1.95, 6.51],  $p=0.29$ ; Intermediate-term: MD=1.83, 95% CI=[-2.66, 6.32],  $p=0.42$ ; Long-term: MD=3.46, 95% CI=[-8.62, 15.55],  $p=0.56$ ) and max AT thickness (Short-term: MD=0.26, 95% CI=[-0.71, 1.24],  $p=0.60$ ; Intermediate-term: MD=-0.84, 95% CI=[-2.12, 0.43],  $p=0.20$ ; Long-term: MD=-0.28, 95% CI=[-1.19, 0.64],  $p=0.55$ )

**Discussion and Conclusion:** Despite trends of increasing PRP injections, no solid evidence exists. Future studies need to standardise and investigate the injection site and technique and quantify the type and dose of PRP to ascertain if PRP injections are an effective treatment for Achilles tendinopathy.

**P06****Effect of non-operative treatment for posterior tibial tendon dysfunction (PTTD) patients: a systematic review****Rita Tsz-Ying Lui, Patrick Shu-Hang Yung, Samuel Ka-Kin Ling***Department of Orthopaedics and Traumatology, The Chinese University of Hong Kong*

**Introduction:** Posterior tibial tendon impairment results in progressive insufficiency of the dynamic arch support and progresses to a clinical finding of pes planus. Posterior tibial tendon dysfunction (PTTD) is classified into four stages, and the common management in the early stages of PTTD is non-operative. The best non-invasive treatment modality is unknown thus, this review aimed to investigate the current available non-operative treatment for PTTD and their efficacy in treating pain, function, and quality of life.

**Methods:** This systematic review was conducted according to the PRISMA guidelines. CINAHL, Cochrane Library, EMBASE, MEDLINE, and PubMed were used for the literature search. The PEDro scale was used for the quality assessment of the included studies. Two independent reviewers completed identifications of the studies and quality assessment.

**Results:** Nine studies were included in this review with four randomised controlled trials, three single group pre-test post-test studies, and two retrospective studies. A heterogeneous combination of treatment modalities was used including orthotics, muscle exercises (including both active and EMG assisted), stretching, and platelet-rich plasma injections. The mean PEDro score was 3.67/10 and is classified as poor-fair quality.

**Conclusion:** Although the studies showed some beneficial effects of the various conservative treatment in pain relief and improving daily function, the low quality of the available studies means we cannot conclude on the efficacy of non-operative treatment for posterior tibial tendon dysfunction.

**P07****Gout after total knee replacement: a 10-year study in Hong Kong**

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**Introduction:** Gouty attack after a total knee replacement (TKR) is rare, with only a few cases reported in the literature. This study investigates its occurrence in Hong Kong.

**Methods:** The Clinical Data Analysis and Reporting System (CDARS) was used to identify all patient records in the Hong Kong West Cluster hospitals (7 public hospitals managing about 330 000 patients/year), who had a diagnosis code of "Gout" and a procedure code of "Total knee replacement" from 2012 to 2022. The clinical notes were further screened to identify gouty attacks after TKR.

**Results:** A total of 37 patients with a diagnosis of gout and underwent a TKR from 2012 to 2022 were identified from CDARS. After screening, only three patients had postoperative gouty attack in the same replaced knee, all confirmed with joint urate crystals. All occurred in the early postoperative period (14 days to 11 weeks) and had a known history of gout. Joint total cell counts ranged from  $51-4460 \times 10^6/L$  and all cultures were negative. Two patients were treated non-surgically with symptomatic improvement. One patient had surgical debridement of the tophi over the patellar tendon which was causing clunking.

**Conclusion:** Gout after TKR is rare—we identified three cases from the Hong Kong public healthcare system over a ten-year period, the largest study conducted on gout after TKR. Surgeons should be aware of this condition, especially patients with a history of gout, and differentiate it from prosthetic joint infection, the former which can be successfully treated with non-operative treatment.

**P08**

**A novel trigonometric model for estimating the loss of body height associated with scoliosis deformity**

**Tsz Hin Tang,<sup>1</sup> Nelson Leung Sang Tang,<sup>2</sup> Jack Chun Yiu Cheng,<sup>1</sup> Tsz Ping Lam<sup>1</sup>**

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**Introduction:** Scoliosis masks the true body height which have been regularly used in estimating body mass index, metabolic function, lung function, and postoperative changes in body height. This study represents an attempt to model the loss in height with a novel trigonometric model.

**Methods:** By assuming an isosceles triangle as a model for the scoliosis curve, the base of the triangle is equivalent to the height of an unaffected spine. While the length of the two equivalent sides in the isosceles triangle would be the true height before height loss. Two measured parameters are required to calculate these lengths:(1) the angles of the triangle which are determined to be equal to [Cobb's Angle/2]; (2) the height of the triangle which corresponds to the apical vertebral translation (AVT).

**Results:** The new model was validated using the dataset from Sarlak et al (2012) that provided detailed measurements of 36 subjects. The mean difference between observed and predicted  $\Delta H$  was 9.23 mm by this new method, comparable to the Stokes method (8.27 mm) and better than Kono (15.4 mm) and Yilkoski (22.6 mm). Additionally, AVT was found to be stable at an average value of 40 mm when the number of vertebrae involved in the major curve were  $\leq 10$ .

**Discussion and Conclusion:** A new validated trigonometric method using the tangent length and Cobb angle to determine  $\Delta H$  was found to have good reliability for clinical application in scoliosis assessment. Another observation was that the AVT measurement value of 40 mm could be assumed when the number vertebrae involved in the major curve are  $\leq 10$ .

**P09**

**Magnesium enriches Grem1+ Cd105+ skeletal stem cells and modulates their differentiation potential to reverse accumulative dosage of bisphosphonate-impaired fracture healing**

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**Introduction:** Patients receiving long-term bisphosphonates treatment are at a high risk of atypical femoral fracture. Our team has successfully established a bisphosphonate-impaired femoral fracture healing model in rats and also validated the therapeutic effect of the magnesium-containing intramedullary nail (Mg-IMN) on the prevention of impaired healing. The present study aimed to further explore the underlying mechanisms of bisphosphonate-impaired fracture healing and the therapeutic effect of Mg using a single-cell approach.

**Methods:** A bisphosphonate-impaired femoral fracture healing model was constructed and fixed with stainless steel intramedullary nail (BP) and Mg-IMN (BP-Mg), respectively. The single-cell transcriptome atlas of primary and cultured fracture callus cells (FCCs) at 2, 4, and 12 weeks post-fracture were depicted in Control, BP, and BP-Mg groups. In vivo validation was performed by immunofluorescence, immunohistochemistry, flow cytometry, and real-time polymerase chain reaction.

**Results:** According to sequencing data, FCCs were comprised of stromal cells that highly expressed fibroblastic markers. There were no significant differences in transcriptomes among Control, BP, and BP-Mg groups at 4 weeks post-fracture. Furthermore, a group of skeletal stem cells highly expressing Grem1 and Cd105 dramatically increased over time in the BP-Mg group. The expression of Ccl2 and Ccl7 was elevated in the BP-Mg group, suggesting activation of the chemokine signalling pathway within FCCs.

**Discussion and Conclusion:** Our study suggests for the first time the potential involvement of Grem1+ Cd105+ skeletal stem cells and activation of the chemokine signalling pathway are the underlying mechanism of Mg degradation from Mg-IMN in the prevention of bisphosphonate-impaired fracture healing.

**P10**

**Adolescent idiopathic scoliosis (AIS) patients getting old—their health-related quality of life and spinal appearance when the number of post-surgical years turns more than 30 years**

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**Introduction:** Patients with severe adolescent idiopathic scoliosis (AIS) demanding spinal surgical correction usually undergo surgery in their earlier teenage years. Their health-related quality of life (HRQOL) and appearance are commonly thought to be stable years after surgery. We speculate that their HRQOL and appearance experience changes when age advances. This study investigated the HRQOL and appearance of patients with AIS 20-25, 25-30 and >30 years after surgery.

**Methods:** A total of 32 patients (90.6% female) who had regular follow-up in our clinic since their spinal correction surgery were recruited. Scoliosis Research Society-22r questionnaire (SRS-22) and Spinal Appearance Questionnaire (SAQ) were invited to fill out every time they attended their regular postoperative follow-up clinic sessions.

**Results:** Mean major Cobb angle was 67.2 (54.96) measured at perioperative stage, 55.2% underwent anterior spinal fusion+posterior spinal fusion and 44.8% underwent posterior spinal fusion only. Mean age was 38.80 (32,45) years and mean follow-up was 22.1, 27.1, 31.4 years in patients 20-25, 25-30, and >30 years after surgery, respectively. All SRS-22 subscores and total score was similar among the 3 time points. Self-image scored at middle range values (20-25, 25-30, >30=3.5 vs 3.3 vs 3.6, p=0.55). In SAQ, Curve scores were significantly increasing (5.41 vs 6.86 vs 7.67, p=0.047) and Prominences scores increased between 20-25 and 25-30, and dropped at >30 (4.29 vs 6.14 vs 5.50, p=0.046).

**Conclusion:** HRQOL maintained stable >30 years after surgery, while self-image scored at middle range reflecting how advancing age change their self-scrutiny. Poor perceptions on their trunk curve and prominence when patients with AIS are aged ≥40 years should be addressed. Special care and tailor-made follow-up should be provided when patients with AIS are getting older, particularly approaching peri-menopause for female.

**P11**

**The ‘obesity paradox’ in sarcopenia: is body composition the missing gap?**

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**Introduction:** Higher body mass index (BMI) is associated with lower risk of sarcopenia. However, people with obesity not only have higher BMI, but also more metabolic problems. The aim of this study was to explore the optimal body compositions to balance obesity and sarcopenia.

**Methods:** Old participants aged ≥60 years were recruited. Parameters related to muscle and fat were measured by bioelectrical impedance analysis. Handgrip strength combined with appendicular skeletal muscle mass were used to diagnose sarcopenia. Obesity was defined by BMI and body fat percentage (BF%), respectively. The association of muscle and fat indicators was analysed by Pearson’s correlation coefficient. The odds ratios (ORs) of sarcopenia incidence according to different obesity definitions, and ORs of sarcopenia incidence according to the distribution of BMI and BF% were detected.

**Results:** A total of 1637 old patients ( $74.8 \pm 7.8$  years) participated in this study. Absolute muscle and fat mass in different positions had positive associations ( $p<0.05$ ), except for the percentage data. When defined by BMI (OR=0.69, 95% confidence interval [CI]=0.56, 0.86), obesity was a protective factor for sarcopenia, whilst a risk factor when using BF% (OR=1.38, 95% CI=1.13, 1.69) to define. The lowest incidence of sarcopenia was found in females with the BF% 26.0–34.6%. A trend showed that BF% less than 23.9% in males was better for sarcopenia prevention.

**Discussion and Conclusion:** Obesity is a risk factor of sarcopenia when defined by BF%. The management of BF% can help old people prevent against sarcopenia and obesity simultaneously.

**P12****Short-chain fatty acids attenuate sarcopenia phenotypes of senescence accelerated mice**

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**Introduction:** Current clinical evidence indicates that short-chain fatty acids (SCFAs) are beneficial gut microbial metabolites, and are associated with muscle appendicular lean mass in old people. We investigate the pre-clinical efficacy of SCFA supplement as a therapeutic strategy for sarcopenia.

**Methods:** Pre-sarcopenic senescent accelerated prone 8 (SAMP8) mice received daily SCFAs (acetate, butyrate, propionate) in drinking water for 3 months. Age-matched SAMR1 and SAMP8 were used as control groups. Stool samples were collected and performed 16s rRNA sequencing. Skeletal muscle mass and strength indicators were detected by muscle weight, myofiber cross-sectional area (CSA), grip strength, and ex-vivo functional test. Gene expressions of foxo3, murf1, and atrogin-1 in muscle were evaluated by qPCR. Colonic Muc2 and Claudin-1 expression and serum lipopolysaccharide concentration were executed to assess the gut barrier function. Gas chromatography-mass spectrometry (GC-MS) was used to detect SCFAs concentration in serum.

**Results:** Aged SAMP8 and SAMR1 had different microbiota composition. Increased muscle mass, myofiber CSA, grip strength, and tetanic force were found in SCFAs-treated mice compared to control SAMP8 mice ( $p<0.05$ ). Gene expressions of foxo3 and murf1 were reduced in treated mice ( $p<0.05$ ). Increased Muc2 and Claudin-1 protein expression and reduced LPS were found indicated the gut barrier repairment after SCFAs treatment in SAMP8 mice ( $p<0.05$ ). SCFAs also rescued circulatory butyric acid reduction in SAMP8 mice.

**Discussion and Conclusion:** SCFAs treatment enhanced muscle mass, strength indicators, reduced the expression of muscle atrophy markers, and repaired gut barrier function in sarcopenic old mice.

**P13**

**Reflections from adolescent idiopathic scoliosis (AIS) patients many years after surgery—How do they feel about their body? Struggling with body conditions despite good clinical and radiological outcomes? Are they still doing great? A preliminary study**

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**Introduction:** Patients with severe adolescent idiopathic scoliosis (AIS) having higher chance on further progress of their spines are recommended to receive spinal correction surgery. Patients have desires which are different from clinical concerns. This study aimed to collect opinions and reflections from patients with AIS many years after surgery.

**Methods:** Every postoperative AIS patient was invited to complete routine online questionnaires. Some non-specific questions on their recent physical and mental conditions were asked also. Patients were requested to enter the discussion points into the system. Discussion points were summarised by number of years since surgery.

**Results:** Comments from 68 patients (52 females, 76.5%) were successfully collected between January and July 2022. Fifty-five patients were followed-up for ≤20 years, and 8, 4, and 1 patients for 20-25, 25-30, and >30 years, respectively. Patients followed-up for ≤20 years commented most on their shoulder imbalance (14/55, 25.5%), Rib bump (5/55, 9.1%), breast imbalance and scar (4/55, 7.3% each). Patients followed-up for 20-25 and 25-30 years hoped to correct their shoulder imbalance (n=3), and rib bump (n=3), back pain (n=2), wrist imbalance (n=2) and head-breast-hip balance (n=2). The patient followed-up for >30 years commented “scar left after surgery is definitely very annoying even until now”.

**Discussion and Conclusion:** Patients with AIS followed-up for many years after surgery have different concerns at different postoperative stages. Patients followed-up for ≤20 years focused on cosmetic influence and imbalances across the trunk. Body imbalance and pain persist. Scar was ultimately a major point for surgeons to follow even after 30 years of surgery as this affects self-image and mentality. Further report on matters concerning these postoperative patients is warranted.

**P14****Application of 3D printing technology in occupational therapy for orthopaedics patients**

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**Introduction:** Conventional treatment in occupational therapy for orthopaedics patients include hand function training with remedial activities and assistive device. However, most commercially available products are with fixed design and limitations.

Occupational Therapy Department in Alice Ho Miu Ling Nethersole Hospital used three-dimensional (3D) printing technology to develop rehabilitation products for orthopaedics patients. The products include devices for forearm rotation training, finger stretching, finger flexor strengthening and a chopsticks aid for patients with rheumatoid arthritis.

**Methods:** Occupational therapists assessed the patients, then designed and produced devices using 3D printing technology. Outcomes were measured by hand assessment and patient's feedback on symptom control and treatment compliance.

**Results:** The 3D printing technology showed advantages over traditional rehabilitation. Products were designed based on individuals' needs and more complex design was achievable. For example, some devices were designed to allow quick adjustment of the difficulty level. Patients reported better compliance with improved hand function. The 3D printing technology enabled greater flexibility.

Man-hour and complexity of craftsmanship skill on fabrication were significantly reduced. Products with complex design could be manufactured within hours. For example, the chopsticks aid was designed with a movable hinge. The 3D printing technology overcame the restriction of traditional process in terms of time and requirement of delicate technique.

**Discussion and Conclusion:** The 3D printing technology enables a more time-efficient and cost-effective treatment modality. Compared to handmade products, it is an efficient process to manufacture products with higher accuracy. More patient-specific device could be developed through 3D printing in the field of hand rehabilitation.

**P15****Acute simultaneous anterior cruciate ligament and patellar tendon rupture: a case report**

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Anterior cruciate ligament (ACL) rupture is a common sports injury, whereas patellar tendon rupture is relatively uncommon. Simultaneous injury of both structures, however, is rare and has only been described in a limited number of case reports worldwide. We present a case of a young man who had left knee injury when landing on a trampoline. Magnetic resonance imaging showed simultaneous rupture of the ACL and patellar tendon, as well as partial medial collateral ligament and lateral malleolus tear. He was treated with acute repair of the patellar tendon and lateral meniscus, followed by staged ACL reconstruction 3 months later. Upon completion of rehabilitation, the patient's left knee achieved satisfactory range of motion and stability. He was able to resume swimming and jogging 9 months after the index operation. We review the literature to compare the outcomes following single-stage vs two-stage repair of these rare combined injuries.

**P16**

**Injectable hydrogel with the sustainable release of magnesium ions enhances bone regeneration in challenging mandible osteonecrosis**

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**Introduction:** A critical side-effect observed in patients undergoing a long-term bisphosphonates-administration may predispose to bisphosphonate-related osteonecrosis of the jaw (BRONJ), an area of necrotic bone in the jaw with impaired healing capacity, reduced angiogenesis, and inevitable infections. The osteo- and angio-promotive properties of magnesium (Mg) implants and Mg<sup>2+</sup> *in vivo* have been widely recognised by our previous study. Additionally considering the special aesthetic restoration of facial structures, we aimed to fabricate an injectable hydrogel with Mg<sup>2+</sup> sustained releasing for bone regeneration in challenging mandibular osteonecrosis and explore the potential mechanism.

**Methods:** A MgO-nanoparticle-encapsulated PBRM hydrogel was synthesised by a pH-mediated reaction and characterised its properties. Cells were extracted and co-cultured with an optimal hydrogel system to evaluate the osteogenic differentiation potentials *in vitro*. Then, we further established a rat BRONJ model and assessed the therapeutic efficacy *in vivo*.

**Results:** PBRM hydrogel achieved a controllable ultrafast crosslinking. The *in vitro* results suggested that PBRM hydrogel possessed biodegradability, enhanced mechanical prosperity, and sustained Mg<sup>2+</sup> releasing, which could benefit osteogenesis and angiogenesis. *In vivo* studies showed the enhanced bone formation with elevated SP7, OPN, and CD31 expression, suggesting the vessel formation involved in Mg-enhance mandible regeneration, which could be also attenuated by local VEGF receptor-2 inhibitor injection for further validation.

**Discussion and Conclusion:** Injectable hybrid hydrogels with sustained-releasing Mg<sup>2+</sup> promote bone regeneration in BRONJ coupling with blood vessel formation. Controllable ultrafast crosslinking and strong osteoinductive ability provide the hydrogel with great clinical translation potential in complex maxillofacial tissue reconstruction.

**P17****The use of five-strand hamstring autograft to increase the graft size in anterior cruciate ligament reconstruction—a prospective cohort study with satisfactory early clinical results**

**Keith Hay-Man Wan, Christine Yuen Shan Lai, Eugene Pak Lin Ng, Richard Hin Lun Lee, Stephen Pui Kit Tang, Kevin Kwun Hung Wong, Kam Kwong Wong**

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**Introduction:** The purpose of the study was to report on the outcomes of using 5-strand hamstring autograft to increase the graft size for anterior cruciate ligament (ACL) reconstruction.

**Methods:** A prospective cohort study of patients with arthroscopic-assisted single bundle anterior cruciate ligament reconstruction using hamstring autograft from January 2019 to June 2021. The patients were prospectively recruited to undergo ACL reconstruction with either 5-strand graft (group A) or 4-strand (Group B) graft.

**Results:** A total of 45 patients were included into the study. The mean diameter of the final graft was  $8.9 \pm 0.6$  cm in the 5-strand group and  $7.5 \pm 0.8$  cm in the 4-strand group ( $p<0.001$ ). Four-strand graft diameter measurements were taken intra-operatively in the 5-strand group before preparation of the 5-strand graft. The mean graft diameter of the 4-strand grafts were similar in both groups:  $7.3 \pm 0.3$  mm in Group A and  $7.5 \pm 0.8$  mm in Group B ( $p=0.72$ ). There was no statistically significant difference between the two groups of patients in terms of the functional knee scores. There were no complications of wound infection in both groups. There was one case of graft rupture (4.8%) in the four-strand group which required revision reconstruction with patellar tendon graft 9 months postoperatively. There was no case of graft rupture in the five-strand group ( $p=0.29$ ).

**Discussion and Conclusion:** The 5-strand hamstring graft technique provides a graft with significantly larger graft diameter than the quadrupled graft technique, with satisfactory clinical outcomes.

**P18****Multiple joints septic arthritis, caused by a rat associated bacteria—*Streptobacillus moniliformis***

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**Background:** *Streptobacillus moniliformis* is a fastidious, gram-negative rod bacteria that is a commensal flora in the respiratory tract of rats. If bitten, it could cause a rare disease known as the rat bite fever, with the classical triad of fever, rash and polyarthralgia.

**Case report:** We report a case of a 73-year-old male with history of gout, presented with multiple joint pain. He was initially treated as gout with steroid coverage. Arthrocentesis of multiple joints was done. Initially only urate crystals were seen. On more detailed examination under microscope, the gram negative *Streptobacillus moniliformis* was actually present, but difficult to be spotted due as it was unusually lightly stained. He was treated with antibiotics together with arthrotomy of multiple joints, but unfortunately, he passed away in the end. We will be discussing the diagnostic difficulty, management strategies and comparing our case with different case reports of septic arthritis caused by this bacterium.

**P19**

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### **Calcified peri-arthritis in the hand and wrist: a report of three cases**

**Kwok Ting Yip, Esther Ching San Chow**

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**Introduction:** Calcific tendonitis or acute calcific periarthritis is well-known in the shoulder region while it is less discussed in the hand and wrist region. With non-specific presentation as acute pain and swelling, it is usually misdiagnosed at an early stage as inflammatory arthritis like gout, septic arthritis or fracture, thus leading to overtreatment with antibiotics or even surgery. Awareness to this condition should be raised in considering differential diagnosis since this condition is usually self-limiting.

**Methods:** Three cases of acute calcific peri-arthritis in the hand and wrist region, who presented to our institute from January 2015 to December 2021 were included. The clinical and radiological outcomes were reviewed.

**Results:** The location of the calcific periarthritis cases include: Scapho-trapezio-trapezoid joint (2 cases) and the distal interphalangeal joint (1 case). The typical clinical presentation was acute pain and swelling. The typical radiological finding was localised calcification. The misdiagnosis of radiological findings includes fracture and bone tumours. All cases were treated conservatively with analgesics, physiotherapy and splintage. There was resolution of symptoms at an average of 1.5 months. Unnecessary investigations include computed tomography scan and magnetic resonance imaging scan in one case.

**Conclusion:** Calcific periarthritis is an unusual and painful condition in the hand and wrist region. The clinical and radiological presentation is usually typical. A high index of suspicion's is necessary to make the correct diagnosis. Proper treatment and avoidance of unnecessary diagnostic tests, invasive procedures and inappropriate medications have to be emphasised.

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FP2.2, FP2.5	<b>Goff E</b>	<b>Ip M</b>
<b>Chow HY</b>	FP3.21	BP04, FP3.18, P12
FP4.4	<b>Goonetilleke RS</b>	<b>Ip TST</b>
<b>Chow MCS</b>	FP6.3	FP1.12
FP1.7	<b>Griffith JF</b>	<b>Ip WK</b>
<b>Chow R</b>	FP6.14, FP8.6	FP2.2, FP2.4, FP2.5
FP4.7	<b>Guldeniz O</b>	<b>J</b>
<b>Chow SKH</b>	FP3.22, FP7.11	<b>Jiang T</b>
BP02, BP04, FP3.9, FP3.13, FP3.16, FP3.18, FP7.17, FP8.19, FP10.8, FP10.12, FP10.15, P04, P11, P12	<b>Guo J</b>	FP1.10
<b>Chow W</b>	P09, P16	<b>Jiang T</b>
FP5.4, FP5.15, FP7.8	<b>H</b>	FP3.5, FP3.6, FP9.6
<b>Choy WY</b>	<b>Hao B</b>	<b>Jiang Y</b>
FP5.19	FP7.19	FP3.3
<b>Chu CPW</b>	<b>He X</b>	<b>K</b>
FP4.16	FP1.7, FP1.8, FP1.10, FP1.12, FP1.13, FP2.17, FP4.13, FP6.2, FP6.9, FP8.4	<b>Ke X</b>
<b>Chu WCW</b>	<b>Ho CH</b>	FP1.15
FP8.18	P15	<b>Khoo JR</b>
<b>Chui ECS</b>	<b>Ho DSL</b>	FP1.4, FP9.13, FP9.14
FP2.20, FP4.12, FP5.11, FP6.5, FP6.6	FP2.11	<b>Ko KSY</b>
<b>Chui MCS</b>	<b>Ho GTY</b>	FP7.17, FP8.16, FP8.18, FP8.19
FP7.17	FP10.5	<b>Ko TS</b>
<b>Chui KH</b>	<b>Ho JLY</b>	FP10.4
FP10.3	FP10.9	<b>Ko TS</b>
<b>Chui TKH</b>	<b>Ho JSW</b>	FP10.13
FP10.14	FP7.9	<b>Ko VMC</b>
<b>Chung MMT</b>	<b>Ho KKW</b>	FP8.4, FP8.8
FP2.2, FP2.4, FP2.5	AP07, FP3.4, FP4.12	<b>Koljonen PA</b>
<b>Chung PM</b>	<b>Ho KKY</b>	FP8.11
FP2.8	FP8.21	<b>Kong CCW</b>
<b>Chung T</b>	<b>Ho PC</b>	FP4.6, FP4.9
FP8.3	FP2.6, FP2.9, FP2.10, FP2.15, FP5.2	<b>Koo JJSC</b>
<b>Cui C</b>	<b>Ho SW</b>	FP2.9, FP2.15
BP02, FP3.9, FP3.13, P04	FP8.12	<b>Kuhn GA</b>
<b>D</b>	<b>Hsu AYC</b>	FP3.21
<b>Dai B</b>	FP5.20, P18	<b>Kumar A</b>
P09	<b>Hu Y</b>	FP3.21, FP5.2, FP5.10, FP5.17
<b>F</b>	AP04, FP3.20, FP7.10, FP8.11	<b>Kuong E</b>
<b>Fan JCH</b>	<b>Hu Z</b>	FP5.4, FP5.15
FP4.16	FP8.18	<b>Kwan CK</b>
<b>Fan L</b>	<b>Huang RXY</b>	FP8.18
FP3.11	FP2.14	<b>Kwan K</b>
<b>Fang CX</b>	<b>Hui SSC</b>	FP7.3, FP7.4
AP03, FP6.6, FP10.7, FP10.17	FP5.5	<b>Kwan KYH</b>
<b>Fang SYJ</b>	<b>Hung ALH</b>	AP04, FP3.20, FP7.1, FP7.8, FP7.11, FP7.13, FP7.19
FP1.2, FP4.18, FP9.5	FP5.2, FP5.7, FP5.10, FP5.11, FP5.12, FP5.13, FP5.16, FP5.17, P10, P13	<b>Kwan PCY</b>
<b>Fok MWM</b>	<b>Hung C</b>	FP8.13
FP2.13	FP1.14, FP6.11, FP6.12	<b>Kwan RLC</b>
<b>Fong DTP</b>	<b>Hung DLL</b>	FP5.5
FP1.8, FP8.7	FP3.19, FP9.17	<b>Kwok CKB</b>
<b>Fu BSC</b>		FP4.16
FP3.23		<b>Kwok KL</b>
		FP2.12

<b>Kwok KO</b>	<b>Lau KC</b>	<b>Leung CY</b>
FP7.2	FP2.3, FP10.1	FP4.17
<b>Kwok PP</b>	<b>Lau KKL</b>	<b>Leung FKL</b>
FP5.21	FP7.6, FP7.8, FP7.20	AP03, FP10.7, FP10.17
<b>Kwok TK</b>	<b>Lau LCM</b>	<b>Leung GCN</b>
FP7.5	FP1.1, FP1.10, FP1.12, FP1.13, FP1.14, FP1.15, FP1.16, FP2.20, FP4.2, FP4.3, FP4.5, FP4.6, FP4.8, FP4.9, FP4.10, FP4.13, FP4.16, FP4.19, FP5.13, FP6.5, FP6.6, FP6.9, FP6.10, FP6.11, FP6.12, FP6.13, FP6.14, FP9.2, FP9.3, FP9.4, FP9.12	FP2.13
<b>L</b>	<b>Lau NN</b>	<b>Leung HL</b>
<b>Lai CYS</b>	FP8.4	FP2.4
FP10.13, P17	<b>Lau RWL</b>	<b>Leung JHY</b>
<b>Lai ICH</b>	FP5.5	FP3.19, FP4.7, FP4.22, FP9.7, FP9.13, FP9.14, FP9.15, FP9.17
FP8.16	<b>Lau SW</b>	<b>Leung K</b>
<b>Lai JCH</b>	FP8.8	FP2.3
FP5.8	<b>Lau TK</b>	<b>Leung NC</b>
<b>Lai JHC</b>	FP7.2	FP8.13, P14
FP1.1	<b>Lau TW</b>	<b>Leung NCH</b>
<b>Lai KK</b>	AP03, FP10.7	FP1.14, FP6.11, FP6.12
FP4.17	<b>Law GYK</b>	<b>Leung OT</b>
<b>Lai MKL</b>	FP6.7	P18
AP11, FP7.22	<b>Law KKP</b>	<b>Leung SM</b>
<b>Lam CCS</b>	FP7.6, FP7.8	FP7.23
FP2.15, FP8.13, P14	<b>Law LCM</b>	<b>Leung SSY</b>
<b>Lam CI</b>	FP4.12	FP3.18
FP10.8	<b>Law MC</b>	<b>Leung WY</b>
<b>Lam CWS</b>	FP8.8	FP9.12
FP2.2, FP2.5	<b>Law SW</b>	<b>Leung YF</b>
<b>Lam CY</b>	FP4.12, FP5.11, FP7.2, FP7.17, FP8.16, FP8.18, FP8.19, FP10.12, FP10.15	FP8.9
FP8.10, FP8.11	<b>Law YY</b>	<b>Leung YS</b>
<b>Lam GCW</b>	FP8.18	FP7.5
FP8.9	<b>Lee ALH</b>	<b>Li C</b>
<b>Lam GYT</b>	FP10.1	FP3.14
FP4.3, FP4.5, FP4.6, FP4.8, FP4.9, FP4.10, FP4.13, FP4.16, FP4.19, FP9.2, FP9.3, FP9.4	<b>Lee AYW</b>	<b>Li G</b>
<b>Lam HT</b>	FP10.14	FP1.3, FP3.11, FP8.5
FP10.1	<b>Lee CW</b>	<b>Li GS</b>
<b>Lam HT</b>	FP10.17	AP04, FP3.20
FP10.14	<b>Lee JWW</b>	<b>Li J</b>
<b>Lam KKP</b>	FP3.2	FP3.18
FP7.20	<b>Lee KB</b>	<b>Li KK</b>
<b>Lam MCY</b>	FP10.3, 10.14	FP7.21
P18	<b>Lee LCY</b>	<b>Li KY</b>
<b>Lam TP</b>	FP8.19, 10.15	FP9.7
FP5.5, FP5.6, FP5.7, FP5.10, FP5.11, FP5.12, FP5.17, P08	<b>Lee MSY</b>	<b>Li MK</b>
<b>Lam WK</b>	FP10.5	FP6.4
FP8.2	<b>Lee RHL</b>	<b>Li MKL</b>
<b>Lam YL</b>	FP10.13, P17	FP2.10, FP6.10
FP8.21	<b>Lee WYW</b>	<b>Li MMC</b>
<b>Lam YT</b>	FP6.2	FP3.16
FP4.2	<b>Leong TH</b>	<b>Li PH</b>
<b>Lau BKK</b>	FP6.9	AP09, FP9.16
FP6.2	<b>Leung AKY</b>	<b>Li R</b>
<b>Lau CH</b>	FP2.15, 8.13, P14	AP04, FP3.20
FP8.8	<b>Leung ANTC</b>	<b>Li THH</b>
<b>Lau CM</b>	FP10.6	AP10, FP3.7
FP8.2	<b>Leung ASM</b>	<b>Li W</b>
<b>Lau FOY</b>	FP8.21	FP10.3, FP10.14
FP8.7	<b>Leung BHW</b>	<b>Li X</b>
<b>Lau HMC</b>	FP10.10	P09, P16
FP6.2		<b>Li Y</b>
<b>Lau JCK</b>		AP07, FP3.4
FP10.14		<b>Li Y</b>
<b>Lau JKY</b>		FP3.14, FP3.15
FP7.23		<b>Li Y</b>
		FP8.5

<b>Li Z</b>	<b>Mak CTK</b>	<b>O</b>
FP1.16	BP03, P05	<b>Ong MTY</b>
<b>Li Z</b>	<b>Mak KKK</b>	AP06, FP1.1, FP1.7, FP1.8, FP1.10, FP1.11,
FP7.7	FP4.12, FP5.11, FP6.6	FP1.12, FP1.13, FP1.14, FP1.15, FP1.16,
<b>Liang Z</b>	<b>Mak MCK</b>	FP2.17, FP2.20, FP3.3, FP3.17, FP4.2,
FP3.1, FP3.2	FP2.6, FP2.9, FP2.10, FP2.12, FP2.14,	FP4.3, FP4.5, FP4.6, FP4.8, FP4.9, FP4.10,
<b>Lin S</b>	FP2.20, FP5.2, FP5.16	FP4.12, FP4.13, FP4.16, FP4.19, FP5.13,
FP1.3	<b>Mak YK</b>	FP6.5, FP6.6, FP6.7, FP6.9, FP6.10, FP6.11,
<b>Lin W</b>	FP10.6	FP6.12, FP6.13, FP6.14, FP9.2, FP9.3, FP9.4,
BP02, FP3.9, FP3.13, P04	<b>Man GCW</b>	FP9.12
<b>Lin Y</b>	FP1.15, FP4.12, FP8.18	<b>P</b>
FP9.6	<b>Man SW</b>	<b>Pan Q</b>
<b>Ling SKK</b>	FP2.16	FP8.5
BP03, FP8.1, FP8.2, FP8.3, FP8.4, FP8.5,	<b>Meng N</b>	<b>Pang FOS</b>
FP8.6, FP8.7, FP8.8, P05, P06	FP7.24	FP6.6
<b>Liu A</b>	<b>Mohammadi M</b>	<b>Q</b>
FP7.13	FP3.8	<b>Qin L</b>
<b>Liu C</b>	<b>Mok DKW</b>	AP06, AP07, FP3.4, FP3.10, FP3.16, FP3.17,
BP04, FP3.13, FP10.15, P11, P12	FP9.3	FP3.23, FP10.12, FP10.15, P03, P09, P16
<b>Liu JHP</b>	<b>Mok JCY</b>	<b>Qiu J</b>
FP1.15	FP9.12	FP1.7, FP1.8, FP1.10, FP1.12, FP1.13, FP8.4
<b>Liu TWK</b>	<b>Mok KM</b>	<b>Qiu Y</b>
FP4.18, FP6.1, FP9.5	FP1.9, FP6.2, FP6.3, FP6.4	FP3.21, FP5.6, FP5.12
<b>Liu WH</b>	<b>Mok PKL</b>	<b>S</b>
AP08, FP10.2, FP10.8, FP10.16	FP8.16	<b>Shakoor A</b>
<b>Liyeung LL</b>	<b>Mok WY</b>	FP3.11
FP5.3, FP5.14, FP8.6	FP10.6	<b>Shea GKH</b>
<b>Lo CH</b>	<b>Moy RLT</b>	FP7.6
FP4.15	FP10.13	<b>Shen WY</b>
<b>Lo CK</b>	<b>Müller R</b>	FP10.14
FP6.10	FP3.21	<b>Siu KT</b>
<b>Lo JHT</b>	<b>N</b>	FP1.2
FP3.11	<b>Nafo W</b>	<b>Siu PKT</b>
<b>Lo JSF</b>	FP3.22	FP6.1
FP10.14	<b>Ng BKW</b>	<b>Siu KW</b>
<b>Lo KCH</b>	FP5.9, P10, P13	FP8.14
FP4.5, FP4.9, FP6.13	<b>Ng CK</b>	<b>Siu YC</b>
<b>Lok LW</b>	FP4.4	FP9.12
FP5.20	<b>Ng CTS</b>	<b>So B</b>
<b>Long Y</b>	FP7.20	FP2.18
BP02, FP3.9, FP3.13, P04	<b>Ng EPL</b>	<b>So KF</b>
<b>Louie FTM</b>	FP7.5, FP10.13, P17	AP04, FP3.20
FP8.13, P14	<b>Ng JCW</b>	<b>So NLW</b>
<b>Lu Q</b>	FP9.11	FP5.4, FP5.15
FP7.7	<b>Ng KC</b>	<b>Su IYW</b>
<b>Lui JTC</b>	FP5.21	FP8.11
FP8.13	<b>Ng KH</b>	<b>Su Y</b>
<b>Lui PPY</b>	FP2.18	P16
FP3.1, FP3.2	<b>Ng KKM</b>	<b>Sun D</b>
<b>Lui RTY</b>	FP4.2, FP6.9	FP3.11
P06	<b>Ng KY</b>	<b>Sun J</b>
<b>Luk MH</b>	FP9.2	FP3.11
AP02, FP3.8, FP3.19, FP4.1, FP4.7, FP4.11,	<b>Ng R</b>	<b>Sung JJY</b>
FP4.18, FP4.21, FP4.22, FP9.1, FP9.5, FP9.7,	FP6.5, FP6.14	BP04, P12
FP9.8, FP9.9, FP9.10, FP9.11, FP9.13,	<b>Ng RHT</b>	<b>T</b>
FP9.14, FP9.15, FP9.17, FP9.18, FP9.19,	FP6.6	<b>Tai I</b>
FP9.20, P07	<b>Ng RWK</b>	FP7.19
	FP10.2	<b>Tam AYC</b>
<b>M</b>	<b>Ng SY</b>	FP2.19
<b>Ma AKH</b>	FP2.1	
FP5.18, FP5.19, FP5.21	<b>Ng YL</b>	
<b>Ma CM</b>	FP8.14	
FP7.23		

<b>Tam CY</b>	<b>Wan SHT</b>	<b>Wong PW</b>
AP08, FP10.11, FP10.16	FP7.1, FP7.7, FP7.11	FP4.4
<b>Tang BYH</b>	<b>Wang BYH</b>	<b>Wong PY</b>
FP4.14, FP4.15	AP05, FP3.12	BP04, P12
<b>Tang N</b>	<b>Wang H</b>	<b>Wong RMY</b>
AP06, AP08, FP2.6, FP3.17, FP3.18, FP10.2,	FP8.5	AP06, AP08, BP02, BP04, FP3.9, FP3.13,
FP10.8, FP10.16	<b>Wang K</b>	FP3.16, FP3.17, FP3.18, FP7.17, FP8.19,
<b>Tang NLS</b>	AP04, FP3.20	FP10.2, FP10.8, FP10.11, FP10.12, FP10.15,
FP5.12, P08	<b>Wang M</b>	FP10.16, P04, P11, P12
<b>Tang SK</b>	FP1.3	<b>Wong SH</b>
FP8.2	<b>Wang Q</b>	FP7.14
<b>Tang SPK</b>	FP7.19	<b>Wong SH</b>
P17	<b>Wang QW</b>	BP04, P12
<b>Tang TCM</b>	FP2.17, FP9.3	<b>Wong SW</b>
AP09, FP9.16	<b>Wang W</b>	FP4.4
<b>Tang TH</b>	FP3.6	<b>Wong TKT</b>
P08	<b>Wang X</b>	FP7.3, FP7.4
<b>Teng G</b>	FP8.5	<b>Wong TM</b>
FP3.8	<b>Wei JZ</b>	AP03, FP1.2, FP6.1, FP10.7, FP10.17
<b>To KKW</b>	FP7.18	<b>Wong YC</b>
FP5.12	<b>Wen C</b>	FP7.2
<b>To MKT</b>	AP10, FP2.18, FP3.5, FP3.6, FP3.7, FP9.6	<b>Wong YW</b>
FP5.15	<b>Wong AHY</b>	FP8.11
<b>To SL</b>	FP8.13	<b>Woo AOF</b>
FP2.7	<b>Wong AYL</b>	AP06, FP1.10, FP2.9, FP3.17
<b>Tong W</b>	FP7.8	<b>Wu H</b>
AP06, AP07, FP3.4, FP3.17, P03, P09	<b>Wong AYY</b>	AP11, FP7.22
<b>Tsang AMK</b>	FP4.13	<b>Wu YM</b>
FP8.20	<b>Wong CK</b>	FP6.9
<b>Tsang CC</b>	FP1.15	<b>Wu Z</b>
FP8.14	<b>Wong CK</b>	FP5.6
<b>Tsang CK</b>	FP7.21	<hr/>
FP1.11	<b>Wong CK</b>	<b>X</b>
<b>Tsang HHL</b>	FP7.21	<b>Xie K</b>
FP7.15	<b>Wong CK</b>	FP1.16
<b>Tsang RCC</b>	FP8.14	<b>Xu J</b>
AP02, FP9.1	<b>Wong CWY</b>	AP06, AP07, FP3.4, FP3.10, FP3.17, FP3.23,
<b>Tse LF</b>	FP8.15	P09, P16
FP8.15	<b>Wong CY</b>	<hr/>
<b>Tse MSH</b>	FP1.9	<b>Y</b>
FP7.5	<b>Wong CY</b>	<b>Yam CL</b>
<b>Tse WL</b>	FP10.17	P15
FP2.6, FP2.9, FP2.10, FP5.2	<b>Wong HC</b>	<b>Yang CH</b>
<b>Tso CY</b>	FP10.13	FP4.11
AP08, FP2.6, FP3.18, FP10.2, FP10.8,	<b>Wong HW</b>	<b>Yang G</b>
FP10.16	FP10.8	FP5.12
<b>Tso SWS</b>	<b>Wong JSH</b>	<b>Yang J</b>
FP1.1, FP9.4	FP5.15, FP10.17	P01
<b>Tsoi KKF</b>	<b>Wong KC</b>	<b>Yang KG</b>
FP8.16	FP5.9	FP3.21, FP5.6, FP5.7, FP5.10, FP5.17
<b>Tsui JCY</b>	<b>Wong KK</b>	<b>Yang Y</b>
FP6.5, FP6.13	FP7.5, FP10.13, P17	FP8.5
<b>Tsui MKH</b>	<b>Wong KKH</b>	<b>Yao H</b>
AP08, FP10.11, FP10.16	FP10.13, P17	P06, P16
<b>Tsui OWK</b>	<b>Wong KY</b>	<b>Yao S</b>
FP4.22	FP7.24	FP3.1, FP3.2, FP3.3
<b>Tung KL</b>	<b>Wong LCH</b>	<b>Yau EWF</b>
FP7.5	FP9.12	FP6.6
<hr/>	<b>Wong LPK</b>	<b>Yau RCH</b>
<b>Wan KHM</b>	AP11, FP7.22	FP8.21
FP10.13, P17	<b>Wong MTL</b>	<b>Yau WP</b>
<b>Wan RCW</b>	FP10.14	AP01, BP01, FP1.4, FP1.5, FP1.6, FP6.1,
FP3.21, FP5.10, FP5.12	<b>Wong MW</b>	FP6.8, P02
	FP5.9	

<b>Ye X</b>	<b>Young JH</b>	<b>Zhang S</b>
FP2.20, FP4.12, FP6.5, FP6.6	FP5.8	P03
<b>Yee AHF</b>	<b>Yu J</b>	<b>Zhang T</b>
FP9.20	BP04, P12	FP7.24
<b>Yee DKH</b>	<b>Yu MQ</b>	<b>Zhang Y</b>
AP08, FP4.2, FP4.3, FP4.5, FP4.6, FP4.8,	FP1.16, FP6.9	AP06, FP3.17, P09
FP4.9, FP4.10, FP4.13, FP4.16, FP4.19,	<b>Yuen HY</b>	<b>Zhao B</b>
FP9.2, FP9.3, FP9.4, FP10.11, FP10.16	FP4.4	P01
<b>Yeng V</b>	<b>Yuen TS</b>	<b>Zhao J</b>
AP11, FP7.22	FP5.21	FP9.6
<b>Yeung CM</b>	<b>Yuen TWH</b>	<b>Zhao M</b>
FP5.18, FP5.19	FP1.14, FP6.11, FP6.12	FP7.24
<b>Yeung KL</b>	<b>Yung BWT</b>	<b>Zheng L</b>
FP2.12	FP4.19	AP06, AP07, FP3.4, FP3.17
<b>Yeung MHY</b>	<b>Yung CSY</b>	<b>Zheng N</b>
FP7.1, FP7.11	AP03, FP10.7, FP10.17	P09
<b>Yeung SS</b>	<b>Yung PSH</b>	<b>Zheng Y</b>
AP02, FP8.14, FP9.1	BP03, FP1.1, FP1.7, FP1.8, FP1.9, FP1.10,	FP2.18
<b>Yip BHK</b>	FP1.11, FP1.12, FP1.13, FP1.14, FP1.15,	<b>Zheng Y</b>
FP5.12, FP10.12	FP1.16, FP2.17, FP2.20, FP3.1, FP3.2, FP3.3,	FP8.12
<b>Yip CCH</b>	FP3.23, FP4.2, FP4.3, FP4.5, FP4.6, FP4.8,	<b>Zhong JR</b>
FP3.22, FP8.11	FP4.9, FP4.10, FP4.12, FP4.13, FP4.16,	FP9.4
<b>Yip EKY</b>	FP4.19, FP5.11, FP5.13, FP6.2, FP6.3, FP6.4,	<b>Zhou L</b>
FP2.1, FP10.9	FP6.5, FP6.6, FP6.7, FP6.9, FP6.10, FP6.11,	AP07, FP3.4
<b>Yip KT</b>	FP6.12, FP6.13, FP6.14, FP8.1, FP8.2, FP8.3,	<b>Zhou W</b>
P19	FP8.4, FP8.6, FP8.7, FP8.8, FP9.2, FP9.3,	FP3.10
<b>Yip SO</b>	FP9.4, FP9.12, P05, P06	<b>Zhu W</b>
FP5.18		P16
<b>Yiu K</b>	<b>Z</b>	<b>Zhu X</b>
FP8.10	<b>Zhang HZ</b>	FP3.3
<b>Yiu RL</b>	FP3.23	<b>Zhu Z</b>
FP2.3, FP8.9	<b>Zhang J</b>	FP5.6
<b>Yiu TL</b>	FP3.5	
FP3.11		

## Acknowledgement to the Organising Partners

We would like to express our deepest gratitude to the organising partners for their honorable contributions and support throughout this Annual Congress:



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References: 1. Lamb YN. Nirmatrelvir plus Ritonavir: first approval. *Drugs*. 2022;19:1-7. 2. Owen DR, Allerton CMN, Anderson AS, et al. An oral SARS-CoV-2 Mpro inhibitor clinical candidate for the treatment of COVID-19. *Science*. 2021;374(6575): 1586-1593. 3. Hammond J, Leister-Tebbe H, Gardner A, et al. Oral nirmatrelvir for high-risk, nonhospitalized adults with Covid-19. *N Engl J Med*. Published online February 16, 2022. doi:10.1056/NEJMoa2118542.

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