

## Free Paper Session VIII: Foot and Ankle

### FP8.1

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#### **Can 3-dimensional printed anatomical models assist in surgical treatment for trimalleolar fracture? A case cohort comparison on early postoperative outcomes**

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**Introduction:** The objective of the present research was to evaluate the effectiveness of 3-dimensional (3D) printed anatomical models in surgical treatment for trimalleolar fracture.

**Methods:** A retrospective case cohort comparison was conducted. 40 patients who were admitted to United Christian Hospital between November 2019 and January 2021 with surgical treatment for trimalleolar fracture were selected. Patients were divided into 2 groups based on the application of anatomical model (3D printing group; n=14) or conventional treatment (conventional group; n=26). 3D printed anatomical model of fracture side and mirrored non-fracture side distal ankle were utilised for surgical planning, including fracture morphology visualisation, surgical rehearsal and pre-contouring of implant, in 3D printing group. Early postoperative outcomes, including operation time, blood loss volume, fixation methods, drainage volume, quality of reduction (Teeny and Wiss Score), functional outcome (Olerud and Molander Score), total length of stay, preoperative length of stay, and complication rate were compared between groups.

**Results:** Characteristics between groups were comparable. No significant difference in mean follow-up duration was found. Significantly lower drainage volume ( $37.27 \pm 34.96$  vs  $65.67 \pm 33.75$  ml;  $p=0.027$ ), higher posterior malleolus fixation rate (85.7% vs 30.8%;  $p=0.003$ ), higher "anatomic" reduction rate (71.4% vs 34.6%;  $p=0.026$ ) and lower complication rate (0.0% vs 26.9%;  $p=0.035$ ) were observed in 3D printing group.

**Conclusion:** Based on the data found, 3D printing group demonstrated higher posterior malleolus fixation rate, higher "anatomic" reduction rate and lower complication rate. 3D printed anatomical model potentially associated with more efficient surgical treatment for trimalleolar fracture.

### FP8.2

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#### **Radiological and clinical effectiveness of a Mini TightRope system in hallux valgus surgery**

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**FP8.3****Cross-cultural adaptation, reliability and validity of the Cantonese-Chinese version of the Cumberland Ankle Instability Tool (CAIT-HK)**

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**Introduction:** This study aimed to translate, cross-culturally adapt and validate the Cumberland Ankle Instability Tool (CAIT) to Cantonese-Chinese for the Hong Kong population to identify chronic ankle instability (CAI).

**Methods:** The CAIT was cross-culturally adapted into Cantonese-Chinese following internationally accepted guidelines. It was renamed the Cumberland Ankle Instability Tool-Hong Kong (CAIT-HK). 46 dancers who were native Cantonese speakers completed the CAIT-HK. The questionnaire was assessed for internal consistency, test-retest reliability and validity. It was validated against the Foot and Ankle Outcome score (FAOS). A cut-off score was determined.

**Results:** For internal consistency, CAIT-HK showed a Cronbach's  $\alpha$  value of 0.726. For test-retest reliability, intraclass correlation coefficient was 0.874. Construct validity against the FAOS was significant. A cut-off score of 20.5 (sensitivity: 0.90, specificity: 0.86, Youden's index: 76.1) was determined to differentiate stable from unstable ankle.

**Discussion and Conclusion:** The original English CAIT was successfully translated, cross-culturally adapted and validated into Cantonese-Chinese. CAIT-HK may be a useful tool for assessing CAI in individuals in Hong Kong.

**FP8.4****Prevalence of ankle instability in performers of Chinese dance**

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**Introduction:** Chinese dance is a major genre of dance, rich in history and culture. Foot and ankle injuries are commonly seen in dancers, yet limited studies exist on the injury prevalence of performers of Chinese dance. This study aimed to determine and assess the prevalence of chronic ankle instability (CAI) in Chinese dancers in Hong Kong, using self-reported assessment tools.

**Methods:** This was a cross-sectional study of 105 Chinese dancers. Chronic ankle instability was assessed using the Cumberland Ankle Instability Tool (CAIT-HK) and foot function via the Foot and Ankle Outcome Score (FAOS). Both self-reported assessment tools were included in an online questionnaire that was distributed between January and February 2021. Descriptive statistical analysis was then conducted for subjects with and without CAI.

**Results:** CAI was seen in 29/105 of Chinese dancers, with most being unilateral instability. The number of training hours, level of expertise, occupation, gender and age showed no statistically significant relationships with ankle instability. FAOS showed that for subjects with CAI, quality of life and pain subscales were the most impacted compared to their healthy counterparts.

**Discussion and Conclusion:** Chronic ankle instability is a major problem affecting 28% of performers of Chinese dance. Future research should investigate the specific risk factors for CAI to formulate strategies to prevent ankle injuries in Chinese dancers.

## FP8.5

### **Anthropologic computed tomography investigation on the site and severity of the rotational deformity in hallux valgus**

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**Introduction:** Solely looking at the transverse plane deformity in hallux valgus fails to account for the entire deformity as the evidence supports a multiplanar deformity. It remains unknown whether the rotation occurs in the tarsal-metatarsal joint, within the metatarsal bone as bony torsion or distally at the metatarsal-phalangeal joint. Additionally, it is important to know whether the severity of coronal rotation directly correlates with transverse deformities and whether the coronal deformity affects foot-related function.

**Methods:** The scans were performed using Xtreme CT II and data were imported into Mimics and 3-Matic for analysis. The landmarks were determined on the medium cuneiform and first MT. Lines were connected accordingly and angles between them presented the rotation at TMTJ and torsion within first MT. FAOS questionnaire was used to evaluate the foot-related functions.

**Results:** The current study recruited 17 patients (23 feet) with HV and 16 control subjects. TMT joint rotation was found significantly different between two groups, while no difference was found in the first MT torsion. Neither TMT joint rotation nor MT torsion of HV patients exhibited significant relation with IMA or HVA. Only TMT joint rotation angle was found significantly correlated with quality of life.

**Discussion and Conclusion:** The coronal deformity in HV originates from TMT joint rotation. TMT joint procedures may be more appropriate. It also shows that TMT joint rotation develops independently to the transverse plane deformity, and severity of TMT joint rotation correlates with worse quality of life, regardless of IMA or HVA.

## FP8.6

### **Case series on the efficacy of a synthetic cartilage implant for the treatment of hallux rigidus**

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**Introduction:** Hallux rigidus is the degeneration of the first metatarsalphalangeal joint resulting in pain and stiffness. After failed conservative management, the mainstay is operative management for pain management. Joint-sacrificing arthrodesis was considered the gold standard. Joint-sparing operations have shown success lately; including cheilectomy, osteotomy, and newer options like implants. There is a lack of studies in the use of artificial implants, especially in our locality.

**Methods:** Patients who underwent synthetic cartilage implant in Prince of Wales Hospital between January 2019 and June 2021 were retrospectively recruited. They completed the Foot and Ankle Outcome Score (FAOS), before and 3 months after the operation. The Hattrup and Johnson (H&J) Classification was used to classify the hallux rigidus.

**Results:** Four patients were recruited, three with H&J grade 2 and one grade 1. There was an increase in the mean of the FAOS in all five domains, however not statistically significant. The mean score of the pain domain increased from 56.9 to 64.6 ( $p=0.269$ ), symptoms from 47.3 to 58.0 ( $p=0.273$ ), ADL from 70.53 to 77.95 ( $p=0.273$ ), sports from 38.8 to 52.5 ( $p=0.197$ ), and QoL from 37.5 to 57.8 ( $p=0.066$ ).

**Discussion and Conclusion:** The increase in the scores over all five domains is promising, although not statistically significant. In view of our small sample size, the strength will be limited. Thus, this small-scale study provides an encouraging pathway for further studies as the use of artificial implants is still rapidly developing.

**FP8.7****The morphological differences of intrinsic foot muscles in runners with plantar fasciitis—a pilot study**

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**FP8.8****Cross-cultural adaptation of Chinese Victorian Institute of Sports Assessment—Achilles questionnaire for Achilles tendinopathy**

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**Introduction:** Achilles tendinopathy is a common overuse musculoskeletal condition. The Victorian Institute of Sports Assessment (VISA-A) is a patient-reported outcome for assessing symptom severity in patients with Achilles tendinopathy. It is a valid and reliable tool that has been used widely for measuring and monitoring treatment outcomes for Achilles tendinopathy. The results of VISA-A range between 0 and 100 points. The overall study objective is to adapt the VISA-A questionnaire cross-culturally and assess its reliability for Chinese-speaking individuals.

**Methods:** VISA-A was translated and adapted cross-culturally according to international guidelines for self-reported questionnaires. The orthopaedic surgeon, physiotherapist, and professional translator performed the five steps in creating Chinese VISA-A, including translation, synthesis, reverse translation, review, and pretesting. Healthy individuals (n=16), recreational athletes (n=14), and patients with Achilles tendinopathy (n=3) were recruited to assess the psychometric properties of Chinese VISA-A. All participants completed Chinese VISA-A twice.

**Results:** The mean Chinese VISA-A score in patients with Achilles tendinopathy was 69 (95% confidence interval (95% CI)=52-86). It was significantly lower than the healthy control score of 96 (95% CI=93-99). The overall test-retest reliability of Chinese VISA-A was good (ICC=0.90).

**Discussion and Conclusion:** Chinese VISA-A demonstrates good reliability for measuring symptom severity in patients with Achilles tendinopathy. Chinese VISA-A can assess Chinese-speaking patients with Achilles tendinopathy, both in research and clinical setting.

## FP8.9

### **Foot pronation is not associated with the radiographic severity of knee degeneration and knee function in an elderly population from the MusFit Cohort**

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**Introduction:** Foot posture have been proposed to be associated with knee osteoarthritis, as altered lower limb alignment could lead to uneven distribution of force. Previous studies have documented attempts to include foot posture correction in the conservative management plan for knee osteoarthritis. However, results were controversial. In this study, the association between foot posture and knee osteoarthritis was investigated.

**Methods:** Forty-six elderly participants with mean age of 69.2 years were invited from a health-promotion programme (MusFit cohort) for assessment. Foot posture index (FPI) was calculated for both feet, which a cut-off of >5 either foot was adapted for classification of foot pronation. Kellgren and Lawrence (KL) grading was used to assess radiographic severity of degeneration, while Knee injury and Osteoarthritis Outcome Score (KOOS) was performed to assess for function. Fisher exact test was performed to investigate the association between presence of foot pronation with radiological severity of knee degeneration and function.

**Results:** Thirty out of 46 participants presented with foot pronation. Foot pronation was not associated with high KL grade of 3 or 4 ( $p=0.789$ ). There was no significance difference between functional score of pain ( $p=0.916$ ), symptoms ( $p=0.895$ ), ADL ( $p=0.531$ ), sports ( $p=0.292$ ), and QOL ( $p=0.124$ ) between participants with and without foot pronation.

**Discussion and Conclusion:** Foot pronation was commonly observed. However, existence of foot pronation was not associated with radiological severity, nor functional condition of knee osteoarthritis. This study supports that correction of foot pronation may not be an effective method in the conservative management strategy of knee osteoarthritis.