

## Free Paper Session V: Trauma

### FP5.1

---

#### **Sarcopenia and associations with quality of life measures among patients with atypical femoral fractures**

**Victor Hin Ting Yick,<sup>1</sup> Christian Xinshuo Fang,<sup>2</sup> Tun Hing Lui,<sup>3</sup> Terence Cheuk Ting Pun,<sup>2</sup> Tak Man Wong,<sup>2</sup> Frankie Ka Li Leung,<sup>2</sup> Janus Siu Him Wong<sup>2</sup>**

<sup>1</sup>*The University of Hong Kong*

<sup>2</sup>*Department of Orthopaedics and Traumatology, The University of Hong Kong*

<sup>3</sup>*Department of Orthopaedics and Traumatology, North District Hospital*

No copyright transfer for abstract printing.

### FP5.2

---

#### **Open fractures for open doctors—does time of presentation affect mortality?**

**Ching Yau Wong,<sup>1</sup> Christian Xinshuo Fang,<sup>2</sup> Colin Shing Yat Yung,<sup>3</sup> Terence Cheuk Ting Pun,<sup>2</sup> Tak Man Wong,<sup>2</sup> Frankie Ka Li Leung,<sup>2</sup> Janus Siu Him Wong<sup>2</sup>**

<sup>1</sup>*The University of Hong Kong*

<sup>2</sup>*Department of Orthopaedics and Traumatology, The University of Hong Kong*

<sup>3</sup>*Department of Orthopaedics and Traumatology, Queen Mary Hospital*

No copyright transfer for abstract printing.

### FP5.3

---

#### **Fracture-related infections—a retrospective single centre study from 2003 to 2020**

**Ryan Chun Kiu So,<sup>1</sup> Sanchal Sanchayyan,<sup>2</sup> Alicia Hoi Ying Liu,<sup>1</sup> Henry Chun Hin Leung,<sup>1</sup> Alfred Lok Hang Lee,<sup>3</sup> Christian Xinshuo Fang,<sup>4</sup> Frankie Ka Li Leung,<sup>4</sup> Janus Siu Him Wong<sup>4</sup>**

<sup>1</sup>*The University of Hong Kong*

<sup>2</sup>*School of Biomedical Sciences, The University of Hong Kong*

<sup>3</sup>*Department of Microbiology, Prince of Wales Hospital*

<sup>4</sup>*Department of Orthopaedics and Traumatology, The University of Hong Kong*

No copyright transfer for abstract printing.

### FP5.4

---

#### **Predictors of mortality in fracture-related infections—survival analysis with a mean follow-up of 5.8 years**

**Henry Chun Hin Leung,<sup>1</sup> Yat Fan Lau,<sup>1</sup> Ryan Chun Kiu So,<sup>1</sup> Alicia Hoi Ying Liu,<sup>1</sup> Alfred Lok Hang Lee,<sup>2</sup> Christian Xinshuo Fang,<sup>3</sup> Frankie Ka Li Leung,<sup>3</sup> Janus Siu Him Wong<sup>3</sup>**

<sup>1</sup>*The University of Hong Kong*

<sup>2</sup>*Department of Microbiology, Prince of Wales Hospital*

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

No copyright transfer for abstract printing.

**FP5.5****Antimicrobial susceptibility among Staphylococcal fracture-related infections**

**Alicia Hoi Ying Liu,<sup>1</sup> Henry Chun Hin Leung,<sup>1</sup> Ryan Chun Kiu So,<sup>1</sup> Alfred Lok Hang Lee,<sup>2</sup> Christian Xinshuo Fang,<sup>3</sup> Frankie Ka Li Leung,<sup>3</sup> Janus Siu Him Wong<sup>3</sup>**

<sup>1</sup>*The University of Hong Kong*

<sup>2</sup>*Department of Microbiology, Prince of Wales Hospital*

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

No copyright transfer for abstract printing.

**FP5.6****Femoral neck system versus multiple cannulated screws for the treatment of intracapsular femoral neck fractures—a propensity score matched cohort study**

**Hiu Yan Leung,<sup>1</sup> Xinshuo Christian Fang,<sup>2</sup> Calvin Tsoi,<sup>1</sup> Shing Hing Choi,<sup>1</sup> Lo Ramon Yiu,<sup>3</sup> Dennis King Hang Yee,<sup>4</sup> Janus Siu Him Wong,<sup>2</sup> Colin Shing Yat Yung<sup>2</sup>**

<sup>1</sup>*Department of Orthopaedics and Traumatology, Princess Margaret Hospital*

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

<sup>3</sup>*Department of Orthopaedics and Traumatology, Tseung Kwan O Hospital*

<sup>4</sup>*Department of Orthopaedics and Traumatology, Alice Ho Miu Ling Nethersole Hospital*

**Introduction:** We investigate the outcomes of the recently launched angle-stable femoral neck system (FNS) against conventional multiple cannulated screws (MCS) for the treatment of intracapsular fracture neck of femur using a retrospective propensity score matched cohort study design.

**Methods:** Consecutive adult patients receiving either MCS or FNS for intracapsular neck of femur fractures from Jan 2018 to March 2021 in five hospitals (QMH, PMH, AHNH, TKOH, GHK) were reviewed. Propensity score matching was performed using baseline confounders including age, sex, garden classification, Charlson comorbidity score and pre-morbid walking status, with nearest neighbour matching and a caliber value of 0.2.

**Results:** Of 221 patients, 76 patients with FNS were matched against 76 patients with MCS and reviewed. The mean age was 74.6 and 79.6% were females. After matching the two groups, the confounding factors were controlled within a standardised difference in means of <0.07. At latest follow-up, FNS treated patients had significantly fewer femoral head penetrations (0% vs 7.4%,  $p=0.028$ ), fewer avascular necrosis (1.6% vs 10.3%,  $p=0.038$ ). There is no significant difference in the extent of collapse, implant migration, reoperations, functional walking status and mortality.

**Discussion and Conclusion:** Our observations support the use of FNS as a promising alternative to MCS for intracapsular neck of femur fractures.

## FP5.7

### Hiking-related orthopaedic injuries: another epidemic during the COVID-19 pandemic

**Claudia Wing Yiu Chu, Wing Yuk Mok, Yau Chun Chong**

*Department of Orthopaedics and Traumatology, Pamela Youde Nethersole Eastern Hospital*

**Introduction:** Social distancing restrictions, such as gathering ban and prohibiting leisure activities have been implemented by the government to fight against the COVID-19. These policies have changed people's habits in recreational activities significantly. It is observed that outdoor activities, especially hiking, became popular during the COVID-19 outbreak in Hong Kong. The purpose of this study is to assess the impact of COVID-19 on the demand of orthopaedics care for hiking-related injuries.

**Methods:** We performed a retrospective review of the patient data admitted to the Pamela Youde Nethersole Eastern Hospital, a hospital with helipads and air ambulance service to rescue injured hikers. Patient records of hiking-related injuries were reviewed for the COVID-19 pandemic period from 2 February to 2 May 2020. This was compared with the corresponding dates of the 2019. Analysis was also performed on data of hiking-related tibia and/or fibular fracture in the past 5 years.

**Results:** There was an overall increase in the number of hiking-related orthopaedics admission from 14 in 2019 to 48 in 2020 (2.4 times increase). Furthermore, a larger portion of patients required operative treatment (35.7% in 2019 vs 54.2% in 2020). There was a significant increase in the number of hiking-related tibia and/or fibular fracture patients in 2020 as compared to the past 5 years (23 vs average 5.8,  $p=0.0001$ ).

**Discussion and Conclusion:** An increase in number of hiking-related injuries requiring in-patient orthopaedics care was observed during the COVID-19 pandemic. Efforts should be made to raise public awareness about hiking safety.

## FP5.8

### Femoral neck system for the treatment of intracapsular femoral neck fractures in patients <65 years

**Calvin Tsoi,<sup>1</sup> Xinshuo Christian Fang,<sup>2</sup> Magdalene Hiu Yan Leung,<sup>1</sup> Shing Hing Choi,<sup>1</sup> Lo Ramon Yiu,<sup>3</sup> Dennis King Hang Yee,<sup>4</sup> Janus Siu Him Wong,<sup>2</sup> Colin Shing Yat Yung<sup>2</sup>**

<sup>1</sup>*Department of Orthopaedics and Traumatology, Princess Margaret Hospital*

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

<sup>3</sup>*Department of Orthopaedics and Traumatology, Tseung Kwan O Hospital*

<sup>4</sup>*Department of Orthopaedics and Traumatology, Alice Ho Miu Ling Nethersole Hospital*

**Introduction:** The femoral neck system (FNS) (DePuy Synthes) for intracapsular femoral neck fractures is designed with superior angular and rotational stability incorporated into a single system. Our objective is to qualitatively review and describe the technical details and outcomes regarding use of this implant in young hip fracture patients.

**Methods:** In a review of consecutive FNS surgeries in five local hospitals (QMH, PMH, AHNH, TKOA, GHK) from June 2020 to March 2021, 19 patients under the age of 65 (28-64) with intracapsular neck fractures (9 un-displaced, 10 displaced) were identified. Reduction techniques (open vs closed), surgical quality (TAD, reduction and implant positioning), clinical and radiological outcomes are qualitatively reported and discussed.

**Results:** One patient (GHK case) required open reduction and 9 were reduced closed. Cortical stepping of >4 mm and retroversion >5 degrees were observed in 4 and 2, respectively. 14 achieved definite healing with cortical remodelling at an average of 18.9 weeks follow-up. Remaining 3 patients had no cortical remodelling between 7 and 39 weeks. One had failure of fixation requiring conversion to a total hip arthroplasty. The average collapse is 3.8 mm (range -2.5 to 14.8). Of the 19 patients, 8 regained unaided outdoor functional walking status before 13 weeks. The technical advantages and difficulties are to be discussed.

**Discussion and Conclusion:** The early results of the FNS are promising in young hip fractures. Larger studies with longer observation periods are needed.

**FP5.9****Neurolysis did not reduce 1-year mortality in fragility hip fracture patients unfit for operative treatment****Siu Kei Kam, Alexander Kai Yiu Choi***Department of Orthopaedics and Traumatology, Tuen Mun Hospital*

**Background:** Neurolysis has emerged as an alternative treatment option for fragility hip fracture patients with high operative risks in recent years, aiming to improve pain control and aid patient care. This retrospective study aimed to investigate on the clinical outcomes of hip fracture patients unfit for surgical treatment receiving neurolysis when compared with previous practice of conservative management.

**Methods:** All patients with fragility hip fractures who received neurolysis in NTWC in Hong Kong from January 2015 to December 2019 were included. One-year mortality was compared with fragility hip fracture patients who received conservative treatment from January 2010 to December 2014. Patients with pathological fractures were excluded. Other clinical outcomes such as length of stay were compared, with risk factors such as age, gender, fracture pattern and comorbidities investigated.

**Results:** A total of 227 patients were included, 123 in neurolysis group and 104 in conservative group respectively. One-year mortality was 59.3% in neurolysis group and 57.7% in conservative group respectively, with no significant difference ( $p=0.8$ ). Median length of stay for neurolysis patients after excluding in-patient mortality cases was longer than conservative group, especially for intracapsular hip fracture cases, while no significant difference was noted in extracapsular hip fracture cases. Chronic kidney disease was associated with higher 1-year mortality among both groups of patients, while intracapsular fracture was associated with lower 1-year mortality.

**Conclusion:** Neurolysis for fragility hip fracture did not reduce 1-year mortality nor hospital stay, while further study may be warranted for efficacy of pain control and functional restoration.

**FP5.10****Preoperative leukocytosis and postoperative outcome in geriatric hip fracture patients: a retrospective cohort study****Stephen Pui Kit Tang, Keith Hay Man Wan, Lok Tin Moy, Kevin Kwun Hung Wong, Kam Kwong Wong***Department of Orthopaedics and Traumatology, Kwong Wah Hospital*

**Introduction:** Studies have suggested an association between preoperative leukocytosis and postoperative infectious complications across a variety of surgeries. The aim of this study was to evaluate the impact of preoperative leukocytosis on the prognosis after treatment for geriatric hip fracture.

**Methods:** 1007 consecutive patients aged  $\geq 65$  years who underwent surgery for hip fracture between 1 January 2016 and 31 December 2019 at Kwong Wah Hospital were included in the retrospective cohort. Assessed outcomes included surgical site infection, mortality within 30 days and 1 year. A multivariate logistic regression model was constructed in order to test whether leukocytosis was an independent predictor of morbidity and mortality in fracture hip patients.

**Results:** After adjustment for covariates, leukocytosis was found not to be a significant independent predictor of poor outcome after hip fracture surgery. Delay of surgery  $>48$  hours was found to be the only independent variable associated with increased risk of surgical site infection. The predictors of 30-day mortality were male gender, history of congestive heart failure (CHF) and use of anticoagulant; whereas male gender, age  $\geq 85$  years, history of CHF, dementia and hypoalbuminemia were associated with increased risk of 1-year mortality.

**Conclusions:** Preoperative leukocytosis is not associated with adverse postoperative outcome after geriatric hip fracture surgery. The most important variables for prediction of outcome, based on the current study, are delay in surgery  $>48$  hours, gender, age and congestive heart failure. These results support the current guidelines, which recommend early surgery for geriatric hip fractures patients.

### FP5.11

---

#### **A retrospective propensity scores matched case-control study comparing cemented and cementless modular hemiarthroplasty for patients with displaced intracapsular neck of femur fractures >65 years of age**

**Samuel Yan Jin Fang,<sup>1</sup> Christian Xinshuo Fang,<sup>1</sup> Kelly Ka Yee Lo,<sup>2</sup> Janus Siu Him Wong,<sup>1</sup> Timmy Chi Wing Chan,<sup>3</sup> Frankie Ka Li Leung<sup>1</sup>**

<sup>1</sup>*Department of Orthopaedics and Traumatology, Queen Mary Hospital*

<sup>2</sup>*Department of Surgery, Queen Mary Hospital*

<sup>3</sup>*Department of Anaesthesiology, Queen Mary Hospital*

No copyright transfer for abstract printing.

### FP5.12

---

#### **Randomised controlled trial on analgesic effect of preoperative fascia iliaca compartment block in geriatric patients with hip fracture**

**Kelvin Tze Kit Wan, Albert Yung Chak Hsu**

*Department of Orthopaedics and Traumatology, United Christian Hospital*

**Introduction:** Geriatric hip fracture is one of the major health problems in Hong Kong's ageing population. While operation is the mainstay of treatment, preoperative pain control is often overlooked. Conventional oral analgesics may only provide suboptimal pain control, which may result in poor morbidity outcome. Fascia iliaca compartment block (FICB) is of increasing popularity and may provide more consistent analgesic effect. There is a lack of local data to support the procedure as a routine practice.

**Methods:** Total 80 geriatric patients with acute fracture hip admitted to United Christian Hospital, requiring preoperative analgesia, were recruited and randomised into intervention group (0.25% levobupivacaine) and control group (normal saline). The procedure was carried out by landmark approach in addition with USG guidance. NRS pain score at different time intervals, timing of injection, systemic analgesic use, complications, and demographics were compared.

**Results:** Pain score upon gentle movement was improved in intervention group, while pain score at rest was similar in both groups. There was no complication from the procedure documented.

**Discussion and Conclusion:** FICB is an effective choice of analgesia for geriatric hip fracture patients with good safety profile. It shall be considered as a routine practice for suitable patients.

**FP5.13****Computed tomography analysis of axial glenoid bone stock in Hong Kong's local population and its clinical implications to reverse shoulder arthroplasty****Wing Sum Li, Ma Chun Man, Yuk Chuen Siu***Department of Orthopaedics and Traumatology, North District Hospital*

**Introduction:** Optimal implant placement is important to prevent complications in reverse shoulder arthroplasty (RSA). In patients with bilateral significant cuff arthropathy, the abnormal glenoid anatomy and bone loss may be challenging for surgery. This study aimed to find out the normal value of axial glenoid bone stock in the local population and its clinical implications.

**Methods:** This is a retrospective, cross-sectional study. Patients admitted to our hospital from 2016 to 2019 with computed tomography of shoulder performed were included. Data were analysed by independent-samples t test using SPSS.

**Results:** Five out of 167 patients identified were excluded due to glenoid pathology. The mean age was 65.4, 65.4% were females. The mean axial glenoid bone stock was  $2.45 \pm 0.33$  cm. The mean axial glenoid bone stock was significantly lower in females (2.35 cm vs 2.65 cm) and the geriatric group (age  $\geq 65$ ) (2.37 cm vs 2.56 cm). 3.7% anatomical variant was found.

**Discussion and Conclusion:** This is the first study to suggest the normal axial glenoid bone stock value in local population, and its relationship to RSA. In conclusion, axial glenoid bone stock is lower in female and geriatric patients. This can serve as a surgical reference for RSA, especially for patients with pre-existing glenoid bone loss to avoid over-medialisation of glenosphere causing impingement and dislocation; and provide a surgical guide for replenishing the glenoid bone stock. The anatomical variant where the coracoid base connects to the glenoid vault is also first reported, which may allow longer central peg insertion for better fixation.

#### FP5.14

### **Optimising the treatment choice of midshaft clavicular fracture: a systematic review and meta-analysis of randomised controlled trials**

**Zhipeng Yan, Wing Sze Yuen, Sung Ching Yeung, Christie Wing Yin Wong, Choi Ying Wong, Walter Si Qi Wang, Elaine Tian, Shireen Rashed, Colin Shing Yat Yung, Christian Xinshuo Fang**

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

**Introduction:** Conservative treatment and surgical intervention are viable choices for midshaft clavicular fractures management. Previous studies compared the clinical differences between them, but the clinical improvements after treatment at different time points are lacking. This meta-analysis focuses on the comparison of early (3 months), intermediate (6-12 months), and late (2 years) clinical outcomes.

**Methods:** A systematic search was done on databases (PubMed, Embase, Medline, Cochrane) on 11 June 2021. Search keywords were: midshaft clavicular fracture and clinical trials. Clinical trials fulfilling the inclusion criteria were selected to compare the clinical difference between surgical and conservative treatments in terms of improvement in the Disabilities of the Arm, Shoulder and Hand Score (DASHS), Constant-Murley Score (CMS), time-to-union and treatment-related complications.

**Results:** Of the 3079 patients of mean age 37.3 years in the 31 selected studies, surgical intervention was associated with improved DASHS (mean difference (MD) -1.72, 95% CI=-2.93 to -0.51,  $p=0.005$ ), CMS (MD 3.64, 95% CI=1.09-6.19,  $p=0.005$ ), time to union (standard mean difference SMD -0.69, 95% CI=-0.97 to -0.41,  $p<0.00001$ ) and risk ratio of bone-related complications including bone non-union, malunion and implant failure (0.22, 95% CI=0.11-0.43;  $p<0.00001$ ). Better long-term DASHS (24-month MD -4.24, 95% CI=-7.03 to -1.45,  $p=0.003$ ) and CMS (24-month MD 5.77, 95% CI=1.63-9.91,  $p=0.006$ ) were observed. Surgical outcome is independent of plate or nail fixations.

**Discussion and Conclusion:** Surgical interventions provide better improvements in DASHS, CMS, time-to-union, and treatment-related complications, despite without reaching minimal clinically significant difference.

#### FP5.15

### **Does osteoporosis cause more severe infection and delayed healing in osteosynthesis-associated infection?**

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

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

<sup>2</sup>*School of Pharmacy, The Chinese University of Hong Kong*

<sup>3</sup>*Department of Microbiology, The Chinese University of Hong Kong*

<sup>4</sup>*Department of Orthopaedics and Traumatology, Prince of Wales Hospital*

No copyright transfer for abstract printing.

**FP5.16**

---

**Defining the fit and ideal entry site of the Fibula Rod System—a computed tomography-based study**

**Yan Chun Cheung,<sup>1</sup> Dennie King Hang Yee,<sup>1</sup> Christian Xinshuo Fang<sup>2</sup>**

<sup>1</sup>*Department of Orthopaedics and Traumatology, Alice Ho Miu Ling Nethersole Hospital*

<sup>2</sup>*Department of Orthopaedics and Traumatology, The University of Hong Kong*

No copyright transfer for abstract printing.

**FP5.17**

---

**Which patients should we perform direct arthroplasty in neck of femur fracture patients? 1-Year results from 233 patients in a tertiary hospital**

**Linus Chee Yeen Lee, Yao Zu, Wai Wang Chau, Chi Yin Tso, Raymond Wai Kit Ng, Simon Kwoon Ho Chow, Wing Hoi Cheung, Ning Tang, Kevin Ki Wai Ho, Ronald Man Yeung Wong**

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

No copyright transfer for abstract printing.

**FP5.18**

---

**Genetic risk factors for atypical femoral fractures—a multi-centre genome-wide association study of 2539 patients with the Hong Kong Osteoporosis Study cohort**

**Janus Siu Him Wong,<sup>1</sup> Christian Xinshuo Fang,<sup>1</sup> Ching Lung Cheung,<sup>2</sup> Gloria Hoi Yee Li,<sup>3</sup> Terence Cheuk Ting Pun,<sup>1</sup> Tak Man Wong,<sup>1</sup> Tun Hing Lui,<sup>4</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 Pharmacology and Pharmacy, The University of Hong Kong*

<sup>3</sup>*Department of Health Technology and Informatics, The Hong Kong Polytechnic University*

<sup>4</sup>*Department of Orthopaedics and Traumatology, North District Hospital*

No copyright transfer for abstract printing.

**FP5.19**

**Sterilised 3D PRINTed bone models versus conventional computed tomography imaging for operative visualisation for complex fracture repair surgery—a single-blinded randomised multicentre study (The SPRINT study): interim data**

**Christian Fang,<sup>1</sup> Colin Shing Yat Yung,<sup>2</sup> Sana Law,<sup>1</sup> Michelle Lam,<sup>1</sup> Yuk Chuen Siu,<sup>3</sup> Kevin Wong,<sup>4</sup> SH Choi,<sup>5</sup> Dennis Yee,<sup>6</sup> Matthew Leung,<sup>1</sup> Frankie 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*

<sup>3</sup>*Department of Orthopaedics and Traumatology, North District Hospital*

<sup>4</sup>*Department of Orthopaedics and Traumatology, Kwong Wah Hospital*

<sup>5</sup>*Department of Orthopaedics and Traumatology, Princess Margaret Hospital*

<sup>6</sup>*Department of Orthopaedics and Traumatology, Alice Ho Miu Ling Nethersole Hospital*

**Introduction:** Applications of 3D printing (3DP) in orthopaedics and traumatology is rapidly evolving. The use of 3DP fracture models provide intra-operative on-table visualisation and tactile representation of fractures compared to that of multi-planar computed tomography (CT) reconstruction scans. Here we postulate that the use of 3DP fracture models improves efficiency and surgical outcomes for intra-articular fracture repair surgery.

**Methods:** Multicentre prospective study for intra-articular fracture surgery involving the distal humerus, proximal tibia and pilon fractures. Patients were randomised to 3DP or CT scan group for aiding fracture repair surgery. Baseline characteristics were measured including demographics, injury mechanism, fracture location, fracture complexity and soft tissue grading. Primary outcome measured are total fluoroscopy time and radiation dosage. Secondary outcomes included quality of articular reduction, intra-operative blood loss, surgical duration, skin incision, complications and functional scores.

**Results:** Interim data with 36 patients include 7 distal humerus fractures, 10 pilon and 19 tibia plateau fractures randomised to two groups. Baseline characteristics were similar. Total fluoroscopy (159.8 seconds vs 250.5 seconds) and radiation dosage (734.6 cGy/cm<sup>2</sup> vs 1439.6 cGy/cm<sup>2</sup>) were both reduced in the 3DP group compared to the CT scan group however not statistically significant (p=0.13 and p=0.52 respectively). Surgical time, total length of incision was similar in both groups without statistical significance. No increase in complications were noted with the 3DP models including infection.

**Discussion:** 3DP usage for intra-articular fracture repair surgery has a trend towards less fluoroscopy time and radiation dosage inflicted upon the operating surgeon. Further patient recruitment and sample size required.

**FP5.20****S2-alar-iliac screw insertion without continuous fluoroscopy—cadaver study comparing conventional versus targeting jig versus robotic assistance****Colin Shing Yat Yung,<sup>1</sup> Lorraine Cheung,<sup>2</sup> Evan Fang,<sup>2</sup> Kenny Kwan,<sup>2</sup> Kenneth MC Cheung,<sup>2</sup> Kathine Ching,<sup>2</sup> Grace Ho,<sup>2</sup> Christian Fang,<sup>2</sup> Frankie Leung<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*

**Introduction:** S2-alar-iliac (S2AI) screw insertion relies heavily on fluoroscopy. Here, we compare the accuracy of conventional instrumentation by experienced surgeons, a novel design S2AI screw insertion tool by inexperienced and experienced surgeons and Brainlab Cirq®, a new robotic assistive navigation device.

**Methodology:** Cadaveric randomised trial with 54 hemi-pelvises. Specimen baseline characteristics were recorded and prepared with standardised surgical dissection. S2AI screws were inserted by either conventional free hand or with the aid of a novel instrumentation tool or by robotic arm-assisted navigation. Post insertion CT scans of all pelvises were performed. Primary outcome measures included length of screw tract, incidence of hazard zone penetration. Secondary outcomes included time of S2AI screw insertion procedure, oblique and caudal tilt angles, deviations of entry site and false tracking.

**Results:** Screw depth was significantly longer for robotic-assisted navigation with 108.4 mm (SD 20.5) compared to instrumentation tool by experienced surgeon (101.9 mm, SD 20.8), inexperienced surgeon (77.4 mm, SD 40.8) and conventional instrumentation (83.5 mm, SD 35.2; ANOVA  $p=0.009$ ). Paired sample t test comparing left and right hemipelvis with different intervention groups showed statistically significant differences ( $p=0.04$ ). Robotic-assisted screw insertion took the longest time (16 minutes 30 seconds) while experienced surgeons using instrumentation tool was the fastest (3 minutes 30 seconds; ANOVA  $p<0.01$ ). Inner cortical perforation was significantly higher in the inexperienced surgeon group utilising instrumentation tool (56%, with 1 partial perforation,  $p<0.01$ ).

**Discussion:** Novel instrumentation tool may help experienced surgeons reduce screw insertion time with a high degree of accuracy. Robotic-assisted screw insertion remains the most accurate.

## FP5.21

### **Evaluation of a prototype wireless head-mounted display system in knee arthroscopy—a randomised cross-over study**

**Christian Fang,<sup>1</sup> Pinky Mo,<sup>2</sup> Holy MH Chan,<sup>2</sup> Yan Kit Mak,<sup>3</sup> Kai Chung Poon,<sup>1</sup> Janus Wong,<sup>1</sup> Colin Yung,<sup>4</sup> Grace PY Ho,<sup>4</sup> Tak Man Wong,<sup>1</sup> Frankie Leung<sup>1</sup>**

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

<sup>2</sup>*The University of Hong Kong*

<sup>3</sup>*Department of Orthopaedics and Traumatology, Pamela Youde Nethersole Eastern Hospital*

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

**Introduction:** Our wireless full-HD augmented reality head-mounted display (AR-HMD) aimed to eliminate surgeon head-turning and reduce theatre clutter. Learning and performance using AR-HMD versus TV monitors (TVM) was evaluated.

**Methods:** 19 Surgeons and 19 novices were randomised into groups A and B and tasked to retrieve four loose-bodies from a bench-top knee arthroscopy simulator. They each performed 5 trials using (1) AR-HMD and (2) TVM following a specified sequence (Group A: 1-2-1-1-1 and Group B: 2-1-2-2-2). Trials 1-3 were cross-over sequences to evaluate “unfamiliar” performance with the user switching between devices. Trials 4-5 were “familiarised” performances using the same device. The outcomes are time-to-completion and the incidence of loose-body drops.

**Results:** In the first 114 “unfamiliar” simulated surgeries, users had 67% longer mean time-to-completion using AR-HMD than TVM users (195s vs 117s, log-rank  $p < 0.001$ ) and same number of loose-body drops (57 vs 57). In the following 76 “familiarised” surgeries, mean time-to-completion was 47% longer for AR-HMD users (134s vs 91s,  $p = 0.036$ ) with equal number of drops (38 vs 38). With AR-HMD, surgeons were 32% quicker than novices in the “unfamiliar” phase (158s vs 233s,  $p = 0.025$ ) but they performed similarly in the “familiarised” phase (139s vs 129s,  $p = 0.874$ ). When familiarised, the 95% CI inferiority margin was 4.4% for the AR-HMD.

**Discussion and Conclusion:** In terms of speed, AR-HMD users cannot beat conventional TVM users. The difference is smaller when familiarised. Novices improved faster than surgeons with the AR-HMD. We will further optimise and evaluate the system.

## FP5.22

**Effect of axial dynamisation on time-to-union and mechanical failures in displaced atypical femoral fractures—A multicentre cohort analysis of 223 cases****Christian Fang,<sup>1</sup> Wan Yiu Shen,<sup>2</sup> Janus Siu Him Wong,<sup>1</sup> Dennis King Hang Yee,<sup>3</sup> Colin Yung,<sup>4</sup> Tak Wing Lau,<sup>4</sup> Kathine Ching,<sup>1</sup> Tun Hing Lui,<sup>5</sup> Frankie 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 Elizabeth Hospital*<sup>3</sup>*Department of Orthopaedics and Traumatology, Alice Ho Miu Ling Nethersole Hospital*<sup>4</sup>*Department of Orthopaedics and Traumatology, Queen Mary Hospital*<sup>5</sup>*Department of Orthopaedics and Traumatology, North District Hospital*

**Introduction:** Atypical femoral fractures (AFFs) have slow union and high reoperations rates. Axial dynamisation augments fracture opposition and micro-motion, may benefit healing.

**Methods:** A consecutive multi-centre cohort (QEH, QMH, KWH, NDH) of 224 displaced AFFs in 207 patients (mean age 73.2 years, SD 9.5) (10 males) since 2007 fulfilling the ASBMR criteria treated with IM nailing were reviewed. Mean radiological follow-up was 4.02 years. The status of axial dynamisation was classed Dynamic or Static under two conditions (1): "By intention" at initial surgery, (2): "By effect" at latest radiological follow-up. Fracture reduction quality was assessed. Union was considered complete by RUST score >13 criteria. Time-to-event (TTE) analysis was carried out using the segmented Kaplan-Meier method.

**Results:** Mean TTE for union was the same for "by intention" dynamic and static locking in the first 180 days. (176 d vs 176 d, log rank  $p=0.413$ ) Following the first 180 days, initially dynamised femurs healed significantly faster (422 d vs 528 d,  $p=0.048$ ). "By effect" dynamisation, with elective removal of distal locking bolts under LA, further yielded significantly faster healing rate after 180 days (418 d vs 548 d,  $p=0.17$ ). The incidence of revision for mechanical failures are the same for dynamised or statically locked femurs (7 vs 6,  $\chi^2$   $p=0.6$ , overall 5.72%). Multivariate Cox regression showed that dynamisation "by effect" independently predicted faster union but not fracture reduction quality (OR=0.320,  $p=0.31$ ).

**Conclusion:** Routine axial dynamisation at primary fixation and elective removal of static locking bolt under enhanced healing of displaced AFFs with no noticeable detrimental effect apart from the additional minor operation.

## FP5.23

### Lower mortality following surgical management for distal femur fractures: a cohort study

**Benedict Yan Yui Cheung, Chun Fung Chan, Wai Ming Chan, Alexander Kai Yiu Choi, Yiu Chung Wun**

*Department of Orthopaedics and Traumatology, Tuen Mun Hospital*

**Background:** While uncommon, distal femur fractures are the second most frequent fracture type of the femur in the geriatric population. The mortality rate for this patient population is not well established and outcomes after surgical management have not been well studied. We present the first large-scale retrospective cohort study to compare the management outcomes in the geriatric population with distal femur fractures.

**Methods:** We included 169 patients >60 years with distal femur fractures for patients admitted into the New Territories West Cluster from 2012 to 2020 in this retrospective cohort study. Patient, fracture and management characteristics were examined and analysed. Survival analysis was done to delineate any differences in mortality rates between surgical and conservative management.

**Results:** The average age in this cohort was 84 years with 86.4% female and 13.6% male patients respectively. Overall mortality at 30 days, 6 months, 1 year and 3 years were 5.3%, 17.1%, 21.8% and 38.4%, respectively. Conservative management including external bandaging or bracing were done in 53.3% of the patients while 46.7% underwent surgical management. Between these two groups, the estimated survival time in days was longer ( $p=0.001$ ) in those who underwent surgical management (2382.1 days) as opposed to conservative management (1499.0 days). There was no statistically significant difference in the mean Charlson Comorbidity Index between the two groups ( $p=0.226$ ).

**Conclusion:** Compared to conservative management, surgical management resulted in a longer estimated survival time in geriatric patients with distal femur fractures.

## FP5.24

### Computational simulation of a novel surgical screw guide system to determine the optimal trajectory for S2-alar-iliac screw fixation in minimally invasive pelvic and spine surgery

**Christian Fang,<sup>1</sup> Lorraine HY Cheung,<sup>2</sup> Evan Fang,<sup>1</sup> Kenny Yat Hong Kwan,<sup>1</sup> Felix Lau,<sup>3</sup> Matthew Man Fai Leung,<sup>1</sup> Kenneth MC Cheung,<sup>1</sup> Frankie Leung<sup>1</sup>**

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

*<sup>2</sup>The University of Hong Kong*

*<sup>3</sup>The Chinese University of Hong Kong*

**Introduction:** The ideal trajectory for S2-alar-iliac (S2AI) screw insertion remains difficult to determine intraoperatively. Using a novel surgical guide which references the greater sciatic notch and outer pelvic surface, in conjunction with computational simulation, we identified a point through which an S2AI screw may be passed that optimises screw length, while minimising perforation hazards.

**Methodology:** Computed tomography scans of 87 adult hemipelvises were segmented and imported for 3D manipulation. A simulated array of screws was passed from the sacral entry point through nine target points with distances from the greater sciatic notch (Y) and outer pelvic surface (X) varying in 1-cm intervals. At each point, the maximum allowable screw length and incidence of critical perforations of the hip joint and inner pelvic cortex were recorded.

**Results:** Target points (X,Y) = (1,1) (1,2) and (2,1) allowed for the longest screw lengths, with mean 104.5 mm (95% CI=101.1-107.9) vs 101.84 mm (95% CI=97.7-106) vs 105.71 mm (95% CI=99.4-112.1). (1,1) has significantly lower risk for complete inner cortex perforation versus (1,2) and (2,1), 1% vs 8% vs 31% ( $p<0.001$ ) and partial inner cortex perforation, 2% vs 8% vs 28% ( $p<0.001$ ). However (1,1) has higher risk of hip perforation than (1,2) 18% vs 2% ( $p<0.001$ ).

**Conclusion:** We determined that target point (1,1) is optimal for S2AI screw insertion. The surgeon should use fluoroscopy to monitor for potential hip perforation.

**FP5.25****Our experience of fixing distal femur fracture with double plating****Tsang Yeung, Hang Cheong Cheng***Department of Orthopaedics and Traumatology, United Christian Hospital*

**Introduction:** Distal femur fracture is sometimes quite challenging to treat, especially in the elderly people and cases of comminuted fracture. Double plating to distal femur is an option to achieve a more stable construct.

**Methods:** It is a retrospective case series study. 33 cases with distal femur fracture (AO type 33) underwent open reduction internal fixation by plating in United Christian Hospital in year 2019-2021 were identified and their data of demographics, fracture patterns, operation details, clinical outcome, and surgical complications were retrieved.

**Results:** Of 33 cases, 13 (39%) with a mean age of 81 years were fixed with double plating configuration. 3 out of the 13 cases were total knee replacement (TKR) periprosthetic fractures. Distal femur locking plates were applied to the lateral side in all cases. Medial sides were plated with either a distal femur locking plate or a PHILOS plate. All cases were instructed for non-weight bearing walking after operation. There was no case of non-union but 2 cases (15%) of wound or soft tissue complication and 1 case (8%) of periprosthetic fracture.

**Discussion and Conclusion:** Double plating is an effective option for distal femur fracture fixation in the elderly people with osteoporotic bone and periprosthetic fracture with TKR. PHILOS plate is a possible option for medial plating as it is of a similar shape to the contour of the medial condyle and its size does not interfere with the femoral component of TKA.

**FP5.26****Development and initial evaluation of a novel (VRU) implant prominence rating scale for predicting outcome and the need for implant removal in distal radius volar plating****Thomas Ka Chun Leung,<sup>1</sup> Christian Fang,<sup>2</sup> Jake Cheung,<sup>2</sup> Tak Wing Lau,<sup>1</sup> Frankie Leung<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*

**Introduction:** Poor positioning of distal radius volar plate is reported to correlate with inferior outcome and need for removal. Nerve and tendon irritation may occur when the implant is offset towards volar, radial or ulna directions. Current literature provides little guidance on optimal plate positioning.

**Methods:** Adult distal radius fractures treated with volar plates between 2013-2019, with minimum 6 months of follow-up, were retrospectively analysed using a newly designed classification system to grade volar V (0-4), radial R (0-2) and ulna U (0-2) prominences from postoperative anteroposterior and lateral radiographs. The dependent outcomes were qDASH scores and incidence of plate removal. Sample size estimation was calculated from a priori MCID values of qDASH scores using an effect size of 0.2.

**Results:** 201 Females and 125 males were reviewed (mean age 61.7 years). 6-, 12- and 24-month qDASH scores were respectively available in 194, 179 and 98 patients. 66 had implant removals. R and U scales did not correlate with qDASH scores nor implant removal. Soong score correlated with 6-month qDASH (Kendall's  $\tau_b=0.103$ ,  $p=0.041$ ) but not implant removal. V scale weakly correlated with 6-month qDASH ( $\tau_b=0.114$ ,  $p=0.027$ ) but significantly predicted the need for removal. At V=0-2, 17.7% had removals and at V=3-4, 35.4% had removals ( $\chi^2$   $p=0.005$ ), RR=2.00 (95% CI=1.27-3.17) and NNT=5.64 (95% CI=3.3-18).

**Discussion and Conclusion:** The VRU system is more useful than the Soong score in predicting implant removal. Patients with 'overhanging' volar implants (V scale  $\geq 3$ ) are twice as likely to require removal. Meticulous positioning of volar plate is needed to prevent impingement.