

## Free Paper Session IX: Hand and Microsurgery

### FP9.1

#### **Ambulatory upper limb tendon surgery by wide-awake local anaesthesia no tourniquet technique under COVID-19 pandemic**

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**Introduction:** Many orthopaedic surgeries were suspended under the COVID-19 pandemic. In particular, patients with upper limb tendon problems were often placed at lower priority in the waiting list. Traditionally tendon surgeries were performed under general anaesthesia or regional nerve blocks. In recent years, avocation of wide-awake local anaesthesia no tourniquet (WALANT) technique was made at terminal digits has been proven safe. Limiting the need of aerosol generating procedure during intubation under general anaesthesia, reducing the length of hospital stay by performing under ambulatory setting made WALANT technique particularly valuable under this pandemic. The aim of this study was to evaluate the applicability and benefits of upper limb tendon surgeries using WALANT technique in our locality.

**Methods:** This was a retrospective case series on upper limb tendon surgeries using WALANT technique from September 2020 to June 2021 in NTWC. Operation details, patients' pain perception, satisfaction and surgeons' evaluation were recorded.

**Results:** Sixteen patients underwent upper limb tendon operations using WALANT technique. The average operation time was 91.2 minutes. The average amount of local anaesthesia required was 9.1 ml (range 3.6-20). The average numeric rating scale of pain by patients during local anaesthesia injection was 3.2, there was no pain during the procedures. Surgeons reported superiority about WALANT technique including secure tendon repair, adequate tenolysis, and titration for additional tendon procedures.

**Discussion and Conclusion:** These cases demonstrated upper limb tendon surgeries could be done

## FP9.2

### **Arthroscopic partial trapeziectomy with suture button suspensionplasty (Mini TightRope) for thumb carpometacarpal osteoarthritis: a retrospective review of intermediate term outcomes**

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**Introduction:** Arthroscopic partial trapeziectomy with suture button suspensionplasty (Mini TightRope) is an emerging minimally invasive option to manage thumb carpometacarpal osteoarthritis (CMCJ OA). In this study we describe its intermediate-term outcomes in a series of Hong Kong patients.

**Methods:** Patients with symptomatic thumb CMCJ OA who failed conservative management and subsequently operated from 2015 to 2019 were reviewed. Functional outcomes, including VAS pain score, grip strength, pinch strength, QuickDASH score and radiological subsidence were evaluated.

**Results:** 23 operations were performed in 8 male and 13 female patients, with median age at 64 years old (range 47-75). 52.2% involved the dominant hand. Median symptom duration was 34.5 months. Majority were of Eaton stage III (II: 4, III: 18, IV: 1). Operation was performed under local anaesthesia in 11 cases (48%) and regional anaesthesia in 8 cases without tourniquet. Arthroscopic partial trapeziectomy of 3-4 mm was performed at the 1R and 1U portals. Mini TightRope was inserted from base of 1st metacarpal to proximal third of second metacarpal. K wire was used in 9 cases. Mean operation time was 141.3 minutes. Median follow-up duration was 39.6 months. All patients had no resting pain. Mean improvement in grip strength, pinch strength and QuickDASH score were 57.5%, 66.3% and 54.5%, respectively. However, radiological outcomes were not significant. Two complications occurred requiring operation for nerve repair and removal of endobutton due to impingement.

**Conclusion:** Arthroscopic partial trapeziectomy with Mini TightRope resulted in intermediate-term improvement in functional outcomes and served as a reliable treatment for thumb CMCJ OA.

## FP9.3

### Clinical and radiological outcome of osteoscopic-assisted treatment of enchondroma in hand with artificial bone substitute or bone graft: a 7-year case series and literature review

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**Introduction:** The addition of osteoscopy to the surgery can allow direct visualisation of the bone cavity during and after curettage of the tumour without excessive damage to the bone cortex, which could potentially lead to a better clearance of tumour tissue and a lower rate of recurrence.

**Methods:** The study data were retrieved retrospectively from the Clinical Management System of Hospital Authority. Eleven patients who received surgery from December 2013 to November 2020 in either PWH or AHNH were included in this study. The duration of follow-up ranged from 3 to 65 months, with a mean of 20.9 months.

**Results:** The total active motion (TAM) of patients ranged from 220 to 280, with a mean of 257. The percentage of TAM compared to the contralateral side ranged from 81.5% to 100%, with a mean of 94.4%. The percentage of grip strength compared with the contralateral side ranged from 62% to 100%, with a mean of 86.2%. The QuickDASH score of patients ranged from 0 to 46.9, with a mean of 7.7. For the wound aesthetic rating, nine out of eleven patients reported as excellent. For the radiological outcome, the postoperative X-ray of all patients showed bone filling defect <3 mm, which belonged to Group 1 in the evaluation system proposed by Tordai et al (1990). None of the patients showed any radiological signs of recurrence.

**Discussion and Conclusion:** Our study showed that patients with enchondromas in hand treated with this minimal invasive method demonstrated good functional and radiological outcome.

## FP9.4

### Outcome of cement-less self-locking replacement arthroplasty of proximal interphalangeal joint for treatment of osteoarthritis, inflammatory arthritis, and posttraumatic arthritis

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**Introduction:** Proximal interphalangeal joint (PIPJ) arthritis results in pain and functional limitation in daily life. Surface replacement implants have gained popularity in the past decade but there is a lack of local data. This study aimed to evaluate the outcome of cement-less self-locking surface replacement arthroplasty for PIPJ arthritis using the Nakashima implant (Self Locking Finger Joint, Nakashima Propeller Inc., Okayama, Japan) in our cluster.

**Methods:** This is a mid-term retrospective analysis on the outcome of 9 patients who received PIPJ arthroplasty with Nakashima implant from 2016 to 2020. Subjective results including DASH score, VAS of pain, and satisfaction were based upon a questionnaire. Objective results including range of motion, pinch and grip power were measured. Radiological result was also assessed.

**Results:** The average follow-up time was 27 months. 5 patients underwent arthroplasty by volar approach and 4 by dorsal approach. 67% of patients reported improvement in pain of affected PIPJ after arthroplasty. The average PIP joint arc of motion (AOM) improved from 34° before surgery to 46° after surgery. The median of gain in AOM at the latest follow-up is 5° (IQR: -35 to 20) for the volar approach and 40° (IQR: -30 to 75) for the dorsal approach (p=0.221). None exhibited loosening on X-ray. Postoperative complications including subluxation and wound infection occurred in 2 patients. 3 patients required a second operation of tenolysis.

**Discussion and Conclusion:** Cement-less self-locking surface replacement arthroplasty is a feasible option that improves pain and preserves range of motion for patients with PIPJ arthritis.

## FP9.5

### **Functional outcome of heterodigital neurovascular island flap for reconstruction of finger and thumb defects**

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**Introduction:** Soft tissue defects in fingers and thumbs can be challenging. It is crucial to achieve a stable, mobile and sensate digits with adequate soft tissue coverage. The purpose of this study was to investigate the functional outcome of heterodigital neurovascular island flap in the reconstruction of finger and thumb defects.

**Methods:** From 2014 to 2020, heterodigital neurovascular flap was performed in 9 patients with thumb or finger defects. The patient history, surgical details, functional outcomes and complications were retrieved from case notes.

**Results:** There were 8 male and 1 female patients. The causes of wound defects included 6 trauma, 2 infection and 1 burn. The affected sites included four thumbs, one index finger, two middle fingers, one ring finger and one little finger. Donor sites included six middle fingers and three ring fingers. The average flap size was 6 cm<sup>2</sup>. The average operation time was 222 minutes. Complete flap survival was achieved in all cases. The sensation of the flap was satisfactory with average monofilament score of 3.67, with no cold intolerance but one case of mild hypersensitivity. The donor fingers had no cold intolerance or hypersensitivity. There were 2 donor fingers with mild fixed flexion contracture at the proximal interphalangeal joint (15 degrees). The patients return to work at an average of 24.75 weeks.

**Discussion and Conclusion:** Use of heterodigital neurovascular island flap in the reconstruction of finger and thumb defects can be considered as a useful and reliable method to restore normal hand function.

## FP9.6

### **Mid- to long-term radiological outcome of self-locking finger joint in proximal interphalangeal joint arthroplasty using a novel radiological classification system**

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**Introduction:** Self-locking finger joint (SLFJ) implant is a relatively new metal implant for proximal interphalangeal joint (PIPJ) arthroplasty with unique surface replacement and double-locking mechanism design developed since 1999. Unlike knee and hip arthroplasties, radiological grading system is lacking. Our study aimed to develop a new radiological classification system for SLFJ PIPJ arthroplasty and to evaluate the mid-to-long term outcomes.

**Methods:** Patients with PIPJ mono- or oligo-arthritis without tendon reconstruction were recruited. A total of 15 SLFJ PIPJ arthroplasties on 14 patients with mean age of 48.9 years (range 37-70) performed between 2008 and 2018 were reviewed. Subsidence is measured as the difference of radiological distance from implant tips to articular surfaces at early and latest follow-up. Bone resorption pattern was observed over 5 zones around the implant at both coronal (namely CP1-5 and CM1-5) and sagittal planes (namely SP1-5 and SM1-5). Bone resorption index from 0-3 is assigned to grade the severity.

**Results:** Mean follow-up was 80.7 months (range 18-151). Intra-observer reliability (ICC) was 0.791 and inter-observer reliability (Cronbach's alpha) was 0.668. Mean subsidence of PP and MP were both 0.1 mm (-0.5 to 0.8 and -0.5 to 0.9 respectively). Lateral approach is correlated with least subsidence. Most resorptions were noted at the peripheral zones (CP5, SP5, CM1&5, SM1&5). There was no loosening in central pegs. One case with two finger PIPJ arthroplasties had implant breakage and migration requiring revision PIPJ fusion.

**Discussion and Conclusion:** This novel radiological classification has good inter- and intra-observer reliability which enhances communication and documentation. SLFJ implant provides good mid-to-long term radiological outcome on implant durability and stability.

**FP9.7****Properly addressing the volar lunate facet rim fragment in distal radius fracture can significantly minimised the complication rate and improve the outcome****Jeffrey Justin Siu Cheong Koo,<sup>1</sup> Wai Wang Chau,<sup>2</sup> Pak Cheong Ho<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, Prince of Wales Hospital*

**Introduction:** Distal radius fracture with volar lunate facet involvement is challenging to treat as volar carpal subluxation can occur if the volar lunate facet rim fragment is not properly addressed. This study aimed to review the clinical and radiological outcome after surgical treatment for distal radius volar lunate facet rim fracture.

**Methods:** Between October 2018 and November 2020, 13 wrists in 12 patients (average age: 47.8 years, range 18-71) who had distal radius volar lunate facet rim fracture were recruited into the retrospective study. Open reduction and internal fixation using specially designed volar distal radius locking plates were performed in all cases. Clinical and radiological outcomes were evaluated.

**Results:** There were six B3 fractures and three C2 fractures and four C3 fractures. The mean follow-up time was 14.5 months (range 6-29). We observed wrist flexion range restoration was not as good as other ranges of motion. Grip strength could achieve 94.2% of contralateral side. Mean Modified Mayo Wrist score and mean Quick DASH score were 80.4 and 6.72, respectively. There was no loss of fixation for the critical volar lunate facet rim fragment and no volar carpal subluxation. There was no iatrogenic tendon rupture and no symptoms of flexor tendon irritation in our patients. Only 1 symptom-free patient had implant removal because of his own request.

**Conclusions:** With properly assessing the presence of volar rim fragment and addressing it during operative treatment, risk of reduction loss and subsequent disabling volar carpal subluxation can be minimised.

**FP9.8****Hypoplastic thumb reconstruction with free longitudinal hemi-metatarsal graft: long-term outcome of minimal 10 years of follow-up****Michael Chu Kay Mak,<sup>1</sup> Pak Cheong Ho,<sup>1</sup> Kar Wai Wong,<sup>2</sup> Wing Lim Tse,<sup>1</sup> Leung Kim Hung<sup>2</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:** Treatment of Blauth's type IIIb and IV hypoplastic thumb by pollicisation is culturally unfavourable in Chinese population. Digit preservation is often preferred. We presented the long-term outcome of an original technique of free longitudinal hemi-metatarsal transfer with minimal 10 years of follow-up.

**Methods:** Between 1997 and 2010, 11 patients with 13 Blauth IIIb, C or IV hypoplastic thumbs received hemi-metatarsal graft transfer including distal hemi-epiphysis at mean age of 18 months (range 10-23). Seven were isolated anomalies and 6 with radial deficiency. Graft was harvested from second or third metatarsal by splitting into longitudinal halves and transferred to the recipient hand to bridge the hypoplastic metacarpal and carpal bone. First web reconstruction utilised local skin flap, and motor reconstruction by Huber opponenplasty and extensor indicis transfer at same surgery (7) or in stage (6).

**Results:** Mean follow-up was 16.5 years (range 10.2-24.2). Thumb CMCJ was stable and mobile in all. Opposition was effective in 10 (76.9%). Grip and pinch power were 65.8% and 23.8% of opposite side, respectively. Seven patients used their thumb in daily life (53.8%). All patients had normal walking and toe motion. Toe shortening was nil in 7, mild in 3 and obvious in 3. Radiologically mean first to second metacarpal ratio was 69.6%. One CMCJ was fused and no subluxation was noted.

**Discussion and Conclusion:** At 16.5 years of mean follow-up, free hemi-metatarsal transfer achieved growth & function in most cases with minimal donor site morbidity. However daily use of thumb was limited likely due to concomitant conditions.

## FP9.9

### Change of functional task kinematics after first carpometacarpal joint arthrodesis

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**Introduction:** The complex motion of the first carpometacarpal joint (CMCJ) makes conventional 2-dimensional range of motion measurements suboptimal and difficult to interpret. It is also commonly believed that first CMCJ arthrodesis will result in impairment of functional performance of the thumb. Our study aimed to provide further insight on post-arthrodesis 3-dimensional first CMCJ motion and outcome in terms of functional performance and pinch strength.

**Methods:** Ten patients (11 thumbs) who received arthroscopic first CMCJ arthrodesis and 11 control subjects were recruited for assessment. The first CMCJ motion was assessed using a marker-based VICON motion capture system. Maximal workspace of the first CMCJ was generated from a combination of thumb movements. Six functional tasks that simulated daily activities were performed and the maximal radial and palmar abduction of the first CMCJ were captured. The pinch strength of the two groups was assessed.

**Results:** A new dome-like model has been developed and utilised to measure the first CMCJ motion. Statistically significant reductions were found in both volume and area in the arthrodesis group and control group. The maximal palmar abduction and maximal radial abduction in performing six functional tasks showed no difference between the two groups. Lateral Pinch strength showed no statistically significant difference between the two groups ( $p=0.583$ ).

**Conclusion:** The new dome-like model provides a more accurate illustration of the first CMCJ motion. Patients who underwent first CMCJ arthroscopic arthrodesis showed no difference in performing functional tasks when compared to the control group. Pinch strength was also similar between two groups.

**FP9.10****Relative motion splint can improve the proximal interphalangeal joint extension range in finger proximal phalangeal fracture****Charles Cheuk Sang Lam,<sup>1</sup> Jeffrey Justin Siu Cheong Koo,<sup>2</sup> Adrian Kam Yiu Leung,<sup>1</sup> Wai Wang Chau,<sup>3</sup> Pak Cheong Ho<sup>3</sup>**<sup>1</sup>*Department of Occupational Therapy, Alice Ho Miu Ling Nethersole Hospital*<sup>2</sup>*Department of Orthopaedics and Traumatology, Alice Ho Miu Ling Nethersole Hospital*<sup>3</sup>*Department of Orthopaedics and Traumatology, Prince of Wales Hospital*

**Introduction:** Proximal interphalangeal joint (PIPJ) extension lag is a common complication after treatment for proximal phalanx fracture. Relative motion splint has been widely used in extensor tendon laceration especially in Boutonniere deformity. However, this splint has never been used in proximal phalanx fracture management to improve extension lag. This is the first study comparing the clinical outcome of finger phalangeal fracture treated by open reduction and internal fixation with or without using relative motion splint.

**Methods:** From April 2016 to November 2020, retrospective cohort study was performed in 13 fingers using the splint and 10 fingers without. They received same rehabilitation regime except relative motion splint usage. Range of motion and grip strength were measured at 3 weeks, 6 weeks, 6 months and 1 year. Upon last follow-up, Belsky score together with contralateral side grip strength and corresponding finger's range of motion were also measured to assess the overall recovery.

**Results:** Patients were followed up for 18.8 months on average (range 6-52). The demographic data showed no statistical difference between two groups. The relative motion splint group had statistically significant improvement in PIPJ extension lag. The effect appeared from sixth week of treatment and long-lasting even after discontinuing splint usage. Patients in younger age-groups (<50 years), dominant hand injury in non-job-related accidents as well as treatment with lateral plating had better outcomes in our study.

**Conclusions:** Relative motion splint is a potential solution in finger proximal phalanx fracture PIPJ extension lag complication.

## FP9.11

### **Use of modified Masquelet technique for staged reconstruction in hand injury and infection: a case series**

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**Introduction:** Management and reconstruction of bone loss due to injury and infection in the hand region is always a challenge. The use of modified Masquelet technique to induce a pseudo-membrane can enhance bone graft survival and provide a neo-capsule for joint reconstruction. Nonetheless, there are limited published studies regarding this topic. The aim of this study is to review the results of such technique.

**Methods:** From 2018 to 2020, cases with hand injury or infection associated with bone defects that were treated by modified Masquelet technique were reviewed. The clinical details were retrieved from case notes. The objective outcomes including range of motion and grip strength were assessed. The subjective outcomes were assessed by pain score and Michigan hand questionnaire. The radiological outcomes were assessed.

**Results:** Four cases received modified Masquelet technique for staged reconstruction were reviewed. The location of bone defects included: distal phalanx (n=2); proximal phalanx (n=1) and metacarpal (n=1). The bone defect volume ranged from 100 to 400 mm<sup>3</sup>. All cases achieved bone union with average bone graft healing at 11.33 weeks. There was no bone graft resorption. There was no case of recurrent infection. The functional outcome was good to excellent for all cases.

**Discussion and Conclusion:** The modified Masquelet technique is an innovative option for treating bone defects in hand. Yet, it is a simple and feasible option. It could provide immediate stability for facilitating early mobilisation, as well as achieving high success bony union rate and good functional outcome in the long-term.

## FP9.12

### **A radiographic index of radial bowing for predicting loss of forearm rotation**

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**Introduction:** Loss of the anatomical bowing of the radius can lead to reduced forearm rotation. The traditional method of measuring bowing only accounts for coronal malalignment on an AP radiograph; however, changes in the lateral plane can also lead to rotational restriction despite an apparently normal AP view. A radiographic index of radial bowing is needed to ensure adequate reduction in forearm fractures and malunions.

**Methods:** Radiographs of all patients  $\geq 6$  years with forearm fractures in our hospital in 2018-2020 were reviewed. On AP and lateral radiographs of the forearm, the maximal perpendicular distance between the forearm axis (a line from the ulna fovea to the joint centre of the radial head) and the radius was measured and divided by the axial length to yield an index of radial bowing. Radiographs of patients with a reduced pronation-supination motion were compared with those with full motion to detect any difference in the radial bow index. The lower limit of this index before pronation is reduced is determined by a 3D computer model established from normal CT scans. The curvatures of the radii were reduced until osseous impingement occurred, correlated with. Corresponding radial bow index in orthogonal views was determined.

**Results:** Among the 42 patients who completed follow-up, 4 had decreased pronation. There was a significant difference in radial bow index (3.2% vs 9.1%), and all of the malunited radii showed a reversed relationship with the forearm axis. A bow index of  $<5\%$  causes decreased pronation.