COA Paper Session 9: Foot and Ankle ●

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An Observational Study of Functional Outcome Scores in Foot and Ankle Trauma

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Purpose: Identifying optimal treatment strategies in patients with traumatic foot and ankle injuries has been hampered by the variety of different measurement tools and lack of validation of generic and foot-specific functional measures. It remains plausible that the choice of functional outcome measure may influence our ability to accurately measure treatment effects. This prospective observational study aims to correlate the scores across six functional outcome measures in patients with traumatic foot and ankle injuries and to examine agreement of scores and patients' subjective health status. **Method:** Patients with traumatic foot or ankle injuries completed two generic, the SF-12 Health Survey and the Short Musculoskeletal Functional Assessment (SMFA), and four specific health outcome measures, the Foot Function Index (FFI), Foot and Ankle Ability Measure (FAAM), American Academy of Orthopedic Surgeons (AAOS) Foot and Ankle Questionnaire and the American Orthopedic Foot and Ankle Society (AOFAS) Ankle-Hindfoot Scale, at a single follow-up visit. Raw scores were calculated and used to assign patients to a categorical functional level (excellent, very good, good, fair or poor). Agreement between the assignments was assessed and Pearson correlation co-efficients were calculated for each pair of outcome scores. Statistical significance was determined using an α of 0.05. **Results:** 52 patients (mean age 43.3 ± 16.8 years) were enrolled at a mean follow-up of 15.5 months. All correlations except for that between the AOFAS ankle-hindfoot scale and the mental component of the SF-12 were statistically significant. The strongest correlations were found between the SMFA, FFI, AAOS Foot and Ankle Questionnaire and the FAAM. Despite significant correlation between scores and patients' subjective functional outcome, there was minimal agreement between assigned categorical functional levels. **Conclusion:** The high correlations between scores on the generic and foot-specific functional measures suggest that it is likely unnecessary to use more than one instrument when examining functional outcome in patients with traumatic foot and ankle injuries. Generic tools also appear to function as well as specific scores in this population. However, assignment of patients to a categorical functional level based on raw outcome scores must be performed with caution as the results obtained may not accurately reflect functional outcome.

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Do Lower Extremity Outcome Questionnaires Used to Assess Ankle Replacements and Fusions Really Capture What Patients Want Us to Hear?

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Purpose: The objective of this study is to compare items from patient-reported questionnaires measuring musculoskeletal outcomes with items generated by pre-and post-operative ankle arthrodesis and arthroplasty patients using -the Patient-Specific Index (PSI-P). The International Classification of Functioning, Disability and Health (ICF) was used as an external reference. **Method:** A literature review identified six questionnaires that assess lower extremity outcomes (AAOS, patient-reported portion of AOFAS, FFI, LEFS, SMFA, WOMAC). Surgical patients (n=142) from an orthopaedic surgeon's practice completed the patient-selected items from PSI-P. Items from questionnaires and PSI-P were coded by three reviewers and linked to the ICF. The ICF is divided into four components (Body Functions and Structures, Activities and Participation, Environmental Factors, and Personal Factors) which are then further divided into second level categories. A higher number of second level categories would indicate a questionnaire that captures a broader range of experiences. **Results:** Patient's responses from PSI-P identified 690 meaningful concepts that were linked to 45 second level ICF categories. Most PSI-P responses fell into Activities and Participation (60.6%) and Body Functions and Body Structures (35.2%) including the second level categories Walking (19.1%), Pain (16.5%), and Recreation and Leisure (15.4%). There was no statistical difference between arthrodesis and arthroplasty patients nor between preoperative versus postoperative patients in terms of the proportion of patient responses that fell into each ICF component. A total of 237 meaningful concepts were identified in the 6 questionnaires studied and linked to 38 second level ICF categories. Overall, SMFA addressed the most number of second level categories and had the closest proportion of Body Function (23.0%) and Activities and Participation (68.9%) concepts as compared to PSI-P. The patient-reported portion of AOFAS addressed the fewest categories. LEFS only contained items from Activities and Participation. AAOS was the only questionnaire to address the issue of 'swelling', though it represented 4.9% of all PSI-P responses. **Conclusion:** Questionnaires differ largely in their content and no single questionnaire captured all of the concerns identified by PSI-P. This analysis will guide us in the development of a new and more comprehensive instrument for evaluating ankle outcomes following fusion or replacement.

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Preference-based Quality of Life in End-stage Ankle Arthritis, Total Ankle Arthroplasty, and Ankle Arthodesis

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Purpose: To describe the pre- and one-year post-operative preference-based, health related quality of life (health state values) among a cohort of subjects with end-stage ankle arthritis treated with total ankle arthroplasty or ankle arthrodesis. This short-term study is not intended to compare the efficacy of arthoplasty and arthrodesis. **Method:** The Short-Form 36 (SF-36) was prospectively completed by subjects enrolled in the Canadian Orthopaedic Foot and Ankle Society Multicentered Ankle Arthritis Outcome Study between 2003 and 2005. Preference-based quality of life was assessed pre-operatively and at one-year post-procedure using health state values (HSVs) derived from the SF-36 transformation described by Brazier (SF-6D). The SF-6D scores are anchored at 1.0 (full health) and at 0 (death). Basic patient demographic and treatment information was also collected. The decision to perform arthroplasty or arthrodesis was made by the attending surgeon. **Results:** Two hundred four of the 214 eligible subjects had complete preoperative SF-36 data to allow transformation to SF-6D values. One-year follow-up was available for 114 of the participants. The mean age at surgery of the included subjects was 58.9 +/- 13.3 years. Of the patients with one-year follow-up, 56% were male and 59% had received total ankle arthroplasty. These demographics did not differ from the original preoperative cohort. The mean SF-6D score among all subjects with end-stage ankle arthrosis was 0.66 (95% CI 0.65 – 0.68). At one-year, the mean HSVs of the total ankle arthroplasty and ankle arthrodesis groups were 0.73 (95% CI 0.71 – 0.76) and 0.73 (95% CI 0.70 – 0.75), respectively. The reported pre-operative scores describe health states below normative data for the US population (0.76 +/- 0.01 for females, ages 55-64). **Conclusion:** These are the first available HSVs for a cohort of patients with end-stage ankle arthritis treated with total ankle arthroplasty or ankle arthrodesis. These data demonstrate an improvement in preference-based quality of life following ankle arthroplasty or arthrodesis. At one-year follow-up, patient reported HSVs approach age-matched US norms.

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RSA Results for an Un-cemented Mobile-bearing Total Ankle Arthroplasty System

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Purpose: Radiostereometric Analysis (RSA) is used to measure migration and inducible displacement (ID) of orthopedic implant devices to allow early prediction of implant failure (eg. Aseptic loosening). Total Ankle Arthroplasty (TAA) is used for the treatment of end-stage ankle arthritis. First generation TAA implant have meet with widespread failures while some second generation TAA implants are showing improved results. In this study RSA is used to evaluate the biomechanical properties of a new third generation TAA

implant in an attempt to set a standard for the biomechanical evaluation on TAA implants in-vivo. **Method:** Patients undergoing TAA were enrolled consecutively (n=12; 7 males; mean age=59 years; mean BMI=29) and had 8 markers (0.08mm) inserted in both the tibia and talus during surgery. Standing, weight-bearing RSA exams were performed at 3 and 6 months and compared to concurrent supine exams to determine component ID. **Results:** For tibial components: at six months the components had translated posteriorly (0.3mm±0.5) and proximally (0.5mm±0.2), tilted into varus (0.5°±1.3), and tilted posteriorly (0.4°±0.8). The magnitudes of ID for the tibial components were moderate (mean < 0.2mm and 0.5°, standard deviation < 0.3mm and 2.2° in each direction). For talar components: at six months the components had translated distally (0.28mm±0.35), rotated internally (0.21°±1.32) and tilted posteriorly (0.15°±0.90). There was varus/valgus tilt measured in the talar components but there was no consistent direction of migration (0.03°±1.4). At six months the magnitudes of ID for the talar components were small (mean < 0.1mm and 0.25°, standard deviation < 0.2mm and 0.6° in each direction). **Conclusion:** An RSA methodology has been established to predict stability.

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Achilles Insertional Tendinopathy Treated By a Posterior Midline Approach: A Safe Procedure

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Purpose: Insertional calcific Achilles tendinosis is a painful, frequently disabling, condition. The longitudinal and radial alignment of the angiosomes of the posterior region of the leg makes a straight posterior midline approach logical. The safety of the posterior midline approach and the outcome of a central tendon splitting approach associated with a Strayer procedure to treat this condition was evaluated. **Method:** A retrospective review of a consecutive cohort of a single surgeon was performed. All patients had failed conservative treatment and all patients were primary cases. Forty-seven patients (48 heels) were treated over a 11-year period for chronic insertional Achilles tendinosis. All patients underwent a midline posterior splitting approach, debridment of the bursae, resection of the haglund deformity, partial Achilles detachment, debridement, reinsertion with bone anchor associated with a proximal gatrocnemius recession (strayer procedure) through a second midline incision. The average age was 59 years old (39-75), co-morbidities included four smokers and one diabetic patient. The average followup was 54 months (15-144). All patients answered pre-op and latest follow up AOFAS questionnaire, satisfaction rate and complications were reviewed. **Results:** Satisfaction rate was 100%. AOFAS score improved significantly from 59 (36-80) preop to 97 (90-100) at the latest follow-up. Complications included one superficial infection and one sural nerve paresthesia. There were no major complications. **Conclusion:** Achilles insertional tendinopathy treated by a posterior midline approach is a

safe and reliable procedure. The procedure was associated with high patient satisfaction rate and excellent outcome.

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Opening-wedge versus Proximal Chevron Osteotomy for Hallux Valgus with Increased Intermetatarsal Angle

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Purpose: For patients with moderate to severe hallux valgus with increased intermetatarsal angle, correction with a proximal first metatarsal osteotomy is indicated. The purpose of this study is to compare the opening-wedge osteotomy of the proximal first metatarsal the proximal chevron osteotomy in the treatment of moderate to severe hallux valgus with increased intermetatarsal angle. **Method:** This prospective, randomized, multi-centered study is being conducted at three centers in Canada. Approximately 75 adult patients with hallux valgus are being randomized to either the proximal metatarsal opening-wedge osteotomy with plate fixation or the proximal chevron osteotomy. Patient functional scores using the SF-36, American Orthopaedic Foot and Ankle Society (AOFAS) forefoot metatarsophalangeal interphalangeal score and Visual Analogue Scale (VAS) for pain, activity & patient satisfaction, are assessed prior to surgery and 3, 6, 12 and 24 months. Surgeon preference is being evaluated based on a questionnaire and actual surgical times. Radiologic measurements (intermetatarsal angle correction, hallux valgus angle correction, sagital talus-first metatarsal (Meary's) angle, metatarsal length and union) will also be assessed. **Results:** Preliminary results demonstrate that patients who undergo the opening-wedge osteotomy have less pain at 3 months (ave.VAS pain reduction 2.9, SE±1.0) than those with the chevron (ave. VAS pain reduction 2.4, SE±1.2). VAS for activity demonstrates greater improvements with the chevron osteotomy at 3 months (0.8, SE±0.8) versus the opening-wedge (0.1, SE±1.0). AOFAS scores improve on average 18.3 (SE±8.6) with the opening wedge compared to 20.8 (SE±7.4) with the chevron at 3 months. Average hallux valgus angle correction for opening-wedge and chevron osteotomies are 11.0 degrees (SE±2.5) and 19.0 degrees (SE±3.1) respectfully. Average intermetatarsal angle correction for opening-wedge and chevron osteotomies are 6.5 (SE±1.3) and 4.3 (SE±1.7) respectfully. Both procedures are effective at maintaining metatarsal length. The opening-wedge osteotomy takes on average 60.9 minutes (SE±3.9) to complete compared to 69.1 minutes (SE±5.1) for the chevron ostetotomy. Surgeon response to the new opening-wedge osteotomy is favorable. **Conclusion:** Opening-wedge and proximal chevron osteotomies have comparable pain, function and radiographic outcomes. Opening wedge osteotomy is technically less demanding and requires less surgical time.

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Relation Tibio-peroniere Distale Sur Vue Fluoroscopique Laterale

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Purpose: Lors de la réduction chirurgicale des fractures de la cheville avec instabilité syndesmotique, le chirurgien se fie généralement sur les vues de mortaise et antéro-postérieure. Toutefois, une subluxation ou luxation antérieure du péroné par rapport au tibia distal peu survenir et passer inaperçu (trois exemples cliniques prouvés par CT Scan post-opératoire), spécialement lors de la pose de vis syndesmotique(s). La présente étude a pour but d'établir la relation radiologique précise sur une vue latérale fluoroscopique entre les tibia et péroné distaux qui permettra au chirurgien de confirmer en peropératoire que l'articulation tibio-péronière distale est bel et bien réduite. **Method:** Les chevilles normales de trente volontaires sans antécédent de traumatisme ou de maladie de la cheville ont été imagées sous une vue latérale fluoroscopique parfaite, avec un Mini C-Arm. Les images ont été analysées et comparées entre elle afin d'établir une relation radiologique fiable et reproductible entre le tibia et le péroné distaux. **Results:** Dans les trente cas, il y avait intersection du milieu de la cicatrice physaire et du cortex antérieur du péroné. Cette relation a été trouvée statistiquement significative. **Conclusion:** La réduction chirurgicale parfaite de l'articulation tibio-péronière distale peut être confirmée avec une vue latérale fluoroscopique de la cheville. Le cortex antérieur du péroné doit toucher le milieu de la cicatrice physaire.

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Operative versus Non-operative Treatment of Achilles Tendon Ruptures: A Randomised Controlled Trial

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Purpose: The purpose of this randomised controlled trial was to compare outcomes of operative and non-operative management of Achilles tendon ruptures. **Method:** Patients with acute complete Achilles tendon ruptures were randomised to receive open suture repair followed by graduated rehabilitation or graduated rehabilitation alone. The primary outcome measure was re-rupture rate. Assessments at three and six months, and one and two years included a modified Leppelhati score (no strength data), range of motion, calf circumference, and isokinetic strength at one and two years. We report the two year findings. **Results:** Two centres randomized 145 patients (118 males and 27 females), mean age 40.9±8.8 years (22.5 - 67.2) to operative (n=73) and non-operative (n=72) treatment. Fourteen were lost to follow-up. Re-rupture occurred in three patients in both groups. The mean modified Leppelhati score (out of 85) was 78.2±7.7 in the operative group and 79.7±7.0 in the non-operative group, which was not significant (-1.5 95%CI -6.4 to 3.5, p=0.55). Mean side-to-side difference in plantar flexion and calf-circumference in the operative group was -2.0±3.2° and -1.4±1.2cm,

and in the non-operative group -0.9±3.0°and -1.6±1.8cm respectively. Mean isokinetic plantar flexion strength was 62.4±24.2 for the operative and 56.7±19.3 for the non-operative group, which was not significant (5.7, 95%CI -3.1 to 14.5, p=0.20). There were a greater number of serious adverse events in the operative group, including pulmonary embolus in one patient, deep vein thrombosis in one and deep infections requiring irrigation and debridement in three. **Conclusion:** This study suggests that non-operative management of Achilles tendon ruptures utilizing an accelerated rehabilitation programme may produce comparable results with fewer adverse events.

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To Assess Moderate-term Outcomes of Silastic Joint Replacements of the First Metatarsophalangeal Joint
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Purpose: To assess moderate-term outcomes of silastic joint replacements of the first metatarsophalangeal joint. **Method:** The thirty-two patients (37 feet) that had silastic implants inserted were reviewed at an average of 2 years and 4 months (ranging 7 months to 5 years and 4 months). The mean patient age was 63 years. These patients answered a subjective questionnaire, had their feet examined clinically and radiographically and a pre-operative and post-operative AOFAS score was calculated for each. **Results:** The follow-up assessment revealed that every patient described that their pain had decreased after surgery and 17 feet (46%) were completely pain free. There was a significant improvement in patients' subjective pain scores after surgery (t value = <0.0001). Pre-operatively, the mean pain score for all 37 feet was 8.14, whereas post-operative the mean pain score was 1.32. The mean AOFAS score before surgery was 39.97. This increased to a mean score of 87.40 after surgery (P = <0.0001). This again is a significant improvement. No patient was dissatisfied with the outcome with their surgery. **Conclusion:** These moderate term results are encouraging, with good subjective and objective results. However, long-term follow-up will be required to assess the longevity of this implant.

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Early Ankle Fracture Fixation Can Lead to Reduced Length of Stay: The Window of Opportunity
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Purpose: The aim of this study was to compare the results and length of stay of patients of early ankle fracture fixation with conventional fixation in a busy District General Hospital in UK. **Method:** A retrospective study was

conducted using data from case records, electronic patient record, clinical coding information, clinic letters and Picture Archiving and Communications System (PACS). Two hundred patients who underwent ankle fracture fixation from July 2004 to June 2005 were included. We looked into age, place of living, Weber classification, mechanism of injury, comorbidities especially diabetes and peripheral vascular disease, addictions mainly smoking, whether patient was anticoagulated, delay for theatre with reasons, length of stay in hospital and complications if any. Other things to looked at were, overlying skin condition, the amount of swelling at the time of presentation to A&E, associated ankle dislocation or talar shift needing reduction, injury types-open or closed or with associated neuro-vascular injury. In-operative management – what method was used ie malleolar screws, diastasis screw, fibular plating, calcaneotalotibial nail or external fixater etc. **Results:** In the 12-month retrospective review, there were 200 ankle fractures that required surgical intervention. Only twenty-two of these had surgery within 12 hours (mean length of stay, 3.3 days), and sixty-seven of these had surgery within 48 hours (mean length of stay, 4.9 days), and 111 had surgery after 48 hours (mean length of stay, 9.4 days). Finally we calculated the cost (784 bed days - £235 thousands) incurred to the trust in terms of extra bed occupancy and treating the complications as a result of wait. **Conclusion:** This study shows that early operative intervention for ankle fractures reduces the length of hospital stay. Intensive physiotherapy and co-ordinated discharge planning are also essential ingredients for early discharge. We want to emphasise on the ‘Window of Opportunity’ ie initial 12 hours to fix ankle fractures to decrease overall morbidity and cost.