
BOOK OF ABSTRACTS

5TH INTERNATIONAL CONGRESS OF FOOT & ANKLE
MINIMALLY INVASIVE SURGERY

MARRAKECH-MOROCCO, MARCH 21TH, 22TH, 23TH, 2019

A black and white photograph of a woman's lower leg and foot. She is wearing a wide, beaded anklet. Her leg and foot are decorated with intricate, dark henna designs, including floral and geometric patterns. The background is solid black.

5th International
Congress of
Foot & Ankle
Minimally Invasive Surgery

Congress co Presidents
S. Karrakchou
F. Ismael

21-23 MARCH
MARRAKECH
2019

Table of Contents

THURSDAY, 21 March 2019	10
FREE PAPERS (FP1) - Percutaneous Surgery	10
F1- Percutaneous surgery of the forefoot compared with open technique - Functional results comparing two different types of burr motors to open surgery – <i>D Robinson, Y Mustafa, E Heller</i>	10
F2- Metatarsophalangeal instability (MPI): is it necessary to repair the plantar plate (PP)? – <i>M Ulivarri, J Barraza</i>	10
F3- Mini-Invasive Surgery in Treatment of Midfoot and Hindfoot Pathology – <i>M Polliak</i>	11
F4- A Percutaneous Technique in the treatment of grade I and II of Hallux Rigidus – <i>FM Liuni, S Ferranti, L Berni, R Cepparulo, A Guardoli, A Bianchi</i>	12
F5- Brachymetatarsia – results of treatment using distraction osteogenesis and percutaneous techniques, 5-year experience – <i>P Chiomicki-Bindas</i>	12
F6- Percutaneous adductor tendon release (PATR) for Hallux Valgus Surgery: A biomechanical study. – <i>J Del Vecchio, G Cordier, ME Ghioldi, L Chemes, ED Dealbera, M Dalmau Pastor</i> ...	13
F7- Percutaneous Repair of Achilles Tendon Rupture Under Ultrasound Surveillance – new intraoperative visualisation approach with two years follow up – <i>M Wrobel, A Mioduszewski, J Sroczyński, G Klos, J Mazek</i>	14
F8- Surgical treatment of Hallux Valgus through percutaneous technique: a retrospective study with a 6,5 year follow-up – <i>L Lara, LC Torres, FL Rodrigues, JA Grajales</i>	14
F9- Treatment of Haglund’s deformity using the percutaneous technique – <i>A El Kohen</i>	15
F10- Treatment of Heel spur using the percutaneous technique – <i>A El Kohen</i>	15
FREE PAPERS (FP2) - Arthroscopy	16
F11- Arthroscopic cheilectomy and synovectomy associated with percutaneous Möberg osteotomy for hallux rigidus. A 30 cases retrospective study at a mean follow-up of 4 years – <i>J Lebecque, P Lecoanet, M Saur, J Lucas-y-Hernandez, M Dias, T Fabre, O Laffenêtre</i>	16
F12- The effect of a flexor hallucis longus release by posterior ankle arthroscopy on the toe raising test – <i>G Bulstra, P van Kampen, B van Dalen, GM Kerkhoffs</i>	16
F13- Outcomes Achilles Tendoscopy Treatment For Non-Insertional Tendinopathy – <i>A Cuellar Avaroma, AC King Martinez</i>	17
F14- Hybrid Treatment for Hallux Rigidus – <i>AC King Martinez, A Cuellar Avaroma</i>	18
F15- Flexor Hallucis Longus Tenosynovitis Treated By Ankle Endoscopy – <i>A Cuellar Avaroma, AC King Martinez</i>	18

F16- Endoscopic FHL transfer for acute Achilles tendon rupture: A hybrid model of treatment – <i>A Polyzos, K Gkoumousian, I Petrakis, A Eleftheropoulos</i>	19
FREE PAPERS (FP3) - Percutaneous Surgery	20
F17- Surgical treatment of displaced intraarticular calcaneal fractures by a minimally invasive technique using a locking nail: A preliminary study – <i>F Fascione , M Di Mauro, M Guelfi, F Malagelada, A Pantalone, V Salinia</i>	20
F18- Minimally invasive versus open Calcaneal osteotomies - comparing the intraoperative parameters – <i>V Andric, C Jowett, M Kinkelin, C Weber, H Waizy</i>	20
F19- Intra and interobserver reliability of the AFCP classification for second toe deformities – <i>V Darcel, F Lintz, J Beldame, A Bernasconi, M Helix, H Brunel, B Piclet</i>	21
F20- Hallux valgus surgery treatment using the modified percutaneous Reverdin Isham technique – <i>L Lara, LC Torres, G Cervone</i>	22
F21- The Hallux Metatarsophalangeal Capsule: an Anatomic Study with respect to Percutaneous Hallux Valgus Correction – <i>R Cerrato, KM Chin, NS Richardson, JT Campbell, CL Jeng, MW Christian</i>	22
F22- Clinical and radiological outcomes after minimally invasive double osteotomy of the first Metatarsal in the treatment of moderate to severe Hallux Valgus – a retrospective study – <i>G Hochheuser</i>	23
FREE PAPERS (FP4) - Arthroscopy	23
F23- Union rates after arthroscopic triple fusion in a consecutive series of 21 patients (including patients with severe deformity, poor soft tissues and revision procedures) – <i>A Perera</i>	23
F24- Union rates after arthroscopic tibiototalcalcaneal fusion in a consecutive series of 12 patients (including patients with severe deformity, soft tissue problems and revisions) – <i>A Perera, T Portal-Banker, D Ebreo, R Mahoney</i>	24
F25- Arthroscopic tibiototalcalcaneal arthrodesis with locked retrograde nail: A case series – <i>A Polyzos, K Gkoumousian, I Petrakis, A Eleftheropoulos</i>	25
F26- Surgical treatment of post-traumatic osteoarthritis of the metatarso-sesamoidal joint using arthroscopic technique – <i>DC Bobrov, AV Lychagin, TM Amirikah</i>	25
F27- The Potential of Ankle Arthroscopy in Ankle Fractures – <i>P Aragoneses Lopez, G Lopez Hernandez, ML Fernandez Hortiguera, JL Gutierrez Garcia, F Garcia de Lucas</i>	26
CASE REPORTS (CR1) - Percutaneous Surgery & Arthroscopy	27
C1- Arthroscopic Subtalar Arthrodesis In Partial Talocalcaneal Coalition – <i>D Saraiva, A Rodrigues</i>	27
C2- Bilateral Fracture of Os Trigonum: A Case Report and Review of Literatures – <i>P Maneeprasopchoke, C Rungprai</i>	27

C3- The role of arthroscopy in a navicular stress fracture - case study – <i>M Wrobel, A Mioduszewski, J Sroczynski, G Klos, R Swierczynski</i>	28
C4- Role of posterior ankle endoscopy in the resection of tumor lesions: A case report – <i>I Portellano Pascual, D Crego Vita, A Puente Lozano, M Fernandez Gayol, A Gomez Rico, R Garcia Canas, M Hueca Martinez, FJ Areta Jimenez</i>	28
C5- Arthroscopic treatment of sesamoid fracture - case report and literature review – <i>M Wrobel, A Mioduszewski, J Sroczynski, G Klos, R Swierczynski</i>	29
C6- MILAN technique for severe or recurrent bunion deformity – <i>R Ray</i>	29
C7- Salvage DMMO for recurrent metatarsophalangeal instability after plantar plate open repair of the second toe – <i>J Del Vecchio, ME Ghioldi, L Chemes, ED Dealbera</i>	30
C8- Using percutaneous techniques to manage complex forefoot deformities – <i>R Ray</i>	30
C9- Combined Open And Minimally Invasive Surgery For Complex Forefoot Deformity – <i>D Saraiva, A Rodrigues</i>	31
C10- Minimally Invasive Surgery for Neglected Calcaneal Fracture – <i>A Primadhi</i>	32
FRIDAY, 22 March 2019	32
FREE PAPERS (FP5) - Percutaneous Surgery	32
F28- Long terms results of percutaneous Chevron Osteotomy fixed with a cannulated screw – <i>J Gonzalez Ustes, F Parals, X Conesa, E Siles, J Novell</i>	32
F29- Mini open Chevron Akin (MOCA) treatment of hallux valgus – <i>D Kay, B den Hartog, A A Perera</i>	33
F30- Minimally Invasive Chevron Akin (MICA) for Hallux Valgus correction: A consecutive case series – <i>S Sivaloganathan, T Holme, K Kunasingam</i>	33
F31- Hallux valgus surgery treatment using percutaneous Chevron technique – <i>L Lara, LC Torres, G Cervone</i>	34
F32- Percutaneous « Scarf like » and Akin screwless osteotomies for correction of hallux valgus: A clinical and radiographic review of 122 cases – <i>M Elkaim, J Laborde</i>	35
F33- The Role of Relative Metatarsal Length in Metatarsalgia after Percutaneous Correction of Hallux Valgus – <i>FM Liuni, A Fontanarosa, A Guardoli, R Cepparulo, L Berni</i>	35
F34- Treatment of moderate hallux valgus by minimally-invasive chevron : a retrospective study of 60 cases at a 5.6-years average follow-up – <i>M Saur, J Lucas, M Dias, T Fabre, O Laffenêtre</i>	36
F35- Shortening Percutaneous, Intra-articular, Chevron Osteotomy (S-PelCO) for the treatment of hallux rigidus: Preliminary Experience with Seven Cases – <i>J Del Vecchio, ED Dealbera, ME Ghioldi, L Chemes, M Dalmau Pastor</i>	37

F36- Outcome of Proximal Closing Wedge First Metatarsal Osteotomy With and Without Fixation for Moderate to Severe Hallux Valgus – <i>AC King Martinez, A Cuellar Avaroma</i>	37
F37- The FAST Chevron: promising early results – <i>F Leiber-Wackenheim</i>	38
FREE PAPERS (FP6) - Arthroscopy	38
F39- The Arthroscopic all-inside ankle lateral collateral ligament repair is a safe and reproducible technique – <i>M Guelfi, J Vega, F Malagelada, M Dalmau Pastor</i>	38
F40- ATFL tear, ankle sprain, ankle arthroscopy, ATFL repair – <i>M Wrobel, A Mioduszewski, J Sroczynski, G Klos, R Swierczynski, A Boszczyk</i>	39
F41- How to optimize the fibular tunnel trajectory in a combined ATFL and CFL reconstruction? – <i>F Michels, G Matricali, F Stockmans</i>	40
F42- Arthroscopic Deltoid Ligament Repair: Technique and Anatomic Study – <i>J Acevedo, P Mangone</i>	40
F43- All-inside arthroscopic allograft reconstruction of anterior talofibular ligament and calcaneofibular ligament : a study of 50 Patients with 2-year follow-up – <i>G Cordier, J Ovigue</i>	41
SATURDAY, 23 March 2019	41
FREE PAPERS (FP7) - Miscellaneous	42
F44- Arthroereisis in Pediatric Flatfoot – <i>J Mayral Esteban, M Mayral Aguilera, T Lordan Agraz, M Torres Cobacho</i>	42
F45- Postoperative casting after hallux valgus correction with a Reve-L +/- Akin osteotomy: a technical description – <i>L Iselin, H Anwander, G Ganot, MK Ulrich</i>	42
F46- Sinus tarsi approach vs. extensile lateral approach for intra-articular calcaneal fracture – <i>K Methee</i>	43
F47- Ultrasound-guided decompression surgery of the tarsal tunnel: a novel technique for the proximal tarsal tunnel syndrome (Part II) – <i>A Fernandez Gibello, S Moroni, G Camunas, R Montes, M Zwierzina, C Tasch, V Starke, J Sanudo, T Vasquez, M Konschake</i>	43
F48- Ultrasound-guided decompression surgery of the tarsal tunnel: a novel technique for the distal tarsal tunnel syndrome (Part III) – <i>S Moroni, A Fernandez Gibello, G Camunas, R Montes, M Zwierzina, M Konschake</i>	44
F49- Minimally Invasive vs open Scarf osteotomy for hallux valgus correction: Preliminary results – <i>J Torrent, I Clares, E Rabat</i>	44
F50- Treatment of displaced intra-articular calcaneal fractures with the intramedullary nail: results of the first twenty-six cases with two years follow-up – <i>J Lucas, A Fourgeaux, O Laffenêtre</i>	45
F51- Minimally invasive hallux valgus correction with PBS technique – <i>FM Liuni, L Berni, A Fontanarosa, R Cepparulo, A Guardoli, A Bianchi</i>	45

F52- Cost analysis and Revenues comparing Open Chevron and Percutaneous, intraarticular, chevron osteotomy (PeICO) – <i>J Del Vecchio, EA Uzair, M Corradi, D Chan, ME Ghioldi, L Chemes, ED Dealbera</i>	46
FREE PAPERS (FP8) - Arthroscopy	47
F53- Arthroscopic Broström-Gould procedure. A retrospective study of 89 consecutive non-select procedure – <i>J Lebecque, J Ovigue, M Dias, G Cordier</i>	47
F54- Treatment of bone marrow lesions with subchondroplasty – <i>T Dewilde, F Michels, S Clockaerts</i>	47
F55- Arthroscopic Brostrom Technique: clinical and functional outcomes – <i>G Araujo Nunes</i>	48
F56- The Osteochondral lesions of the talus – therapy strategies with a weak evidence – <i>W Hazibullah</i>	49
F57- Previous Ankle Conflict in the Footballer – <i>M Arssi, A Fennane, H Garnaoui, M Rahmi, A Garch</i>	49
F58- Reconstruction of focal osteochondral defects of the talus by arthroscopically-assisted Autologous Matrix Induced Chondrogenesis – <i>FV Sciarretta, P Versari, L Marcellini, E Di Cave</i>	50
F59- Reconstruction of osteochondral lesions of the talar dome with an arthroscopic assisted Biological Inlay Osteochondral Reconstruction (BIOR) technique—Midterm results – <i>M Podsiadlo, H Laprus, W Klön, B Sadlik</i>	50
FREE PAPERS (FP9) - Miscellaneous	51
F60- Spherical metatarsophalangeal implants of the first ray in pyrocarbon HAPY®: series of 18 cases – <i>M Maestro</i>	51
F61- The influence of the ossification centres on the geometry of the calcaneus – <i>B Pombo Ferreira, R Branco, R Silva, F Ferreira, M Areias, P Goncalves</i>	52
F62- Tissue engineered biphasic stratified scaffold in talus articular cartilage and subchondral bone reconstruction– <i>FV Sciarretta, P Versari, E di Cave</i>	52
F63- Metatarsophalangeal joint mobility in minimally invasive hallux valgus surgery – <i>JL Castellini, B Boietti, D Goncalvez, M Khoury</i>	53
F64- Treatment of tarsometatarsal osteoarthritis using basal metatarsal arthroplasty: a retrospective study of 26 cases at a 8-years follow-up – <i>M Dias, J Lucas y Hernandez, T Fabre, O Laffenêtre</i>	53
F65- Pearls and pitfalls of calcaneal ossoscopy – <i>A Toepfer</i>	54
F66- The role of the MetatarsalSesamoidal Joint in hallux valgus pathology – <i>G Bulstra, B van Dalen, J de Poorter, P van Kampen, G Kerkhoffs</i>	54

F67- Comparison of the pain intensity and early functional outcomes after open and percutaneous hallux valgus surgery - prospective randomized control study – <i>H Liszka, M Malczak, A Gadek</i>	55
F68- Adducted Fifth Toe Deformity treated by Minimally Invasive Surgery – <i>C Biz, R Baracco, I Fantoni, G de Guttry, P Ruggieri</i>	55
F69- Our experience in UAE with Minimally Invasive Surgery in Foot & Ankle. Extended clinical applications – <i>M Taba</i>	56
E-POSTERS	56
E-POSTERS - Arthroscopy	56
E1- Peroneal Tendoscopy Through Lateral Portals – <i>D Saraiva, A Rodrigues</i>	56
E2- How to drill the calcaneal tunnel in calcaneofibular ligament reconstruction? – <i>F Michels, H Wastin, K van Compernelle, S Clockaerts, F Stockmans, E Vereecke</i>	57
E3- Arthroscopic findings in patients who underwent surgery for ankle fracture type B and C by Denis Weber – <i>AC King Martinez, A Cuellar Avaroma</i>	57
E4- All-arthroscopic AMIC® (AT-AMIC) in the treatment of osteochondral talar lesion: A Case report – <i>G Araujo Nunes, O de Oliveira Junior</i>	58
E5- Posterior ankle bony impingement: outcome of posterior ankle arthroscopy about 5 cases – <i>Y Saadi, Y Benyass, M Boussouga</i>	58
E-POSTERS - Percutaneous Surgery	59
E6- Percutaneous treatment of a posterolateral calcaneal bump – <i>F Michels</i>	59
E7- Distal metatarsal mini-invasive osteotomy (DMMO): a cadaveric study – <i>F Michels, S Clockaerts, E Matthys, L Baekelandt, K Callens, E Vereecke</i>	59
E8- Surgery of hallux valgus by SCARF without osteosynthesis – <i>M Yahyaoui, M Benhammou, S Aharram, J Amghar, O Agoumi, A Daoudi</i>	60
E9- Short-Term Outcomes of First Metatarsophalangeal Joint Hemiarthroplasty in Hallux Rigidus – <i>S Harrington, R Gul, J Hepburn</i>	60
E10- Interest of the percutaneous screwing of the tibial pilan about 4 cases – <i>EM Sabri</i>	61
E11- Tibiotalar Dislocation, about a rare case – <i>EM Sabri, L Otmani, R Fekhaoui, R Bassir, HM Boufettal, H Ait Benali, M Kharmaz, MO Lamrani, A Elbardouni, Mahfoud, MS Berrada, N Oubidar, P Palmari</i>	62
E12- Subtalar dislocation with Hawkins' type I talar fracture : Case report and literature review – <i>M Nassiri, A Chaoui, M Madhar, H El Haoury, R Chafik, Y Najeb</i>	62

E13- Minimally invasive internal fixation of calcaneal fractures using a locking nail – <i>A Pantalone, F Fascione, M Di Mauro, M Guelfi, F Malagelada, V Salini</i>	63
E14- The sinus tarsi approach in calcaneal fractures. A case report – <i>P Aragonese Lopez, G Lopez Hernandez, P Bustos Bedoya, A Sutil Blanco</i>	63
E15- Percutaneous tenorrhaphy of acute ruptures of the calcanea tendon in athletes with minimal cost – <i>M Yahyaoui</i>	64
E-POSTERS - Miscellaneous	65
E16- Contribution of gait analysis in bilateral spastic feet: a case report – <i>Y Habdelfettah</i>	65
E17- Kinematics of unilateral spastic foot: a case report – <i>Y Habdelfettah</i>	65
E18- Medial proximal elongation of Gastrocnemius and percutaneous section of Plantar Fascia in patients with chronic Achilles Tendinopathy and Plantar Fasciitis – <i>F Parals Granero, X Gonzelez Ustes, X Conesa Munoz, J Novell Alsina</i>	66
E19- Histologic characteristics of the arciform fibers – <i>F Michels, J Batista, D Quintero, JJ Del Vecchio</i>	66
E20- The lateral fibulotalocalcaneal complex of the ankle: Intra-articular connecting fibers – <i>M Dalmau Pastor, F Malagelada, J Vega</i>	67
E21- Application of minimally invasive surgery as a definitive solution in hard management of pathological foot – <i>C Lopez Munoz, D Gallach Sanchis, V Garcia Martin, LE Hernandez Castillejo</i>	67
E22- The interest of radial shock wave therapy in foot diseases: about 11 cases – <i>Y Abdelfettah</i>	68
E23- Foot and ankle disorders in an obese population – <i>AC King Martinez, A Cuellar Avaroma</i>	68

FREE PAPERS (FP1) - Percutaneous Surgery

F1- Percutaneous surgery of the forefoot compared with open technique - Functional results comparing two different types of burr motors to open surgery – *D Robinson, Y Mustafa, E Heller*

Introduction: The use of percutaneous surgery is currently very common in foot and ankle surgery. It is not clear whether use of these technique requires specialized high torque motors or could be safely performed using standard orthopedic motors.

Methods: The current study describes the results of 287 patients followed for a period of up to 6 months, to assess the surgery related pain, complications and patient satisfaction. Data was prospectively collected. The study was not randomized due to ethical concerns. Older patients can only be operated on percutaneously due to poor wound healing capacity. Thus, higher risk cases (diabetics and impaired blood flow) were allocated to the percutaneous surgery groups. 112 patients operated using a conventional open technique were compared to 118 patients treated using a percutaneous technique with a standard orthopedic motor and 57 patients treated by the MICA dedicated system (Wright Medical; Figure 1). A major concern regarding percutaneous surgery is possible thermal damage to tissue due to heating up of the burrs. This was measured both directly at the burr tip and in the surrounding tissues using digital thermography (FLIR C2 sensitivity was 0.1 C°). Numerical Rating Scale (NRS) pain score was recorded pre-op, at 3 days, 7 days, 6-weeks and 6-months post-op. Global patient impression of change score was recorded at 6 weeks post-op. FAOS scores were recorded pre-op and at 6-months post-op.

Results: Both surgical motors, generate some heat during osteotomy. The tissue temperatures during surgery did not reach dangerous levels (Figure 2) though it was higher than open-surgery tissue-temperatures. There is significantly less pain using the percutaneous techniques relative to the open technique during the first 6 post-operative weeks (Figure 3 shows the NRS values at 3 days post-op). PGIC was superior in both percutaneous groups to the open surgery group at 6-weeks (Figure 4). The 6 months FAOS score is similar in all groups. Complications are rare in any of the groups, with a significantly higher ASEPSIS score in the open surgery group (Figure 5).

Discussion: In conclusion, percutaneous forefoot surgery appears safe and efficacious, whether performed using a dedicated system or standard orthopedic motors. Due to less post-operative pain, and less infection risk in percutaneous surgery, it appears that percutaneous techniques are superior to open surgery in the immediate post-operative period and as efficacious in the medium term. The choice of motor used, does not seem to influence the results as long as low speed is used.

F2- Metatarsophalangeal instability (MPI): is it necessary to repair the plantar plate (PP)? – *M Ulivarri, J Barraza*

Introduction: Is it necessary to repair the lesions of the Plantar Plate? To answer this question, we must distinguish two different etiopathogenic situations: 1) A traumatic acute injury on a healthy PP. There, in most cases, its repair is indicated, which is beyond the reach of Percutaneous Surgery (PS). 2) A chronic and progressive deterioration of the PP due to metatarsal heads overload, leading to a MPI. The aim of this study is to determine whether PS, acting on the causes, can stabilize the Metatarsophalangeal Joint (MFJ) without repairing the PP.

Material and Methods: Level IV of evidence, retrospective case series. A search was made on all patients operated between 2009 and 2017 with PP lesions due to overload, Coughlin stages, III,

IV, V and VI. Exclusion criteria: Traumatic injuries and Rheumatoid Arthritis. There were 365 feet (305 patients) operated in this period, but only 132 could be evaluated. Average follow-up 4.6 years (1 to 8). Distribution: Stage III: 51 feet. Stage IV: 23 feet. Stage V: 15 feet. Stage VI: 43 feet. Female 78%, male 22%. Average age: 62. In all cases there were radiological and photographic records, as well, a pre-operative clinical examination. A clinical and radiographic examination was performed on all patients and the following items were taken to evaluate the results: 1) MPI (persistence or recurrence of subluxation or dislocation). 2) Persistent, recurrent or transfer Metatarsalgia (MTT) 3) Patient satisfaction (PS). 4) Complications: Floating toe. Stiffness. Pseudoarthrosis. Delayed union was not taken as a complication. The constant surgical gesture was Distal Metatarsal Mini Invasive Osteotomy (DMMO) of the three central and shortening osteotomy of the first phalanx in most cases. In patients Stage VI, surgical gestures for the correction of hallux valgus was associated. Tenotomies and capsulotomies were done in Stages V and VI with cross over toe.

Results: Stage III. Stable MPJ: 51 feet (100%). MTT: 2 feet (3,92%). PS: Between highly satisfactory and satisfactory: (88.2%). Somewhat satisfactory: (9.8%). Unsatisfactory: (1.9%). Stage IV. Stable MPJ: 45 feet (100%). MTT: 1 (2.2%). PS: Between highly satisfactory and satisfactory: (93.3%). Somewhat satisfactory: (6.7%). Unsatisfactory: (2.2%). Stage V. Stable MPJ: 11 feet (73.3%). MTT: 1 (6.6%). PS: Between highly satisfactory and satisfactory: (80%). Somewhat satisfactory: (13.3%). Unsatisfactory: (6.7%). Stage VI. Stable MPJ: 50 feet (94.3%). MTT: 5 (4,06%). PS: Between highly satisfactory and satisfactory: (88%). Somewhat satisfactory: (8.2%). Unsatisfactory: (3.8%). GENERAL COMPLICATIONS: Floating toe: 4 cases (3%). Severe stiffness: 5 cases (3.78%). Asymptomatic pseudoarthrosis: 3 cases (2.27%). Symptomatic pseudoarthrosis: 2 (1,51%).

Conclusion: Percutaneous Surgery is efficient in treating the MFI. Long-term follow-ups show that the MPJ remains stable without needing to repair the PP.

F3- Mini-Invasive Surgery in Treatment of Midfoot and Hindfoot Pathology – M Polliak

Introduction: Minimizing the risks of foot surgery and improving aesthetic results through the evolution of surgical techniques for the reconstruction of midfoot and hindfoot deformities.

Material and methods: Our retrospective study included 17 adult patients, predominantly females, with cavovarus and planovalgus deformities (19 feet). Their body mass index varied; however, overweight and obese patients prevailed. Eleven patients had been operated on in childhood, 3 had posttraumatic deformity, rheumatoid arthritis – 1, idiopathic form - 3. In 7 cases we performed open surgery, in 11 – mini-invasive surgery (MIS), and in 1 – hybrid (open + MIS). After open surgery we used plaster cast; after MIS surgery - taping and orthosis fixation. In 16 cases we used triple arthrodesis with or without frontfoot reconstruction, achilloplasty and plantar fascia tenotomy; one case required reduction of neglected luxation with arthrodesis, another one - supramalleolar osteotomy, and still other one – calcaneal osteotomy.

Results: The patients were followed up for 1 to 7 years, and the long-term results of treatment were assessed using Maryland Foot Score (MFS), X-ray (Hibbs and Meary's angles and calcaneal pitch). All results were found positive in comparison with the preoperative condition.

Conclusion: Our study was not intended to compare the results of open and MIS methods. Our results give grounds to recommend MIS for foot reconstruction for the following advantages: no need for vascular tourniquet (to prevent complications); minimal invasiveness of surgery (2-3 mm long incisions); ability to reconstruct all parts of the foot during one session; reduction of

inflammation risks and prevention of marginal necrosis (+-0%); decrease in the number of bandaging (1-2 before suture removal); better aesthetic results.

F4- A Percutaneous Technique in the treatment of grade I and II of Hallux Rigidus – FM Liuni, S Ferranti, L Berni, R Cepparulo, A Guardoli, A Bianchi

Introduction: In recent years, new techniques have been emerging for the percutaneous treatment of symptomatic hallux rigidus. While percutaneous cheilectomy already has a defined role in literature, only a few studies have shown functional outcomes after osteotomies with minimally invasive techniques. In this study, we have analyzed the preliminary data after a percutaneous osteotomy of the first metatarsus in the treatment of hallux rigidus.

Material and methods: A clinical and radiographic retrospective analysis was performed on 32 patients (10 men and 22 women) with grade I and II of hallux rigidus, with ages ranging from 21 to 84 years, the average being 56.9. Surgical treatment involved a dorsal cheilectomy of the first metatarsus and proximal phalanx and a percutaneous extracapsular osteotomy with a dorsal base wedge of the first metatarsus head. The average follow-up time was 18 months, time ranging from 8 to 24 months. Patients were assessed with AOFAS score, VAS scale and weight-bearing radiographs.

Results: The AOFAS increased from 22 points at the preoperative assessment to 85 at the last follow-up. The preoperative VAS of 7.3, was reduced to 2.2 at the last follow-up. In all cases, the Rx control showed the consolidation of the osteotomy. 31 patients out of 32 said they were completely satisfied with the operation. No complications were reported.

Conclusion: The preliminary data which was reported highlights the optimal results of this percutaneous technique in terms of clinical outcome and patient satisfaction. Patients have also shown, in almost all cases, a remission of the symptoms at the last follow-up. The percutaneous approach leads to a number of advantages such as immediate weight-bearing associated with almost absent pain, a faster recovery of daily activities and a low incidence of complications. This percutaneous technique, pending further clinical and functional data, could represent a valid alternative to open techniques in the treatment of grade I and II of hallux rigidus.

F5- Brachymetatarsia – results of treatment using distraction osteogenesis and percutaneous techniques, 5-year experience – P Chiomicki-Bindas

Introduction: Brachymetatarsia is a rare congenital or developmental condition of unclear etiology, that results in a short metatarsal. Accompanying phalangeal shortening is also commonly observed. The main complaint is cosmetic problem, but pain and shoe conflict can also be reported. The study presents single surgeon 5-year experience in treatment of this condition.

Material and methods: Percutaneous metatarsal osteotomy with gradual distraction was used in treatment of brachymetatarsia. Retrospective analysis of records of patients who underwent minimally-invasive surgery for this conditions between December 2013 and September 2018 was performed. Data concerning distraction, outcome, and complications were recorded.

Results: There were 16 patients, all females, with a total 22 distractions. In 11 patients there was shortening of the 4th metatarsal (bilateral in 6 cases), in 5 patients of the 3rd metatarsal.

Preoperative foot pain was reported by some patients with shortening of the 3rd metatarsal. In all patients but one the planned lengthening of the metatarsal was achieved. No infection or pseudarthrosis was noted. In 3 cases delayed radiological consolidation was observed. In two cases secondary surgery needed to be performed in order to improve the result.

Conclusion: Treatment of brachymetatarsia using percutaneous osteotomy and distraction osteogenesis is an effective method to restore the length of the metatarsal, even in shortening exceeding 2 cm. Minimally-invasive technique diminishes the risk of severe complications and gives good cosmetic result. The method is not as easy as it could seem, requires meticulous surgical technique, quick reaction in case of common problems during and after distraction and full compliance of the patient.

F6- Percutaneous adductor tendon release (PATR) for Hallux Valgus Surgery: A biomechanical study. – J Del Vecchio, G Cordier, ME Ghioldi, L Chemes, ED Dealbera, M Dalmau Pastor

Introduction: Hallux Valgus is a common deformity affecting the first toe. Lateral release consists on a tenotomy of the adductor muscle with/without the release of other lateral structures of the first metatarsophalangeal joint, is one of the commonly used procedures for soft-tissue correction. There is a great discussion about which structures should be released and which ones not associated with a generalized confusion of the anatomical terminology of the region. The aim of the study was to analyze biomechanically varus correction power using percutaneous adductor tendon release (PATR) for the treatment of hallux valgus.

Material and methods: Eleven cadaveric feet with moderate hallux valgus deformity was used. PATR were performed by a surgeon with an extensive experience in percutaneous techniques for Hallux Valgus. PATR technique: a 4mm incision is made on the first web space at the level of the first metatarsophalangeal joint, which is localized using radiofluoroscopy. Blade is advanced with an orientation of 60° until a quarter of the blade is inside the joint. At this point, the blade is turned 90° to the lateral aspect of the joint to face the adductor tendon, which is then cut with a frontal movement of the blade, while the first toe is driven into varus. The following measurements (Angular correction angles) were made and the results were compared with each other (all x-rays were made with weightbearing with a special device): AP view (1), AP with manual varus stress (2), 1kg -1 newton- varus stress (3), postoperative (POP) manual varus stress (4) and POP 1 kg varus stress (5). Statistical analysis was performed using Mann Whitney and t-test with R language version 3.4.3. A P value of less than .05 was considered to be statistically significant.

Results: The average main differences are the following: Between 1 and 2 was 19,95 degrees (p 0.007); between 2 and 3 was -0,04 (p 0.0332); between 3 and 5 was 9 (p 0.41); between 1 and 3 was 19,9 (p 0.007); between 1 and 4 was 34,62 (p 0.71); between 1 and 5 was 28,9 (p 0.27) and between 2 and 4 was 14,66 (p 0.042).

Conclusion: In the published studies, a question remains unanswered: knowing what we should release from soft tissue as a complementary procedure to osteotomies. This study showed that PATR is powerful (performing isolatedly) to correct the valgus metatarsophalangeal joint when treating hallux valgus deformity. It seems that we should not continue with lateral release if we have correctly done the PATR. To date there is no study that addresses this issue.

F7- Percutaneous Repair of Achilles Tendon Rupture Under Ultrasound Surveillance – new intraoperative visualisation approach with two years follow up – *M Wrobel, A Mioduszewski, J Sroczynski, G Klos, J Mazek*

Introduction: Open repair of ruptured Achilles tendon is a standard procedure, however complications may occur due to extensive approach, especially in older patients with general conditions. Different systems for minimally invasive procedures were introduced to the market but the risk of damaging sural nerve was pointed out. Aims: We developed percutaneous repair of Achilles tendon rupture under ultrasound surveillance and assessed safety and results of the procedure, comparing to a matched group of patients who underwent open repair.

Material and methods: Between May 2011 and September 2018 we performed 23 percutaneous procedures, and 34 open procedures. The tendons were repaired with non-absorbable suture loop passed through the tendon tissue below and above rupture through the skin with elastic needle under direct ultrasound visualization. We analyzed results of patients with minimally 2 years follow up (30 open and 18 percutaneous procedures). Some of patients from percutaneous group were also burden with diabetes, cardiac diseases, psychiatric disorders and thrombocytopenia, which are confirmed contraindications for open approach. We qualified for treatment only acute ruptures (up to 12 days).

Results: We assessed function of repaired tendon in clinical examination and ultrasound exam 6 weeks and three months after surgery. Also AOFAS score and - retrospectively EQ5 scores were used. 16 of 18 patients healed tendon without complications. In one case conversion to open surgery was necessary as patient experienced another trauma in postoperative period. In one case deep infection occurred three months after the surgery, requiring open revision and debridement of the tendon. Another patient reported persisting pain due to suture conflict with soft tissues. Release of the suture was necessary six months after surgery. There was no sural nerve entrapment nor any skin healing problems. AOFAS score raised from 57,8 to 92,8 three months after surgery and was comparable to open procedure.

Conclusion: Percutaneous repair of Achilles tendon rupture under ultrasound surveillance is minimally invasive and effective method of treatment of acute ruptures. It is safe and allows to avoid both sural nerve entrapment and skin healing problems. However, it requires some experience with ultrasound diagnostics. The results of tendon healing and patients satisfaction are similar to open surgery, but with lower complication rate.

F8- Surgical treatment of Hallux Valgus through percutaneous technique: a retrospective study with a 6,5 year follow-up – *L Lara, LC Torres, FL Rodrigues, JA Grajales*

Introduction: To analyse clinically and radiographic study the results of hallux valgus surgical treatment, using Reverdin-Isham percutaneous technique.

Material and methods: We evaluated retrospectively 43 feet in 38 patients with mild to moderate hallux valgus, between June 2009 and July 2018. The mean age was 59 years and the mean post-operative follow up was 79 months. All patients submitted to Reverdin modified by Isham technique were evaluated before and after surgery using the American Association Orthopaedic Foot and Ankle Society (AOFAS) score. We measured the hallux valgus angle (HVA) through radiographic studies, intermetatarsal angle (IMA) and the distal metatarsal articular angle (DMAA).

Results: The AOFAS score had an average increase of 55 points. The AHV decreased on average 14°, the AIM 3°, and the AADM 9°. The median shortening of the first metatarsal bone was 0,3cm.

Conclusion: The present surgical technique enabled the hallux valgus deformity to be corrected, showing good angular correction and significant increase of AOFAS score.

F9- Treatment of Haglund's deformity using the percutaneous technique – A El Kohen

Objectives: The aim of this study is to report a different technique of treatment of Haglund's deformity using percutaneous exostosectomy for painful prominence and bursitis of the posterolateral aspect of the calcaneus. Objectives are the same as those of open surgery by reducing the volume and removing all the exostosis.

Methods: Achievement of mini approche by one percutaneous incision and using of specific material and fluoroscopy.

Results: Results were very good after clinical and radiological evaluation and comparable to those of open surgery but with the advantages of percutaneous surgery.

Conclusion: MIS surgery is less aggressive, practicable in ambulatory. Perfect codifications of the indications. Very long learning curve. Courses on cadaver lab are very important. Mentoring is desirable.

F10- Treatment of Heel spur using the percutaneous technique – A El Kohen

Objectives: The aim of this study is to report a different technique of treatment of heel spurs using percutaneous osteotomy for severe and painful heel. Objectives are the same as those of open surgery by reducing the volume and removing all the spur and plantar fasciotomy is often associated.

Methods: Achievement of mini approach by one percutaneous incision and using of specific material and fluoroscopy.

Results: Results were very good after clinical and radiological evaluation and comparable to those of open surgery but with the advantages of percutaneous surgery.

Conclusion: MIS surgery is less aggressive, practicable in ambulatory. Perfect codifications of the indications. Very long learning curve. Courses on cadaver lab are very important. Mentoring is desirable.

FREE PAPERS (FP2) - Arthroscopy

F11- Arthroscopic cheilectomy and synovectomy associated with percutaneous Möberg osteotomy for hallux rigidus. A 30 cases retrospective study at a mean follow-up of 4 years – J Lebecque, P Lecoanet, M Saur, J Lucas-y-Hernandez, M Dias, T Fabre, O Laffenêtre

Introduction: The association of a proximal phalanx extension osteotomy and an open cheilectomy, which was described by Möberg, provides good results for patient with hallux rigidus grade 1 or 2. This conservative treatment can be performed in patients with a short first ray when Weil osteotomy cannot be used. This technique has been described in percutaneous approach under fluoroscopic control. However, synovectomy is not realized. The aim of this study was to describe the combination of arthroscopic and percutaneous surgery for hallux rigidus and its results.

Material and methods: Thirty feet in 28 patients (6 men and 22 women, mean age 59 years, 36-78) with Coughlin grade 1, 2 or 3 hallux rigidus were treated with an arthroscopic and percutaneous procedure. Grade 4 of Coughlin and hallux valgo-rigidus were excluded. The primary endpoint was AOFAS score. The range of motion of the first metatarsophalangeal joint and the complication rate was also analyzed. Mean follow-up was 48 (12-96) months.

Results: Mean AOFAS score increased from 59 preoperatively to 84 at final follow-up. Mean range of motion's change was not statistically significant (54° to 56°), mean dorsal flexion of first metatarsophalangeal joint was 4° . We have not reported septic complication, delayed wound healing or neurological complication. One patient needed a first metatarsophalangeal joint fusion at 6 months.

Conclusion: This percutaneous and arthroscopic technique can provide a similar pain relieve as open technique with a lower rate of complications. Benefits of arthroscopy are a direct control of the cheilectomy; furthermore it allows a synovectomy and a wash of the joint. Level of Evidence: Level IV, retrospective case series.

F12- The effect of a flexor hallucis longus release by posterior ankle arthroscopy on the toe raising test – G Bulstra, P van Kampen, B van Dalen, GM Kerkhoffs

Introduction: The windlass mechanism is unique in human bipedal locomotion. It is still unclear how the different structures that elevate the medial longitudinal arch contribute to this mechanism. Although the plantar aponeurosis is considered to be of one of the most important structures to contribute to the windlass mechanism, other authors have discussed the role of tendons in the windlass mechanism. We hypothesized that the flexor hallucis longus has an influence on the toe raising test and is involved in the change of the distance between the calcaneus and the first metatarsal head during this test. And additionally could have an influence on the windlass mechanism.

Material and methods: Using the toe-raising test, in which the examiner manually dorsiflexes the hallux while the patient stands in a relaxed double-limb position, the difference in distance between calcaneus and the first metatarsal head was measured on mm graph paper, in 3 groups. Group 1 N=33 with a functional hallux limitus, group 2 N=47 following an arthroscopic release of the flexor hallucis longus (FHL) and group 3 N=31 control group with healthy individuals without

foot complaints.

Results: Additional post hoc analyses showed a significant difference between the functional hallux limitus group and after FHL release group ($p = .001$), between the functional hallux limitus group and control group ($p = .001$) and between the after FHL release group and control group ($p = .012$).

Conclusion: The results show a significant difference in the distance between the three groups. This supports the hypothesis that the FHL has an influence in the outcome of the toe raising test. When the FHL is stuck in the fibro-osseous channel of the functional hallux limitus group, it has a negative effect on the windlass mechanism. Hence, it might be interesting to open the debate about the structures who are involved in the windlass mechanism, and in which way tendons, especially the FHL contribute to that.

F13- Outcomes Achilles Tendoscopy Treatment For Non-Insertional Tendinopathy – A Cuellar Avaroma, AC King Martinez

Introduction: The purpose of this study was to assess the outcome of Achilles tendoscopy in patients with diagnosis of non insertional tendinopathy. Background: Pain in the Achilles tendon is a common problem and can occur anywhere along the length of the tendon. It can be associated with enthesopathy or retrocalcaneal bursitis at the calcaneal insertions site (insertional tendinopathy) and the pain in the mid-portion of the tendon can be associated with tendon thickening, degeneration and or swelling (non insertional tendinopathy). Endoscopic debridement has shown good outcomes, ranging from 72 to 97% excellent or good results, for experienced arthroscopic surgeon with minimal complications rates.

Material and methods: : We studied 10 patients that underwent a Achilles tendoscopy procedure during the period between 2014 to 2016, with the diagnosis of Achilles non insertional tendinopathy. All patients were classified accordingly to AOFAS scores for ankle pathology, VAS for pain. We measured patient satisfaction to the procedure according to the Linkert scale.

Results: The average follow-up was 38 months. The average age of our patients was 46.60 ± 15.45 years. We had 5 male (50%) and 5 female (50%) patients. 4 rights (40 %) and 6 lefts (60%). The average preoperative Visual Analog Scale of pain (VAS) 7.10 ± 1.37 and postoperative was 1.40 ± 0.51 . The average preoperative AOFAS scores of 75.20 ± 5.30 improved to 98.50 ± 1.58 . Our patients used an ambulatory suropodal immobilization for an average of 17.41 ± 2.36 days with total weight bearing at 2 weeks. They returned to their sports activities at same level an average of $4.16 (\pm 1.27)$ months. Our patients rated their personal satisfaction as very satisfied in 7 cases (70%), satisfied 3 cases (30%), regular satisfaction in 1 case (3.2%). One patient presented with 3 months of pain in the postoperative period which resolved with physical therapy.

Conclusion: The non-insertional Achilles tendinopathy diagnosis is mainly clinical, it is greatly associated with tendon thickening, and poor tissue vascularity. It has a strong repercussion in the sports activities patients. The tendoscopic treatment is an ideal treatment option for this pathology as it presents a good postoperative recovery with a swift return to patient's preoperative sports activities with few complications.

F14- Hybrid Treatment for Hallux Rigidus – AC King Martinez, A Cuellar Avaroma

Introduction: Hallux rigidus, is a common and disabling source of foot pain in adult populations. Hallux rigidus is characterized by diseased cartilage and large periarticular osteophytes that results in a stiff and painful joint. A number of surgical options exist for the treatment of hallux rigidus which include dorsal cheilectomy, dorsal wedge osteotomy, arthroplasty even arthrodesis. As arthroscopic techniques have improved for small joints, they have emerge as a useful tool to address hallux MTP joint pathologies, including the hallux rigidus.

Material and methods: : We studied 14 patients with Hallux rigidus that underwent a procedure that consists in Metatarsal phalangeal arthroscopy associated with percutaneous closing wedge osteotomy of the metatarsal and proximal phalange, during the period between 2013 to 2016. All patients were classified accordingly to AOFAS scores for hallux, VAS for pain. The articular mobility of the first toe was measured before and after the procedure. We also measured patient satisfaction according to a Linkert scale.

Results: The minimal follow-up was 12 months. The average age of our patients was 48 years. We had 4 male (28.6%) and 10 female (71.4.%) patients. 6 rights (42.8 %) and 8 lefts (57.2%). The average Visual Analog Scale of pain (VAS) was 8.21 preoperative and 1.53 postoperative. The average preoperative AOFAS scales of 50.78 riced to 87.46 at the longest follow-up. Our patients used a postoperative shoe for an average of 19.45 ± 2.66 days. The mobility of the first toe was preoperative: dorsal flexion 16.07° and plantar flexion was 11.78° at follow-up the mobility improved to 24.23 and 19.63 degrees respectively. Our patients rated their personal satisfaction as very satisfied in 7 cases (50 %), satisfied 7 cases (50%). One patient had a edema for three months as the most sever complication in the series.

Conclusion: The hybrid procedure is an effective treatment for Hallux rigidus it controls pain and improves the range of motion of the first MTT-F joint. The technique minimizes dissection of the soft tissue envelope and provides visualization of the entire joint to assess and address concomitant pathologies. The Hybrid technique is an ideal treatment as it presents a good postoperative recovery with a swift return to patients preoperative daily activities.

F15- Flexor Hallucis Longus Tenosynovitis Treated By Ankle Endoscopy – A Cuellar Avaroma, AC King Martinez

Introduction: Chronic pain on the posterior portion of the ankle is often due to posterior impingement between boney of soft tissue structures. The tenosynovitis of the flexor hallucis longus tendon can be caused by chronic entrapment of the tendon inside its sheath in overuse in ballet dancers and soccer players. The presence of an os trigono or a prominent posterior apophysis of the talus can produce this impingement.

Material and methods: We studied 31 patients that underwent a posterior ankle endoscopic procedure during the period between 2012 to 2015, with the diagnostic of Flexor hallucis Longus tenosynovitis . We analyzed variables such as: sport, level of sports activity according to CLAS classification, return to sport. All patients were classified accordingly to AOFAS scores for ankle pathology, VAS for pain. We measured patient satisfaction to the procedure according to the Linkert scale.

Results: The average follow-up was 24 months. The average age of our patients was 35.13 ± 10.68 years. We had 21 male (67.7%) and 10 female (32.2.%) patients. 17 rights (54.8 %) and 14 lefts (45.2%). The average preoperative Visual Analog Scale of pain (VAS) 7.16 and postoperative was 2.16. The average preoperative AOFAS scales of 76.39 ± 5.06 riced to 97.10 ± 3.78 . Our

patients had their ankles immobilized for an average of 19.45 ± 2.66 days. They returned to their sports activities at same level an average of $4.6 (\pm 1.27)$ months. Our patients rated their personal satisfaction as very satisfied in 21 cases (67.7%), satisfied 9 cases (29.0%), regular satisfaction in 1 case (3.2%). One patient developed a pain for four month that was resolved with physical therapy and one patient had a wound erythema in a portal.

Conclusion: The Flexor Hallucis Longus tenosynovitis is a pathology which diagnostic is mainly clinical, is greatly associated with an impingement with an os trigono or a large Stieda process. It has a strong repercussion in the sports activities of the patients. The endoscopic treatment is an ideal treatment option for this pathology as it presents a good postoperative recovery with a swift return to patients preoperative sports activities.

F16- Endoscopic FHL transfer for acute Achilles tendon rupture: A hybrid model of treatment – A Polyzos, K Gkoumousian, I Petrakis, A Eleftheropoulos

Introduction: To present our early results after using this modified endoscopic - hybrid technique for the treatment of acute Achilles tendon ruptures.

Material and methods: Between 2014 and 2018, 17 patients with acute Achilles tendon ruptures were admitted in our department. 11 males and 6 females with a mean age of 47 years (24 to 78). Patients with co-morbidities like obesity and diabetes mellitus were not excluded. The diagnosis was established using clinical and imaging tests, like Squeeze test and Magnetic Resonance Imaging(MRI). All patients underwent a hind foot endoscopy including an endoscopic inspection and identification of the acute Achilles tendon rupture. The Flexor Hallucis Longus(FHL) tendon was identified, was harvested (endoscopically), and got prepared. Under fluoroscopic and endoscopic guidance the stump of FHL was transferred to os calcis just proximal and medial to Achilles tendon insertion. It was transfixed in a 6-7 mm intraosseous tunnel using a 7-8 mm bioabsorbable screw, with the foot in full plantar flexion position. The end to end approximation of Achilles tendon stumps was checked endoscopically and a below knee back slab was positioned for two weeks time. An aggressive physio program was undertaken as soon as the cast was removed. Partial weight bearing started in 2/52 time postoperatively and full weight bearing in 4/52 time post-op, with the use of a removable below knee boot. Using ultrasound and/ or MRI the healing process of Achilles tendon was checked the 4th, the 6th, the 8th and the 12th-week postoperatively.

Results: : No major complication like wound infection or failure of the tendon transfer was recorded. Healing of the ruptured Achilles tendon was achieved in all cases. All the patients return to their normal daytime activities after 8 to 10 weeks time. Single heel rise was achieved after 4 months time. Sporting activities were allowed after the 5th month postoperatively.

Conclusion: The use of FHL tendon as an "internal spring", it seems that inspire the patients and the physio team and gives them more confidence regarding the approximation of the Achilles tendon stumps. All patients declared that they could control their ankle easily and confidently immediately after the endoscopic reconstruction just as they could before the rupture. The satisfaction rate was high, even in the young population.

FREE PAPERS (FP3) - Percutaneous Surgery

F17- Surgical treatment of displaced intraarticular calcaneal fractures by a minimally invasive technique using a locking nail: A preliminary study – *F Fascione, M Di Mauro, M Guelfi, F Malagelada, A Pantalone, V Salinia*

Using as a springboard the fact that thalamic fractures of the ankle oftentimes are complex fractures—hence, difficult to reduce, even with the help of a plaque and experience—and that open reduction and internal fixation is a practice with still some complications on soft tissues, as Sanders himself has asserted (11% of cutaneous necrosis), we have tried to find an alternative route to the plaque in order to tackle this type of fracture. What led us to want to use and then use more and more CALCANAIL was surely its good external and intra-focal reduction of the nail. Furthermore, studies on this subject matter have compared the bio-mechanic stability of the plaques with nail stability have found differences in the synthesis used. What we think is important for the final office and radiographic result is surely the good reduction of the back sub-talar surface and the restoration of Böhler's angle, since most of the weight is placed on this surface. Another study has also demonstrated that, even though the back sub-talar surface and Böhler's angle are raised, the articular, cuboid-calcaneus surface in compressed fractures (20) is restored as well. Nevertheless, should there be a need, this method allows physicians to intervene with a mini-access procedures even in cuboid-calcaneus surfaces. In patients with tongue-type fractures of the back tuberosity, we have placed a compressed screw on the fragment so that it traverses the body of the screw. We would like to highlight here the fact that, once this technique is mastered, surgery lasts less than an hour. This is particularly important in complex fractures, as in the case of articular thalamic calcaneal fractures. Additionally, it also reduces the chance of complications resulting from early and late infections. This system allows the reduction more than an external instrument and the deperiostization of the fragments, thus avoiding the emptying of the hematoma caused by the fracture; hence, it protects all the biological factors that contribute to the healing of the fracture. Based on our experience, including in patients with poor cutaneous conditions (type II and II Tscherne), CALCANAIL since there will be little or limited skin access. We believe that CALNAIL should be used in thalamic Sanders II and II type fractures. The results in the office and radiographic follow-ups do not depend on the type of fracture, but rather, on the type of reduction obtained. In the case of Sanders IV type fracture, whereby the sub-talar surface has already been hit by severe arthrosis, this nail gets the same results of a surgical instrument in tacking acute arthrodesis.

F18- Minimally invasive versus open Calcaneal osteotomies - comparing the intraoperative parameters – *V Andric, C Jowett, M Kinkelin, C Weber, H Waizy*

Introduction: The calcaneal osteotomy is often performed as one of a number of procedures to correct a symptomatic hindfoot deformity. Traditionally the operation has been carried out through an open approach. More recently minimally invasive techniques have been described with promising clinical outcomes. In a prospective study we compared these two techniques for fluoroscopic and operating time as well as radiation dose, which has not previously been reported.

Material and methods: 60 consecutive patients having had a calcaneal osteotomy and a minimum follow up of 12 weeks were included. 33 (55%) patients were treated with an open osteotomy and 27 (45%) with MICO. There were no significant differences between the groups. Each osteotomy was performed in conjunction with another procedure on the same foot. We recorded the following intraoperative parameters: operation time for the osteotomy (incision to suture) in minutes [min], the fluoroscopy time in milliseconds [ms], the fluoroscopy dose [cGycm²] and the skin incision in millimetres [mm]. The clinical (FAOS) and radiological outcome were

examined 6 and 12 weeks postoperatively and also 6 and 12 months postoperatively. The Wilcoxon test and the continuity correction were used to compare data of the two surgical techniques and $\alpha=5\%$ value for the statistical significance.

Results: The minimally invasive group showed a significantly shorter operation time ($p=0,024$). There was no significant difference between the radiation time and dose in the two groups. The length of the incision in the minimally invasive group was significantly shorter ($p=0,001$). We found no difference in clinical outcome and radiological follow up.

Conclusion: This study reports a significantly shorter operating time and a shorter incision in the MICO group. The radiation exposition was not significantly different between the two groups. A clinical difference could not be shown in our study. Larger study groups are required to investigate this further. However, we see the shorter operating time of the minimally invasive calcaneal osteotomy being beneficial.

F19- Intra and interobserver reliability of the AFCP classification for second toe deformities – V Darcel, F Lintz, J Beldame, A Bernasconi, M Helix, H Brunel, B Piclet

Introduction: The French Association of Foot Surgery (AFCP) recently proposed a morphological classification of lesser toe deformities, describing the position of each joint (metatarsophalangeal or MTP, proximal interphalangeal or PIP and distal interphalangeal or DIP) in relation to their anatomic position on both the vertical (V) and horizontal (H) planes. A study was designed to test its reliability and the time spent for assessment of second toe deformities in the clinical setting.

Material and methods: In this retrospective study 55 second toes (55 feet, 50 patients) were evaluated. Eleven foot and ankle surgeons assessed independently standardized photographs of each case acquired in a blinded fashion. Assessment was repeated three times, each 15 days apart. Intra- (Intraclass Correlation Coefficient or ICC) and inter-observer reliability (Fleiss' Kappa coefficient) were calculated for each plane (V or H) and each joint.

Results: Intra- and inter-observer reliability were moderate for the MTP joint (ICC range V-MTP: 0.54-0.61; H-MTP: 0.55-0.63) (Kappa range V-MTP: 0.53-0.61; H-MTP: 0.51-0.58) and substantial for the PIP (ICC range V-PIP: 0.60-0.71; H-PIP: 0.67-0.78) (Kappa range V-PIP: 0.68-0.75; H-PIP: 0.62-0.75) and DIP joints (ICC range V-DIP: 0.69-0.78; H-DIP: 0.70-0.73) (Kappa range V-DIP: 0.74-0.78; H-DIP: 0.63-0.65). Mean assessment time \pm standard deviation was 30 ± 10 seconds per case.

Conclusion: The AFCP classification proved itself fast and reliable in the assessment of second toe deformities among eleven foot and ankle surgeons. It is based only on a visual description of the deformity, and does not provide informations on either the clinical reducibility of the deformity and the radiographic joint status.

F20- Hallux valgus surgery treatment using the modified percutaneous Reverdin Isham technique

L Lara, LC Torres, G Cervone

Introduction: the present study was done to observe clinically and through radiographic study the results of mild and moderate hallux valgus surgical treatment, using the modified Reverdin Isham technique.

Material and methods: We evaluated retrospectively 46 feet in 39 patients with mild to moderate hallux valgus, from June 2010 to July 2017. The mean post-operative follow up was 36 months and the mean age was 53 years. All patients submitted to modified Reverdin Isham technique were evaluated clinically before and after surgery using the American Association Orthopaedic Foot and Ankle Society (AOFAS) score and radiological measured the hallux valgus angle (HVA) through radiographic studies, intermetatarsal angle (IMA) and the distal metatarsal articular angle (DMAA). We decided to modify the way to perform this osteotomy, so that it became more stable.

Results: the AOFAS score increase an average of 54 points. The radiological measurement AHV decreased on average 17.1°, the AIM 4.2°, and the AADM 12° on average.

Conclusion: The percutaneous modified Reverdin Isham technique enabled to correct mild to moderate hallux valgus deformity, with good angular correction and increase stability compared to classic technique, also with worthy increase of AOFAS score.

F21- The Hallux Metatarsophalangeal Capsule: an Anatomic Study with respect to Percutaneous Hallux Valgus Correction – *R Cerrato, KM Chin, NS Richardson, JT Campbell, CL Jeng, MW Christian*

Introduction: Minimally invasive surgery for the treatment of hallux valgus deformities has become increasingly popular. Knowledge of the location of the hallux MTP proximal capsular origin on the metatarsal neck is critical for surgeons in planning and executing extra-capsular corrective osteotomies. A cadaveric study was undertaken to further study this anatomic relationship.

Material and methods: Ten nonpaired fresh-frozen frozen cadaveric specimens were used for this study. Careful dissection was performed, and the capsular origin of the hallux MTP joint was measured from the central portion of the metatarsal head in the medial, lateral, dorsal, plantar medial, and plantar lateral dimensions.

Results: The ten specimens had a mean age of 77 years, five female and five male. The mean distances from the central hallux metatarsal head to the MTP capsular origin was 15.2mm dorsally, 8.4mm medially, 9.6mm laterally, 19.3mm plantar medially, and 21.0mm plantar laterally.

Conclusion: The MTP capsular origin at the hallux metatarsal varies at different anatomic positions. Knowledge of this capsular anatomy is critical for orthopaedic surgeons when planning and performing minimally invasive distal metatarsal osteotomies for the correction of hallux valgus.

F22- Clinical and radiological outcomes after minimally invasive double osteotomy of the first Metatarsal in the treatment of moderate to severe Hallux Valgus – a retrospective study – G Hochheuser

Introduction: In minimally just like in open surgery of Hallux Valgus there is no such thing like a golden standard. Quite a number of papers report about the outcome of MICA, MIS Chevron or Isham Osteotomies. This prospective study shows the results of treating moderate to severe Hallux Valgus by minimally invasive double osteotomy of the first metatarsal.

Material and methods: A total of 44 consecutive patients who underwent Hallux Valgus correction were included, 38 females and 6 males. The age of the patients ranged from 24 to 82 years with a mean age of 56 years. The operation included standardized an exostosectomy, a distal subcapital Isham osteotomy to correct the distal Metatarsal Articular Angle (DMMA) and a lateral release of the plantar aspect of the capsule and the sesamoid ligament. Furthermore a medial closing Akin osteotomy of the proximal phalanx was performed and finally a proximal lateral closing wedge osteotomy of the first metatarsal. The basal osteotomy was fixed by one screw, no other implants were used. In more than 95% additional MIS surgical procedures were performed such as DMMO and correction of lesser toes. Patients were allowed full weight bearing in a flat shoe with rigid sole right from day one. The shoe was to be used for 6 weeks when going out. At home patients were allowed to walk without the shoe after one week. Clinical and radiological assessments were performed preoperatively, at 6 weeks and 3 months postoperatively. Radiographic measures included the preoperative and postoperative values of the Hallux Valgus angle (HVA) and the intermetatarsal angle (IMA).

Results: The patients had an IMA between 10° and 24° with a mean IMA of 17° whereas the mean HVA was 38° with a range from 18° to 56°. The mean correction achieved an improvement of HVA from 38° to 13° and for IMA from 17° to 12°. The clinical outcome was measured using the AOFAS Score. Scores on the AOFAS scale improved from 56 to 86. One case of superficial wound infection was observed. There were no revisions necessary.

Conclusion: In patients with a moderate to severe Hallux Valgus the technique of double osteotomy of the first ray shows good results.

FREE PAPERS (FP4) - Arthroscopy

F23- Union rates after arthroscopic triple fusion in a consecutive series of 21 patients (including patients with severe deformity, poor soft tissues and revision procedures) – A Perera

Historically triple fusion had a reputation for a high rate of complications, in particular non-union with rates of up to 23% (Angus 1986). However with the advent of modern techniques and fixation methods the rate of reported non-union in single surgeon series from experts was as low as 1-3% (Pell 2000, Rosenfeld 2005). A recent series from a California Health Maintenance Organisation that included a number of different surgeons may provide a more realistic insight into the results 'on the ground' with a rate of 29.9%(Klassen 2018). We describe a new technique of arthroscopic triple fusion performed in 21 consecutive patients using lateral hindfoot endoscopy and an additional talonavicular portal. 14 patients have a planovalgus foot (mean heel valgus 40deg, calcaneal pitch angle 11deg, Meary's angle -12deg, Talonavicular uncoverage of 38% and angle of 28deg). 3 patients had cavovarus feet and 4 patients had normal hindfoot alignment. All patients had routine post-operative CT scan performed at 12 weeks, union was diagnosed if >50% of the joint was fused. The CT scans showed that radiological union was achieved in all patients (63 out of 63 joints). There were no infections or neurological injuries. Furthermore there was excellent

correction of the deformity. In the planovalgus patients post-operative measure improved to a mean heel valgus of 13.5deg, calcaneal pitch angle 18deg, Meary's angle 6.5deg, Talonavicular uncoverage of 10% and angle of 3.6deg. All patients were very satisfied with the outcome. The commonest complication was screw removal, this was primarily for symptomatic hardware (in particular the posterior heel screw). However the CT scans showed a greater awareness of the hardware position than the x-rays and therefore some screws were also removed for asymptomatic mal-position.

F24- Union rates after arthroscopic tibiototalcalcaneal fusion in a consecutive series of 12 patients(including patients with severe deformity, soft tissue problems and revisions) – A Perera, T Portal-Banker, D Ebreo, R Mahoney

Union rates after arthroscopic tibiototalcalcaneal fusion in a consecutive series of 12 patients(including patients with severe deformity, soft tissue problems and revisions) Portal-Banker T, Ebreo D, Mahoney D, Perera AM University Hospital of Wales, Cardiff and Spire Cardiff Hospital Historically Tibiototalcalcaneal (TTC) fusion had a reputation for a high rate of complications, in part this was due to the nature of the underlying condition being treated but non-union remained an issue even in patients without co-morbidities. A 2011 systematic review found that the union rate was 86.7% with an average union time of 4.5 months. The complication rate was 55.7% and this included an amputation rate of 1.5% (Jehan 2011). Even with modern open techniques and implants non-union rates of 10-30% are reported (Ford 2019 Smith 2017). In a recent series of 20 patients the superficial infection rate was 20 %, deep infection rate was 15%, with 5% amputation, non-union of 20% in subtalar and 20% in ankle and 20% in both. Arthroscopic TTC fusion has been described in 4 separate series totally 22 patients in all. We describe a new technique of arthroscopic preparation of the joints using lateral hindfoot arthroscopy. These were then fixed with a standard intramedullary implant that was designed for an open insertion and thus we have developed a modification of the technique in order to facilitate fixation. We present the results in a consecutive series of 12 patients that includes patients with severe deformity (from 41deg of heel valgus/ -12 degs Meary's angle, in patients with flatfeet to 12deg of heel varus/ 26 degs Meary's angle in patients with pes cavus). Some patients required additional procedures (proximal medial gastrocnemius release, percutaneous ligidus fusion or triple fusion). Weight bearing was permitted from the 2nd week post-operation. All patients were monitored prospectively and assessed for radiological union using x-ray and CT in patients that were symptomatic at 12 weeks. 100% of joints went on to unite clinically and radiologically. Furthermore there was an excellent correction of deformity, in the pes planus group mean valgus was 12 degs and Meary's angle was 9 degs, in the pes cavus groups mean heel valgus was 15 degs and Meary's angle was 9 degs. We believe that the lateral endoscopic approach facilitates an easier correction of deformity than standard arthroscopic approach and even an open approach. There were no infections no neurological injuries. However there was one patient who developed a pseudoaneurysm but this was related to the proximal locking screw and not the arthroscopic approach. Metalwork removal was required in one patient who developed a stress reaction at the proximal tip of the nail after 1 year and one patient who had pain at the nail insertion site at 3 months but was otherwise asymptomatic and had CT proven 100% union of the ankle and subtalar joints.

**F25- Arthroscopic tibiototalcalcaneal arthrodesis with locked retrograde nail : A case series –
A Polyzos, K Gkoumousian, I Petrakis, A Eleftheropoulos**

Introduction: Indications of Tibio-Talar-Calcaneal(TTC) fusion are wide, including post-traumatic arthritis, rheumatoid arthritis, acquired flat foot deformity (Myerson stageIV), failed total ankle arthroplasty, etc. In the vast majority of these cases, there are skin problems because of systemic diseases or wound problems following prior surgery. The purpose of this presentation is to describe an alternative less invasive surgical technique of TTC fusion using an intramedullary retrograde nail via a posterior hindfoot arthroscopy. We present the surgical technique and quote several cases treated by this method.

Material and methods: Between 2014 and 2018, 15 patients (5 male and 10 female) with severe hindfoot pathology underseek surgical treatment in our clinic. The mean age of the population was 68 years and their mean Body Mass Index (BMI) 30.5. Under spinal or general anaesthesia, the patient was placed in prone position. Using the standard posteromedial and posterolateral portals, a standard knee arthroscope was inserted via the posterolateral portal. Via the posteromedial portal, a soft tissue shaver was introduced to prepare the posterior gutter. Most of the preparation of the articular surface of the ankle joint was achieved with the use of a 5.0 acromionizer. After the preparation of the ankle joint surfaces, under fluoroscopic control, a guide wire was inserted through calcaneus and talus into the tibia. Reaming was performed. An anodised titanium alloy intramedullary nail was used (inserted through the calcaneal) and locked statically with one or two screws in the calcaneus, one screw in the talus and two screws in the tibial shaft. The preparation of the subtalar articular surfaces then took place.

Results: Hindfoot fusion was achieved in all fifteen cases. There were no major complications, such as infection, trauma complications, nonunion, malunion or hardware failure. Fusion was achieved in about three months time. All the patients returned back to their daily activities in four to five months time. The postoperative American Orthopaedic Foot & Ankle Society (AOFAS) score was significantly improved. The mean hospitalisation was 1.2 days.

Conclusion: This alternative surgical technique combines the advantages of the TTC fusion with an intramedullary nail and the advantages of the arthroscopic minimal intervention to the soft tissue envelope. This enables the immediate mobilisation of the patient and a small period of hospitalisation. The key point is the steep learning curve. From the literature review can be found similar techniques with equally positive results.

F26- Surgical treatment of post-traumatic osteoarthritis of the metatarso-sesamoidal joint using arthroscopic technique – DS Bobrov, AV Lychagin, TM Amirikah

Introduction: To improve the results of treatment of patients with pathology of the metatarsophalangeal and metatarsosesamodal joints.

Material and methods: Foot pathology has a wide variety of both etiology and clinical manifestations. In a selected group of problems, we can highlight Metatarsalgia. Metatarsalgia is a term for pain in the anterior part of the foot. This is a symptom-complex, which corresponds to a whole group of diseases. Overloading (Central, primary) metatarsalgia- a kind of metatarsalgia, which occurs as a result of structural and functional changes in the forefoot. Metatarsalgia is not a rare disease. According to M. Bardelli [1], metatarsalgia due to biomechanical disorders is 84.4% of all causes of pain in the forefoot. Despite the seeming simplicity of diagnosis, the true cause of

pain in the anterior part of the foot often remains unrecognized, and many patients are treated either conservatively or are treated for other diseases affecting the anterior part of the foot. One of the most common causes of pain in the area of the metatarsals is the pathology of the metatarsophalangeal joints and metatarsosesamoid joint as reported by Anupam Wakhlu [2]. Given the high probability of developing contractures after classical surgical with extended skin incisions and the complexity of the restoration of the articular capsule and ligamentous apparatus, one of the promising areas of treatment is the introduction and use of arthroscopic techniques for the treatment of foot and ankle pathology. The most common diseases in which arthroscopic techniques are used are the pathology of sesamoid bones and osteochondropathy of the heads of the metatarsals (Keller II osteochondropathy or Freiberg disease). The Use of Arthroscopy is the most relevant, in the pathology of the lateral (fibular) sesamoid bone, due to the anatomical location and complexity of imaging using classical approaches without the use of an arthroscope. An important point when using the technique is the availability of specialized equipment. In the clinics of the Department of traumatology, orthopedics and Disaster Surgery Of the first MG MU. I. M. Sechenov From the period of 2015 to 2016, 25 patients with the pathology of the metatarsophalangeal joints were treated.

Results: : Good results (relief of pain syndrome, restoration of foot biomechanics) were obtained in 22 patients (88% of the total number of operated patients). In 3 patients (12% of patients) the results of treatment were satisfactory (preservation of pain syndrome, moderate dysfunction of the metatarsophalangeal joints). It should be noted that satisfactory results of treatment were obtained in patients with initially severe pathology, osteoarthritis of the metatarsophalangeal joints.

Conclusion: The use of modern arthroscopic technology allows to obtain a high percentage of good results due to the low trauma of the performed operative technique, good intraoperative visualization of the pathological changes and high accuracy of the surgical manipulations.

F27- The Potential of Ankle Arthroscopy in Ankle Fractures – P Aragonese Lopez, G Lopez Hernandez, ML Fernandez Hortiguera, JL Gutierrez Garcia, F Garcia de Lucas

Introduction: The incidence of intra-articular pathology associated with ankle fractures is high, with concomitant osteo-chondral lesions reported in 63-73% of individuals and ligamentous disruption in most patients. There are several studies that demonstrated the role of ankle arthroscopy to help confirm anatomic reduction and to diagnose and treat associated intra-articular pathology in displaced ankle fractures. Our purpose is to describe and evaluate our results with the use of the arthroscopy in Ankle fractures.

Material and methods: We present a sample of our experience using this technique that shows the severity of intra-articular pathology that is often found and occurs even in benign fracture patterns. We perform an arthroscopic assessment of all ankle fractures requiring open reduction and internal fixation. Both procedures are performed with the patient in the supine position with our habitual landmarks. Once the initial reduction and temporary stabilization of the fracture has been achieved, we introduce the arthroscopy to evaluate the reduction and to diagnose and treat other pathologies associated.

Results: We have performed this technique in over 116 patients since 2014. 72% of patients showed a type B Weber fracture. 63% of patients presented a tear of the tibiofibular syndesmosis. 60% of patients had significant osteochondral injuries. Although the clinical significance of these lesions has not been determined specifically in the ankle fracture setting, arthroscopic assessment and management of osteochondral lesions have proven prognostic and therapeutic benefit in the non-fracture setting. There was no major complications from arthroscopy. Three

cases showed persistent postoperative pain due to superficial peroneal nerve injury.

Conclusion: In our opinion the use of arthroscopy in ankle fractures helps to control anatomic reduction, and has provided us with a safe, reliable means of diagnosis and intervention of intra-articular pathology associated with ankle fractures. It is a low risk and reasonably fast technique and has high potential benefit even though further investigation is required to fully define the long-term clinical outcomes.

CASE REPORTS (CR1) - Percutaneous Surgery & Arthroscopy

C1- Arthroscopic Subtalar Arthrodesis In Partial Talocalcaneal Coalition – D Saraiva, A Rodrigues

Introduction: Talocalcaneal coalitions may be bony, cartilaginous or fibrous. In adults, bony talocalcaneal coalitions may lead to diffuse pain over the sinus tarsi, foot fatigue and difficulty on walking on uneven surfaces. Resection of the coalition may be an option, but in patients with degenerative changes on the subtalar joint and without arthritis over the talonavicular joint, subtalar arthrodesis is recommended. Arthroscopic subtalar arthrodesis presents several potential advantages over the open approach as a minimally invasive procedure with lower risk of wound complications or infection and faster recovery, with reported fusion rates between 91% and 100%.

Case Report: We present a case of a 69-year-old patient with prolonged pain on her left foot, particularly over the sinus tarsi. Exploration of subtalar joint mobility was restricted and painful, and some peroneal spasm and pain on stressing was present. Standard radiographic projections, computed tomography scan (CT Scan) and magnetic resonance imaging (MRI) showed medial talocalcaneal coalition, as well as degenerative joint disease over the subtalar joint and no significant arthritis over the talonavicular or calcaneocuboid joints. Posterior arthroscopic subtalar arthrodesis with two 6.5mm partial threaded screws was performed. Visual Analog Scale (VAS) and Foot and Ankle Outcome Score (FAOS) were measured preoperatively, at 6 months and one year postoperatively. We present images of the surgical technique. A posterior arthroscopic approach was performed through the posteromedial and posterolateral portals. The coalition was identified and left untouched. Articular cartilage from the remaining joint was removed with arthroscopic shaver, curet and osteotome. Finally, the subtalar joint was fixed with two 6.5mm partial threaded screws under fluoroscopic control. The foot was placed in a well padded short leg plaster cast for 4 weeks. Posteriorly full weight bearing in a walker boot was allowed for another 8 weeks. Fusion was achieved by 12 weeks postoperatively. VAS decreased from 8 preoperatively to 4 at 6 months and 1 at one year postoperatively. FAOS increased from 47% preoperatively to 73% at 6 months and 86% at one year postoperatively.

Conclusion: We found that arthroscopic subtalar arthrodesis is an effective procedure for bony medial talocalcaneal coalition, relieving pain and with high patient satisfaction.

C2- Bilateral Fracture of Os Trigonum: A Case Report and Review of Literatures – P Maneprasopchoke, C Rungprai

Introduction: Acute fracture of os trigonum is a rare condition and bilateral fracture of os trigonum has never been reported in the previous literatures. We would like to report intermediate-term outcomes in a patient who had simultaneously bilateral os trigonum fracture treated with posterior ankle arthroscopic debridement of os trigonum.

Case Report: A 21-year-old female presented with acute bilateral posterior ankles pain after hyperplantar flexion injury during jumping out of the van. The patient was misdiagnosed and treated with ankle sprain for 3 months due to negative initial plain radiograph. However, MRI of both ankles demonstrated fracture line on both os trigonum. She was undergone posterior ankle arthroscopic debridement of the os trigonum.

Clinical Outcomes: Clinical outcomes including ankle range of motion and validated functional outcomes consist of FAAM (ADL and Sports), Short Form-36 (PCS and MCS) and Visual Analogue Scale (VAS) were assessed at pre-operative and final post-operative visit.

Conclusion: This is the first report for bilaterally acute fracture of the os trigonum which demonstrated a promising clinical and functional outcomes following bilaterally posterior ankle arthroscopic debridement of both os trigonum.

C3- The role of arthroscopy in a navicular stress fracture - case study- *M Wrobel, A Mioduszewski, J Sroczynski, G Klos, R Swierczynski*

Arthroscopy as a minimally invasive technique develops continuously, however arthroscopy of small joints is still rare due to its difficulty. Presently there are very few publications about the arthroscopy of talonavicular and cuneonavicular joints. Usually they report the use of arthroscopy in a triple arthrodesis or they examine feasibility and safety of this procedure in cadaveric studies. We present a case of a young professional athlete with a chronic navicular stress fracture which was treated arthroscopically after a year of ineffective conservative treatment. Because of the presence of a navicular pseudoarthrosis the decision was taken about operative treatment. We chose arthroscopic debridement of a navicular fracture from a talonavicular and cuneonavicular joints with intraoperative external distraction and internal fixation using one Herbert screw to minimize tissue damage comparing to an open procedure and to enable quicker recovery. 6 weeks after the procedure X-Ray proved bone union. Patient started full weight-bearing without pain. After 3 months CT scan confirmed bone healing, and the patient returned to long distance running. To conclude, arthroscopy of a talonavicular and cuneonavicular joints is a useful method to treat navicular non-unions. We did not observe any complications after the procedure. This case verified this procedure as safe, effective and worth propagating.

C4- Role of posterior ankle endoscopy in the resection of tumor lesions: A case report – *I Portellano, D Crego Vita, A Puente Lozano, M Fernandez Gayol, A Gomez Rico, R Garcia Canas, M Hueca Martinez, FJ Areta Jimenez*

Role of posterior ankle endoscopy in the resection of tumor lesions: A case report. Introduction. The Giant Cells Tumor of Tendon Sheath (GCTTS) is an extra-articular benign tumor of soft tissues. It is more commonly found on hands and feet, and more rarely on ankles and knees. The GCTTS affects individuals in the 3rd to 5th decades and its etiology is unknown yet. Case report. We present the case of a 47-year-old woman who consulted for pain of neuropathic characteristics in the posterior region of the ankle, continuous and burning pain in left ankle in the previous 4 months. In the clinical examination, the Forced hyper-plantar Flexion Test was positive but the Tinel test was negative, and there were not hindfoot deformities. In MRI, a mass of 13 x 14 x 16 mm was observed adhered to the vasculonervioso package of the posterior tibialis. In the differential diagnosis of pseudotumoral and tumor lesions, it is necessary to include the giant cell tumor of the tendinous sheaths, the neurological tumors and the pigmented villonodular synovitis. In addition, it is important to perform a differential diagnosis of other causes of posterior ankle pain, such as Posterior Ankle Impingement Syndrome (PAIS), Haglund deformity, Achilles insertion tendinopathy, ... The resection is carried out through the posterior endoscopic portals described by van Dijk in

the year 2000, which allows excellent access to the posterior structures of the ankle, avoiding injury to the posterior tibial nerve. Surgical excision is the main treatment, however, we must know that local recurrence is described in 7-45%, depends on the author. There are several techniques to perform the excision. The arthroscopic and endoscopic treatment has been shown to be effective, presenting low morbidity, and being clinically resolving.

C5- Arthroscopic treatment of sesamoid fracture - case report and literature review – M Wrobel, A Mioduszewski, J Sroczynski, G Klos, R Swierczynski

Pathologies of the first metatarsal joint are a common occurrence, and they might be a source of chronic pain and might impair gait. They could be related to chondral surfaces, osteophytes as well as to the pathology of the sesamoid bones. Arthroscopy of the MTP I is not a routinely carried out procedure, even though there are references in the literature about the indications for such surgical techniques. We present a case of a 47 years old patient, long distance runner with a stress fracture of the lateral sesamoid bone. Because the conservative treatment took about 12 months and did not bring any results, the patient was offered a surgical procedure. Traditional surgical techniques based on the open approach requires a wide skin incision and soft tissue interference, and all the complications associated with such approach. The patient was therefore offered an arthroscopic surgical technique. Arthroscopy of the first metatarsal joint was carried out with the concomitant repair of the chondral surface and the resection of the interposing fragment of the lateral sesamoid. The following abstract presents the surgical procedure and the literature review.

C6- MILAN technique for severe or recurrent bunion deformity – R Ray

Presentation of case: DN presented to the elective foot and ankle clinic two years following a Scarf/Akin osteotomy for bunion correction on her left foot. Bunion correction was originally excellent both clinically and radiographically, however deformities had fully recurred and now both feet had similar significant deformity. Examination revealed instability of the first TMT joint. The un-operated side was actually more painful and she wanted this side treated first.

Problems to face: Metatarsal osteotomies are reliable for long term correction of hallux valgus deformities, however 1st TMT instability is a cause of recurrence. Hallux valgus with an unstable 1st TMT joint can be better managed with a Lapidus arthrodesis but this procedure carries risks of non-union, requires a prolonged period of casting or non-weight bearing and requires a very large incision to do the fusion, the bunionectomy and an Akin osteotomy. For these reasons the surgery was performed using a minimally invasive Lapidus arthrodesis nailing (MILAN) technique.

Solution: A 4cm dorsomedial incision is made just distal to the 1st TMT joint. The incision is distal to allow for the jig for the Lapidus nail to be directly applied to the dorsum of the first metatarsal. The joint is opened and standard instruments are used to prepare the joint surfaces. The joint is derotated and reduced using percutaneous wires. The Lapidus nailing is performed using a proprietary technique which gives significant compression and stable fixation. A cheilectomy of the medial exostosis is then performed with a wedge burr and a percutaneous Akin osteotomy is performed and fixed with a 2.5mm headless compression screw. Exact details and tips and tricks along with radiographs and photographs will be presented in the case presentation. Post op, immediate full weight bearing was allowed in a flat post-operative shoe. Radiographs at 6 weeks showed excellent correction with ongoing union of the arthrodesis. She has requested for the other side with the recurrence to be revised in a similar fashion. Positioning of the jig is imperative for good compression and early weight bearing, as such a mini open technique is currently required. This is still smaller than the incision required for plating. If improvements of the jigs allow safe

positioning under imaging, the aim would be to perform the entire procedure percutaneously in the future.

C7- Salvage DMMO for recurrent metatarsophalangeal instability after plantar plate open repair of the second toe – J Del Vecchio, ME Ghioldi, L Chemes, ED Dealbera

Introduction: Instability of the metatarsophalangeal joints (MTPJ) of the lesser toes is a common cause of forefoot pain. After failure of a conservative treatment there are different surgical options: plantar plate repair PPR through from a dorsal approach which showed pain relief and patient satisfaction; tendon transfers; indirect reduction of the MTPJ by a distal metatarsal osteotomy that generates a joint decompression, among others.

Material and methods: A 64-year-old old female patient presented with a recurrent metatarsalgia associated to a plantar plate rupture of the second MTP joint associated with articular instability and subluxation. She already underwent plantar plate repair (PPR) from a dorsal approach and a Maceira (Triple Weil) osteotomy stabilized with two fully threaded cortical screws ten months before. Seven months after the first surgery, the patient reported metatarsalgia and a new dislocation of the second MTPJ without having a trauma. Clinical assessment showed: pain to the direct compression of the plantar plate, a positive "drawer test" (grade 2 of Hamilton–Thompson scale, >50 % subluxable), and a positive "paper pullout test" as well. The AP-xray showed a MTPJ subluxation, and MRI confirmed a rupture of the plantar plate. In order to treat the residual deformity MIS surgery is indicated. A DMMO of the 2-4 metatarsals was indicated without repeating PPR. A Visual analog scale (VAS) scores, MTP range of motion (ROM), paper pull-out test, AOFAS scores, satisfaction, and radiographic measures were assessed after surgery.

Results: Clinical results were excellent, acquiring complete pain relief at 18 months postoperative. The AOFAS improved from 52 points pre-operatively to 98 points post-operatively and a visual analog pain scale (VAS) decreased from eight points pre-operatively to one post-operatively. She presented a positive paper pull-out test and would repeat surgery again.

Conclusion: It seems that shortening and elevation achieved by the burr (>2mm) is a crucial step to reduce metatarsalgia and help maintain MTF reduction. Although there is no consensus about which surgical technique is considered the "gold standard" for metatarsalgia treatment, MIS looks ideal to treat patients who have already undergone open surgery, reducing possible complications related to the approach such as wound healing, devascularization of the area, infections, etc.

C8- Using percutaneous techniques to manage complex forefoot deformities – R Ray

Presentation of case: SY presented to the elective foot and ankle clinic 5 years after a significant crush injury to her left foot. She had required an amputation of her 5th toe and had been left with significant deformities in toes 2, 3 and 4. The first ray was spared. The second toe had arthritis at the 2nd metatarsophalangeal joint and had developed a reverse hammer toe with hyperextension at the PIP joint. On close examination, she was actually propelling through this joint rather than the MTP joint and had developed a painful callosity on the plantar aspect. The 3rd toe was hyperextended and overlapping the second toe. The MTP joint was arthritic, however the distal joints were in good alignment. The EDL tendon was very tight. The fourth toe had been badly damaged and was floppy and sitting under the third contributing to the hyperextension and causing pain and callosities in the toe.

Problems to face: This was a complex forefoot deformity with a number of issues. The fourth toe had fixed deformity in the DIP and PIP joints and was not functional. The 3rd toe was essentially

normal with some hyperextension due to tight tendon pull and the 2nd toe had a complex deformity with a reverse hammer toe. My main concern was the second toe as a PIP fusion would have corrected the deformity but as she was bearing weight through this joint, this may have transferred the pain to the stiff arthritic MTP joint leading to more significant symptoms.

Solution: The toes were managed from lateral to medial. A 2/8mm Shannon burr was used to prepare the DIP and PIP joints of the 4th toe. A 2.5mm cannulated screw was then used to perform a straightening fusion. For the third toe and a simple percutaneous proximal EDL tenotomy was performed in the midfoot, allowing correction of the hyperextension deformity. Finally, attention was turned to the second toe. A 2/8mm Shannon burr was used to perform a dorsal closing wedge osteotomy of the proximal phalanx and a plantar closing wedge osteotomy of the middle phalanx in an attempt to correct the reverse hammer toe deformity. The 3rd and 4th toes settled quickly, however the 2nd toe was still swollen at 3 months due to the unstable osteotomies. By 6 months swelling had receded, callosities were gone and the foot looks good.

C9- Combined Open And Minimally Invasive Surgery For Complex Forefoot Deformity – D Saraiva, A Rodrigues

Background: Complex forefoot deformities pose a difficult challenge for the orthopaedic surgeon. In revision cases, with prior surgeries, combining open and minimally invasive techniques is a useful tool.

Objectives To present a clinical case of a complex forefoot approached by a combination of open and minimally invasive techniques.

Study Design & Methods We present a case of a 67-year-old patient with a history of a first metatarsal osteotomy for correction of a severe hallux valgus. He developed a painful hallux rigidus, with a shortened first metatarsal which resulted in central metatarsalgia and rigid deformities of the second, third and fourth toes. Standard radiographic projections confirmed the diagnosis. After failure of a trial of conservative treatment including shoe modification, insoles and oral medication, surgery was indicated. We performed arthrodesis of the first metatarsophalangeal joint with two screws through an open medial approach, distal metatarsal minimal invasive osteotomies of the second, third and fourth metatarsals and arthrodesis of the proximal interphalangeal joints with Kirschner wires of the second, third and fourth toes. The patient wore a Barouk shoe for 8 weeks. After radiographic confirmation of a stable arthrodesis of the first metatarsophalangeal joint and removal of the Kirschner wires, he progressively returned to his normal activity. Visual Analog Scale (VAS) and Foot and Ankle Outcome Score (FAOS) were measured preoperatively, at 6 months and one year postoperatively. Results VAS decreased from 9 preoperatively to 4 at 6 months and 2 at one year postoperatively. FAOS increased from 25% preoperatively to 50% at 6 months and 75% at one year postoperatively.

Conclusions We found that combining open and minimally invasive techniques in a complex forefoot revision case is a valid option, relieving pain and with a high impact on patient quality of life.

C10- Minimally Invasive Surgery for Neglected Calcaneal Fracture – *A Primadhi*

Neglected fracture is still considered a serious problem in developing countries, especially in their remote areas. The resultant malunion can produce many complications such as arthritis or soft tissue problems due to pressure of the displaced fracture to the skin. We herein report a case of neglected calcaneal fracture with subsequent soft tissue compromise. X-rays showed a superior displacement of posterior tuberosity. The goal of our treatment is to restore calcaneal alignment and relieve the pressure to the affected skin. Special care was to be taken to ensure that no further harm was endured. The minimally invasive surgery (MIS) consisted of fibrotic tissue removal at the fracture site, followed by fracture reduction, adequate gastrocnemius recession, and percutaneous fixation. After surgery, the wound was healed uneventfully. MIS is proven to be effective in the management of neglected cases that the skin had been compromised, in which the extent of the surgery should be reduced while maintaining the proper reduction and fixation.

FRIDAY, 22 March 2019

FREE PAPERS (FP5) - Percutaneous Surgery

F28- Long terms results of percutaneous Chevron Osteotomy fixed with a cannulated screw – *J Gonzalez Ustes, F Parals, X Conesa, E Siles, J Novell*

Introduction: It's review of 100 cases of hallux valgus osteotomy surgery by percutaneous chevron fixed with cannulated screw introduced percutaneously.

Material and methods: 100 cases have been operated between 1.1.15 and 1.1.18, predominant sex female, average age 58 a, follow up of 2.5 years of evolution. All have been ambulatory surgery. They have had an immediate load with the postoperative shoe. The hallux valgus were moderate or severe in their great majority.

Results: We have obtained good results using this technique, passing the angle of hallux valgus from 45 to 10 degrees. The AOFAS scale has gone from 70 to 95 points. All the patients would be operated again, a degree of functional satisfaction and very high aesthetics.

Discussion: reviewing the literature we have similar or better results than open surgery. Much less cutaneous complications due to percutaneous surgery. We had to remove some screws by protusion of it.

Conclusions: based on our experience we believe that the chevron percutaneous osteotomy is not easy to do but with skill you can achieve good functional clinical results.

F29- Mini open Chevron Akin (MOCA) treatment of hallux valgus – D Kay, B den Hartog, A A Perera

Introduction: Minimally invasive surgical techniques have been developed to address correction of the symptomatic hallux valgus. The required technical skill hurdles are significant and adoption has been slow.

Methods: This paper is a retrospective case series where a small incision (2-3 cm) is used for the extended shift first metatarsal distal osteotomy and a minimal incision technique (MIS) is used for the Akin component of the procedure. This hybrid approach offers the advantages of MIS soft tissue handling and the visibility that's afforded by a small incision. The intra/extra-medullary device was designed to create consistency in the placement of stable fixation. The technical skill component is lessened by the mini-open approach over pure MIS. This device was developed several years ago to provide for a low-profile fixation of the classic chevron bunionectomy. The device was originally placed in the first metatarsal intramedullary canal and the medial surface of the first metatarsal head after resection of the medial eminence. The osteotomy was intra-capsular and the lateral shift was modest, following the accepted technique of chevron and Akin osteotomies. Subsequently the lateral shift was increased allowing for up to 90% translation of the osteotomy on the shaft, but this was still intracapsular and done with an open Akin. Due to mechanical advantages of the implant, the osteotomy was then changed from a chevron to a short oblique osteotomy. Since the recent availability of MIS power equipment in the United States the procedure now consists of an extracapsular osteotomy. Elevation of the capsule just enough to create a flat surface for the plate and not have soft tissue interposition underneath it. A transverse osteotomy is done to allow for lateral translation, rotation and correction of the abnormal angulation of the metatarsal head. The Akin osteotomy is performed percutaneously with a keyhole incision and fixed by placing the screw through the distal part of the metatarsal osteotomy incision.

Results: There was no increase in complications as the incision size decreased over the traditional open procedure with an identical device.

Conclusion: This modification in approach, the Mini Open Chevron Akin (MOCA), allows for full correction of the bunion deformity and uses a device that allows for stable fixation that can be used in a consistent and reproducible fashion.

F30- Minimally Invasive Chevron Akin (MICA) for Hallux Valgus correction: A consecutive case series– S Sivaloganathan, T Holme, K Kunasingam

Introduction: Hallux valgus is thought to affect up to 28.4% of the adult population in the United Kingdom. There have been significant changes in surgical treatment options available for the management of hallux valgus deformities which have a major bearing on significantly decreased post-operative pain and swelling, immediate weight bearing status, early return to footwear, aesthetics, and accelerated return to function. We present a consecutive case series of 33 patients undergoing third generation Minimally Invasive Chevron Akin (MICA) surgery for hallux valgus under the care of a consultant orthopaedic surgeon.

Methods: 33 consecutive patients undergoing third generation MICA surgery for hallux valgus under the care of a single fellowship trained consultant orthopaedic surgeon. Clinical outcome measures, pre-operatively and at 3 months post-operatively, focused on the American Orthopaedic Foot and Ankle Society (AOFAS) Score, and on subjective patient satisfaction surveys. Radiographic evaluation was undertaken on standard foot antero-posterior/lateral weight bearing radiographs. Inter-metatarsal angle (IMA) and hallux valgus angles (HVA) were measured pre-operatively and post-operatively at 3 months.

Results: The pre-operative AOFAS mean score was 47 (range 24-67) and the post-operative mean score was 92 (range 72-100). Post-operative pain assessments indicated that 25/33 patients had no pain; 4/33 mild pain and 4/33 moderate pain. We found that post-operatively 27/33 patients had no activity limitations and 6/33 had recreational limitations only. With respect to footwear; 16/33 patients had no restriction to the type of shoe they wore, however, 17/33 could only wear comfort or modified shoes. All patients post-operatively had full correction of alignment and resolution of callus at 3 months. Objective results using radiographic parameters included assessments of IMA and HVA. The IMA mean score improved by 7° (range 1.8° to 17.1°) from a pre-operative IMA mean of 13° (range 7.1° to 24.2°) to a post-operative IMA mean of 6° (range 0.7° to 11.9°). The MICA technique also demonstrated the HVA by a mean score of 22° (range 13.7° to 35.4°) from pre-operative mean HVA score of 31° (range 17.9° to 57.2°) to a post-operative HVA mean score of 9° (range -1.9° to 21.8°). Of the 33 patients, there were two complications that included the removal of a screw due to prominence and one post-operative infection.

Conclusion: Our consecutive case series for third generation Minimally Invasive Chevron Akin (MICA) surgery for hallux valgus has demonstrated significant improvements in clinical outcome measures when using both subjective and objective assessment tools.

F31- Hallux valgus surgery treatment using percutaneous Chevron technique – L Lara, LC Torres, G Cervone

Introduction: To observe clinically and through radiographic study the results of moderate and severe hallux valgus surgical treatment, using distal Chevron osteotomy by percutaneous technique.

Material and methods: We evaluated retrospectively 35 feet in 33 patients with moderate and severe hallux valgus using Couhling classification, from June 2016 to January 2018. The mean age was 53 years and the mean post-operative follow up was 13 months. All patients submitted to chevron osteotomy technique were evaluated before and after surgery using the American Association Orthopaedic Foot and Ankle Society (AOFAS) score. We measured the hallux valgus angle (HVA) through radiographic studies, intermetatarsal angle (IMA) and the distal metatarsal articular angle (DMAA).

Results: the AOFAS score had an average increase of 54 points. The AHV decreased on average 19°, the AIM 7°, and the AADM 11° average. The median shortening of the first metatarsal bone was 0,35 cm.

Conclusion: The chevron osteotomy using percutaneous surgical technique enabled the moderate to severe hallux valgus deformity to be corrected, with excellent angular correction and significant increase of AOFAS score.

F32- Percutaneous « Scarf like » and Akin screwless osteotomies for correction of hallux valgus: A clinical and radiographic review of 122 cases – *M Elkaim, J Laborde*

Introduction: Hallux valgus is a common condition and more than 100 procedures were described in the literature for its correction. It is usually admitted that, distal metatarsal osteotomies are useful for mild deformities correction, and proximal osteotomies for more severe one. The well-known Scarf osteotomy is powerful enough for both type of deformation and this technique was already described without internal fixation. This study describes a percutaneous “scarf-like” osteotomy with its radiological and functional outcome.

Material and methods: This is a retrospective single surgeon consecutive case series performed in a 6 months period. 122 isolated gestures on the first ray were identified, with an average follow up time of 19 months. Satisfaction of the surgery, return to normal footwear and return to sport was evaluated. The hallux valgus angle (HVA), intermetatarsal angle (IMA) and distal metatarsal articular angle (DMAA) were assessed on preoperative and postoperative AP weight-bearing foot X-rays.

Results: 97% were satisfied, 88% could wear “normal” shoes and 99% return to the same activities after surgery. The mean preoperative HVA, IMA and DMAA were 35.04°, 15.04° and 19° respectively. The mean postoperative HVA, IMA and DMAA were 10.54°, 5.83° and 7.2°, respectively. We report a loss of correction in one case. No revision surgery of the first metatarsal was performed.

Conclusion: This series shows a technique of osteotomy “scarf like” screwless, with few complications and enabling good correction even in advanced hallux valgus with very good satisfaction of the patients.

F33- The Role of Relative Metatarsal Length in Metatarsalgia after Percutaneous Correction of Hallux Valgus – *FM Liuni, A Fontanarosa, A Guardoli, R Cepparulo, L Berni*

Introduction: Secondary metatarsalgia is a condition frequently associated with hallux valgus surgery. It could be related to excessive first metatarsal shortening in hallux valgus correction surgery. The aim of this study was to evaluate how the variation in length of first metatarsal (calculated with the Relative Metatarsal Length), can influence the incidence of metatarsalgia in patients treated with percutaneous PBS (Percutaneous Bianchi System) technique for hallux valgus correction.

Material and methods: A clinical and radiographic retrospective analysis was performed on 85 patients with isolated hallux valgus, without clinical signs of metatarsalgia, treated with PBS first metatarsal osteotomy with an average follow-up of 26.3 months. Patients were evaluated with AOFAS score and with anteroposterior weight-bearing x-rays. The relative length of the first metatarsal compared with the second metatarsal (RML - Relative Metatarsal Length), described in literature as a prognostic index of metatarsalgia, was determined according to the modalities described by Nilsson-Morton.

Results: The AOFAS increased from 31 at the preoperative assessment to 90 at the last follow-up. The RML decreased from an average of -1.08 mm in the preoperative to -5.05 at the last follow-up. Three patients showed clinical signs of metatarsalgia at the last outpatient evaluation.

Conclusion: Data showed a reduction in RML from the preoperative assessment to the last follow-up. Despite this, even with significant shortenings of the first metatarsus, only three cases of secondary metatarsalgia were observed. This could be due to the dynamic correction allowed by this technique, which provides immediate weight-bearing without using any device. Also, the plantarization given by the osteotomy helps to reduce the risk of secondary metatarsalgia. The results demonstrate that despite the shortening of the first metatarsus, the PBS technique showed a low incidence of secondary metatarsalgia.

F34- Treatment of moderate hallux valgus by minimally-invasive chevron : a retrospective study of 60 cases at a 5.6-years average follow-up.– M Saur, J Lucas, M Dias, T Fabre, O Laffenêtre

Introduction: The aim of this study is to analyze the clinical and radiographic outcomes of the minimally-invasive chevron at 5.6-years of average follow-up.

Material and methods: This was a retrospective single-center study of patients operated on an isolated bunion between January 2008 and December 2015 using this technique. The data were collected prospectively during the postoperative year by the referring surgeon, and patients were reviewed in consultation between June and August 2018 by an independent reviewer for analysis at the last follow-up. A clinical (AOFAS, pain, range of motion, complications, recurrence, satisfaction) and radiographic (Inter Metatarsal Angle IMA, Hallux Valgus Angle HVA, and osteoarthritis) analysis was performed.

Results: Among the 116 patients (139 feet, 95% women) who were treated and had minimal follow-up of one year postoperatively, 60 (74 feet) were reviewed at the last follow-up. The preoperative AOFAS score 66.35 ± 7.4 [47-85] was improved at 1 year by 28.63 points ($p < 0.001$) with a stable result at the last follow-up. Overall articular range of motion of the MTP joint was reduced at 1 year follow-up (FU) from $96.5^\circ \pm 16.7^\circ$ to $89.5^\circ \pm 17^\circ$ ($p = 0.0005$) but improved at the last FU to $103.8^\circ \pm 16.9^\circ$ ($p = 0.003$). The preoperative IMA was $13.4^\circ \pm 2.9^\circ$ [5-23], $7.7^\circ \pm 2.1^\circ$ [4-14] ($p < 0.001$) at one year, and $7^\circ \pm 2.7^\circ$ [3-16] at the last FU ($p < 0.001$). The preoperative HVA was $29.3^\circ \pm 7.1^\circ$ [9-50], $12.4^\circ \pm 3.5^\circ$ [5-24] at one year ($p < 0.001$) and of $12.9^\circ \pm 5.2^\circ$ [2-30] ($p < 0.001$) at the last FU. Among the complications, radiographic osteoarthritis occurred in 8.1% of cases (6 feet) and a recurrence was observed in 5.4% of cases (4 feet). The satisfaction score was 8,9/10 points with 91% satisfied patients.

Conclusion: The use of minimally-invasive chevron is a simple, reproducible and effective technique with a significant improvement in the quality of life of patients. It's reliable over time, and provides significant satisfaction, with acceptable rate of complications. Contrary to popular belief, joint mobility in the medium and long term remains excellent. Most of the time this hybrid approach is a bridge between classical and complete percutaneous surgeries, facilitating the way from one to the other.

F35- Shortening Percutaneous, Intra-articular, Chevron Osteotomy (S-PeICO) for the treatment of hallux rigidus: Preliminary Experience with Seven Cases – J Del Vecchio, ED Dealbera, ME Ghioldi, L Chemes, M Dalmau Pastor

Introduction: Hallux rigidus is a degenerative condition of the first metatarsophalangeal joint resulting in stiffness and pain. Operative treatment options for advanced arthritis resistant to nonoperative treatments include joint-sacrificing and joint-sparing operations. The aim of this study was to describe a Shortening Percutaneous, Intra-articular, Chevron Osteotomy (S-PeICO) for the treatment of hallux rigidus and review early clinical and radiological outcomes. S-PeICO is a modification of the PeICO technique. PeICO have radiological and cadaveric validations.

Material and methods: A prospective study was designed. In the period May 2017–May 2018, 7 consecutive patients (5 men and 2 women) with Coughlin grade II or III hallux rigidus were included. Pain visual analog scale (VAS), Foot and Ankle Ability Measure (FAAM) Activities of Daily Living (ADL), and FAAM Sports subscales were completed preoperatively and at final follow up. Hallux passive and active dorsiflexion, weightbearing x-rays and complementary procedures were also evaluated. Radiographic control at 2, 4, 6 and 8 postoperative weeks.

Results: Range of motion (average) improved up to 62° of dorsiflexion and 12° of plantarflexion at final follow-up. Pain VAS improved from 81,2 to 29,3 points; FAAM ADL improved 33.0 ± 17.6 points and FAAM Sports scores improved by 46.9 ± 25.1 points from baseline. Three patients had the implant removed due to discomfort. All patients would have the procedure again.

Conclusion: S-PeICO provides excellent clinical and functional results and represents a viable treatment option to decrease pain, improve function, and maintain motion for hallux rigidus grade II and III.

F36- Outcome of Proximal Closing Wedge First Metatarsal Osteotomy With and Without Fixation for Moderate to Severe Hallux Valgus – AC King Martinez, A Cuellar Avaroma

Introduction: The Hallux valgus is one of the most common orthopedic diseases. The overall goal of the different surgical techniques is to restore a physiological metatarsal-phalangeal and inter-metatarsal angle with the most stable osteotomy possible and with the lesser pain postoperative. The minimal invasive surgery (MIS) was grown in popularity since the early 2000's for correction of hallux valgus. The purpose of this study was to assess the outcome of first metatarsal proximal closing wedge osteotomy with and without fixation in patients with diagnosis of moderate to severe Hallux valgus.

Material and methods: Cohort, observational and prospective study; Patients with moderate to severe Hallux valgus deformity treated by percutaneous proximal metatarsal osteotomy and Akin's osteotomy with and without fixation technique from 2012 to 2017. All the results were analyzed with SPSS 13.0 program.

Results: Our series were 49 patients: 3 men (6.12%) and 46 women (93.88%) with 20.36 month mean follow-up. The mean age was 57.77 ± 11.79 years, 24 rights (48.98%) and 25 lefts (51.02%), 25 fixed (51.02%) 14 with two parallels K-wire and 11 with single screw) and 24 not fixed. The AOFAS score preoperative 49.46 ±10.95 to 88.28 ±8.19 postoperative (p < 0.002), EVAD from 7.24 ±1.44 preoperative to 1.06 ±1.99 postoperative (p<0.048).

Conclusion: In our series, we found a stable and adequate correction of the angles, small skin incision benefiting the cosmetic results, adequate pain control after surgery, and with few complications. The percutaneous proximal closing wedge osteotomy in association with an Akin osteotomy is a good alternative for the treatment of moderate to severe hallux valgus.

F37- The FAST Chevron : promising early results – F Leiber-Wackenheim

Introduction: Introduction The FAST (Fast And Secure Translation) chevron is a simplified fixation technique of the percutaneous chevron. Fixation is achieved through a single screw going from the medial diaphysis of the 1st metatarsal bone (M1) to its head, remaining in the horizontal level of M1. The assumed interest of this technique is to decrease per-operative X-Ray exposure of the surgical team. Objective The aim of this study is to confirm the low number of fluoroscopic shots needed for this type of fixation, to verify the absence of specific discomfort linked to the positioning of the screw head, and to assess a cutaneous marking method allowing to spot the ideal entry point for the guiding K-wire.

Material and methods: This is a retrospective study of patients undergoing surgery between July and September 2018. Forty patients underwent a percutaneous FAST chevron and an Akin osteotomy fixed by a screw. Per-operative fluoroscopic shots were analyzed. All patients were seen 3 months after surgery for X-Ray and clinical follow-up. As of September 2018, a specific cutaneous spotting was implemented. Groupe 1 includes the 20 first patients without marking. Group 2 includes the 20 patients with cutaneous marking.

Results: At 3 months post-operatively, no re-operation was necessary. No patient felt any discomfort related to the screw head. The analysis of X-Rays shows a full consolidation of the osteotomies. The mean number of fluoroscopic shots was 11,9 per surgery, out of which in average 4,8 for the fixation of the chevron (5,8 in group 1 and 3,9 in group 2). The path of the guiding K-wire had to be modified in 17 of the 40 study cases. In group 1, it was necessary to change the K-wire entry point in 12 cases, versus 5 cases in group 2. This difference is statistically significant ($p < 0.05$, chi2 test).

Conclusion: The FAST technique allows a simple and quick fixation of the percutaneous chevron with a low number of fluoroscopic shots. The use of a cutaneous marking is a relevant way to further reduce this number.

FREE PAPERS (FP6) - Arthroscopy

F39- The Arthroscopic all-inside ankle lateral collateral ligament repair is a safe and reproducible technique – M Guelfi, J Vega, F Malagelada, M Dalmau Pastor

Introduction: Neurovascular structures around the ankle are at risk of injury during arthroscopic all-inside lateral collateral ligament repair for the treatment of chronic ankle instability. This study aimed to evaluate the risk of damage to anatomical structures and reproducibility of the technique amongst surgeons with different levels of expertise in the arthroscopic all-inside ligament repair.

Material and methods: Twelve fresh-frozen ankle specimens were used for the study. Two foot and ankle surgeons with different level of experience in the technique performed the procedure on

6 specimens each. The repair was performed following a standardized procedure as originally described. Then, an experienced anatomist dissected all the specimens to evaluate the outcome of the ligament repair, any injuries to anatomical structures and the distance between arthroscopic portals and the superficial peroneal nerve (SPN) and sural nerve.

Results: Dissections revealed no injury to the nerves assessed. Mean distance from the anterolateral portal and the SPN was of 4.8mm (range, 0.0-10.4mm). The mean distance from the accessory anterolateral portal to the SPN and sural nerve was of 14.2mm (range, 7.1-32.9) and 28.1mm (range, 2.8-39.6) respectively. The difference between the 2 surgeons' groups was non-statistically significant for any measurement. In all specimens both fascicles of the anterior talofibular ligament were reattached onto its original fibular footprint. The calcaneofibular ligament was not penetrated in any specimen.

Conclusion The all-inside arthroscopic lateral collateral ligament repair is a safe and reproducible technique. This study has proven that it provides a safe and anatomic reattachment of the anterior talofibular ligament, with minimal risk of injury to surrounding anatomical structures regardless of the level of experience with the technique.

F40- ATFL tear, ankle sprain, ankle arthroscopy, ATFL repair – M Wrobel, A Mioduszewski, J Sroczyński, G Klos, R Swierczyński, A Boszczyk

Introduction: Optimal treatment of symptomatic ankle instability is a subject of debate. Good results have been reported for both anatomic and non-anatomic reconstructions. Open Brostrom-Gould procedure is considered a standard. Introduction of minimally-invasive arthroscopic methods is, however, expected to bring about reduced morbidity and faster return to activity. In this study we report the results of all-arthroscopic anatomic ATFL repair in a single-centre prospective cohort. The novelty of presented series lies in identification and treatment of non-fibular sites of ligament injury.

Material and methods: There were 23 patients (24 ankles, 8 females, 15 males, average age 32 years; range 15-49) treated for lateral ankle instability followed up for a mean of 29,6 (range 6-75) months. The reinsertion site was determined based on preop and intra-op diagnosis – at the fibula, at the talus or at the fibula and talus in cases of ligament elongation. Preop and postop AOFAS hindfoot scores were collected. The procedure was deemed successful if no subjective (recurrent sprain or giving-way episodes) or objective (clinical examination, ligament competence on ultrasound) instability was present.

Results: The injury site was found at the fibula (tear or avulsion at fibular side) - in 14/24 cases, intrasubstance tear was found in 5/24 cases and talar site lesion (tear or avulsion) in 5/24 cases. The preoperative AOFAS score improved from the mean of 49 (median ??, range 37-65) to the mean of 92,5 (median 95, range 85-100). No patient reported recurrent sprain or giving-way episode. On ultrasound ligament healing was confirmed in all patients with apparent laxity in one case. This translated into good results 100% subjectively and 96% objectively. One case on irritation of sensory nerve was observed.

Conclusion: All-arthroscopic anatomic ATFL repair is a technique capable of providing reliable clinical results with minimal morbidity in ankle instability.

F41- How to optimize the fibular tunnel trajectory in a combined ATFL and CFL reconstruction? – F Michels, G Matricali, F Stockmans

Introduction: When reconstructing the anterior talofibular and calcaneofibular ligament often a bone tunnel is used for ligament fixation in the fibula. The purpose of this study is to compare proposed directions to drill this fibular tunnel and to assess tunnel length, tunnel length using a 5 mm diameter tunnel and surrounding bone.

Material and methods: Anonymous DICOM data from spiral CT–scan images of the ankle were obtained from 12 Caucasian patients: 6 females and 6 males. Virtual tunnels were generated in a 3D bone model with angles of 30, 45, 60 and 90 degrees related to the fibula axis. Several measurements were performed: distance from entrance to perforation of opposing cortex, shortening of the tunnel when using a diameter of 5mm, distance from tunnel to bone surface.

Results: A tunnel in a perpendicular direction according to the fibular axis resulted in an average possible tunnel length of 16.8 mm in the female group and 20.3 in the male group. A tunnel directed at 30 degrees offered the longest length: 30.9 mm in the female group and 34.4 mm in the male group. • The use a 5mm diameter tunnel caused important shortening of the tunnel at the entrance in the perpendicular tunnels but only limited shortening in the more oblique tunnels. • The perpendicular tunnel is very near to the digital fossa while the most obliquely directed tunnels avoid this region.

Conclusion: An oblique fibular tunnel is the safest option when reconstructing the ATFL and CFL. It allows a longer tunnel, least shortening at the entrance and avoids the region of the digital fossa allowing more surrounding bone. In addition, absolute values of tunnel length are given, which can be useful when considering the use of certain implants.

F42- Arthroscopic Deltoid Ligament Repair: Technique and Anatomic Study – J Acevedo, P Mangone

Introduction: Recent studies have underscored the importance of open repair of the deltoid ligament for rotational ankle instability in purely ligamentous injuries as well as with ankle fractures. With the advent of successful arthroscopic lateral ligament techniques the authors have explored the use of similar arthroscopic techniques for deltoid repair. The purpose of this study was to evaluate the proximity of anatomic structures for a novel arthroscopic deltoid ligament stabilization technique and to define ideal landmarks and “safe zones” for this repair.

Material and methods: Five human cadaveric ankle specimens were screened for the study. All specimens underwent arthroscopic deltoid ligament repair with a suture passer and suture anchor technique. Five cadaveric specimens were dissected to determine the proximity of anatomic structures after repair. Several distances were measured, including those of different anatomic structures to the suture knot to determine the “safe zones.” Measurements were obtained and statistical analysis was performed. Details of the arthroscopic deltoid ligament repair technique are described and illustrated.

Results: None of the specimens revealed entrapment of the suture knots to the posterior tibial tendon (PTT) or saphenous nerve. The safe zone between the PTT and saphenous vein was a mean of 20 mm (range, 16-25 mm). On average, a 16 mm (range, 12-20 mm) safe distance was maintained from the suture knot to the PTT. The saphenous vein was in close proximity to the

suture knot at a mean distance of 3mm (range, 0-9 mm).

Conclusion: The results indicate that there is a relatively wide safe zone between the PTT and the saphenous vein when performing the arthroscopic deltoid ligament stabilization technique. While none of the critical anatomic structures (except for saphenous vein) were entrapped by the suture knot, it was evident that the variable course of the saphenous vein renders it at risk for entrapment. This study further defines the proximity of adjacent anatomic structures and establishes the anatomic safe zones for the arthroscopic deltoid ankle stabilization procedure. Clinical Relevance: By defining this relatively risk-free zone, surgeons who are not as experienced with arthroscopic ligament repair techniques may approach arthroscopic suture passage with more confidence.

F43- All-inside arthroscopic allograft reconstruction of anterior talofibular ligament and calcaneofibular ligament : a study of 50 Patients with 2-year follow-up – J Ovigie, G Cordier

Introduction: The majority of lateral ankle instability can be treated successfully with conservative method. However, if such treatments fail, surgical treatment should be considered. A wide variety of procedures have been introduced to treat chronic lateral ankle instability. But, without remnant, the reconstruction is the best option. The purpose of this study was to evaluate the clinical outcomes of arthroscopic lateral ligament reconstruction with an autograft in the treatment of chronic lateral ankle instability without remnant LFTA.

Material and methods: A retrospective series between December 2013 and April 2016, arthroscopic lateral ligament reconstruction using an autograft was performed on 50 ankles in 49 patients for chronic lateral ankle instability. Inclusion criteria were primary LTFA-LCF reconstruction with hamstring autograft and minimum follow-up duration of 2 years. Exclusion criteria were multiligamentous injuries. The clinical outcomes were evaluated with Visual Analogue Scale (VAS) for pain, Karlsson-Peterson ankle score, and American Orthopaedic Foot and Ankle Society (AOFAS). All associated injuries were documented, and complications were reported. The patients' satisfaction and return to sports were documented.

Results: The mean follow-up time was 33.1 months (range 24 – 51, median 31.5). The VAS improved from preoperative 3.5 ± 0.5 to 0.8 ± 0.3 at the last followup ($p < .001$). The Karlsson-Peterson ankle score increased from 69 (range 7-95) to 93.7 (range 57 – 100) ($p = 0.0001$). The mean overall AOFAS score increased from a preoperative mean of 76.4 to 94.7, showing a statistically significant difference ($P=0.0001$). Patients were satisfied in 47 cases (93.8%) with excellent or good results. Overall, postoperative complications occurred in 3 patients (6.1%).

Conclusion: We believe arthroscopic lateral ligament reconstruction with autograft to be a useful method as a salvage procedure for the treatment of severe and complicated types of chronic lateral ankle instability.

FREE PAPERS (FP7) - Miscellaneous

F44- Arthroereisis in Pediatric Flatfoot – J Mayral Esteban, M Mayral Aguilera, T Lordan Agraz, M Torres Cobacho

Objective: The aim of this study is to evaluate the radiological results in the treatment of pediatric flatfoot using Arthroereisis technique.

Methods: 9 patients (13 feet) with a mean age of 13.33 years were reviewed. They required a follow-up of 6 to 36 months. To evaluate the correction of Arthroereisis technique, the following angles were taken into account: Moreau-Costa-Bartani angle, Kite angle and Meary angle. Radiological measurements were performed on the pre and postoperative in all patients.

Results: All the angles studied underwent an evident and statistically significant postoperative improvement ($p \leq 0,006$). The average of the degrees at the Moreau-Costa-Bartani angles for the right foot, before surgery is 141.14 and 130.43 after surgery. For the left foot, before surgery is 137.5 and 128.67 postoperatively. The average of degrees in the angles of Kite for the right foot, before surgery is 27.67 and of 21.17 in the postoperative. The average of degrees in the angles of Kite for the left foot, before surgery is 26 and 19.80 in the postoperative. The average of degrees for Meary angle for the right foot, before surgery is 16.75 and 5 in the postoperative, and for the left foot, before surgery is 14.6 and 0 in the postoperative.

Conclusion: We believe that Arthroereisis is an effective and stable technique for the correction of pediatric flatfoot. The angles studied are a good system of radiological evaluation and indispensable to carry out the intervention. On the other hand, the inferential analyzes that have been processed, using the t-Student test for two paired samples, confirm that there are statistically significant differences between the means of the Moreau-Costa-Bartani, Kite and Meary angles for the right foot and for the left, before and after surgery.

F45- Postoperative casting after hallux valgus correction with a Reve-L +/- Akin osteotomy: a technical description – L Iselin, H Anwander, G Ganot, MK Ulrich

Introduction: Postoperative casting after a Hallux valgus correction is controlled with a Hohmann bandage or Hallux valgus cast. The patient has to redo the Hohmann bandage every day. For more patient comfort and controlling an individual postoperative position of the Hallux, in our institute we use during the early postoperative time the Hohmann bandage. When the stitches are removed, Kinesiology Tape replaces the Hohmann bandage using the following scheme. We use a 3d stretchable tape 5cmx450cm. Patients are instructed to apply the tape, a change is recommended every five to seven days.

Conclusion: Taping is a feasible technique for external fixation after hallux valgus correction with a Reve-L +/- Akin osteotomy. The application is simple and daily body care (eg. shower) is easily done with the tape.

**F46- Sinus tarsi approach vs. extensile lateral approach for intra-articular calcaneal fracture –
K Methee**

Introduction: The options of operative treatment for intra-articular calcaneal fracture still remains controversial. Extensile lateral approach allow excellent exposure to fracture, but bring high rate of wound complications. The aim of this study was to compare the outcome of intra-articular calcaneal fracture treated with open reduction and internal fixation via an extensile lateral versus. Sinus tarsi approach.

Methods Prospective randomize controlled study(RCT) of 62 intra-articular calcaneal fractures treated by open reduction and internal fixation between 2014, December to 2017, June. 29 were treated with extensile lateral approach with calcaneal locking plate (Wright medical, Tennessee), 33 sinus tarsi approach(4 cases need additional mini medial incision approaches for SanderIII AC,BC) with mini-calcaneal locking plate(Normed, Florida). Durations until operation, operative time,foot functional index(total score), visual analog scale, SF-36, Bohler's angle, angle of Gissane, wound complications and duration of hospital stay were recorded post-operatively, post operative CT at 6 months and minimal 12 months follow up.

Results Compared 2 groups with demographic datas.Average duration until operation; extensile group was 13.32 days , sinus tarsi group was 6.08 days, $p < 0.001$. Operative time ; extensile group was 123.41minutes vs. sinus tarsi group was 91.20 minutes, $p < 0.001$. Wound complications was 24.13% in extensile group vs. 6.06% in sinus tarsi group, $p = 0.045$, Duration of post-operative admission was 6.68 days in extensile group vs. 3.10 days in sinus tarsi group $p < 0.001$ FFI last visits was 25.36 in extensile group vs. 25.65 in sinus tarsi group, $p = 0.969$, VAS activity was 29.68 in extensile group vs. 28.54 in sinus tarsi group, $p = 0.271$. Post-operative CT scan at 6 months, extensile group 15/29(51.7%) of patients had CT scan and found mean posterior facet stepping= 0.74 mm vs. sinus tarsi group 17/33(51.5%) of patient got CT scan and found posterior facet stepping= 0.92mm, p -value =0.809 .

Conclusions Sinus tarsi approach with mini-calcaneal locking plate was a great option for treatment of intra-articular calcaneal fracture. This approach brought lower rate of wound complications, earlier operations, shorter operation times and shorter hospital stay with comparable clinical and radiographic results to extensile lateral approach.

F47- Ultrasound-guided decompression surgery of the tarsal tunnel: a novel technique for the proximal tarsal tunnel syndrome (Part II) – A Fernandez Gibello, S Moroni, G Camunas, R Montes, M Zwierzina, C Tasch, V Starke, J Sanudo, T Vasquez, M Konschake

Background: The aim of this study is to provide a safe ultrasound-guided minimally invasive surgical approach for a proximal tarsal tunnel release concerning nerve entrapments.

Methods and results: The study was carried out on ten fresh-frozen feet. All of them were examined by high resolution ultrasound at the medial ankle region. The surgical approach was marked throughout the course of the flexor retinaculum (laciniate ligament). Once the previous steps were done, the flexor retinaculum release technique was carried out with a 2-mm entry only. As a result, an effective and safe release of the flexor retinaculum was obtained in all fresh-frozen feet.

Conclusion: The results of our anatomic study indicate that our novel ultrasound-guided minimally invasive surgical approach for the release of the flexor retinaculum might be an effective, safe and quick decompression technique treating selected patients with a proximal tarsal tunnel syndrome.

F48- Ultrasound-guided decompression surgery of the tarsal tunnel: a novel technique for the distal tarsal tunnel syndrome (Part III) – S Moroni, A Fernandez Gibello, G Camunas, R Montes, M Zwierzina, M Konschake

Background: The aim of this study was to provide a safe ultrasound-guided minimally invasive surgical approach for a distal tarsal tunnel release concerning nerve entrapments.

Methods and Results: The study was carried out on 10 fresh-frozen feet. All of them have been examined by high-resolution ultrasound at the distal tarsal tunnel using the triangle of Heimkes as a reference. The surgical approach has been marked throughout the course of the medial intermuscular septum (MIS). Once After the previous steps, were done, a nerve external decompression was carried out through a MIS release with through a 2,5mm (+/- 0,5mm) surgical portal. As a result, an effective full width and safe release of the MIS has been obtained in all fresh-frozen feet.

Conclusion: The results of our anatomic study indicate, that this novel ultrasound-guided minimally invasive surgical approach for the release of the MIS might be an effective, safe and quick decompression technique treating selected patients with a distal tarsal tunnel-syndrome.

F49- Minimally Invasive vs open Scarf osteotomy for hallux valgus correction: Preliminary results – J Torrent, I Clares, E Rabat

Introduction: The purpose of this study was to compare the minimally invasive Scarf osteotomy technique and the open Scarf technique for correction of hallux valgus deformity

Material and methods: This is a preliminary report of the first cases enrolled in the randomized controlled trial about operative correction of hallux valgus with the Scarf technique using the Open technique vs the MIS technique. We have collected the early data of the first 34 patients with a follow-up of 3 months. Data were collected preoperatively and on 1 day, 1 month and 3 months. Outcome measures include the AOFAS-HMI Score, visual analog pain score, hallux valgus angle (HVA), and 1-2 intermetatarsal angle (IMA). Seventeen patients underwent MIS procedures and Seventeen patients received open procedures.

Results: Both operative techniques achieved significant correction of the hallux deformity. The intermetatarsal angle (IMA) improved from 15.5° to 6,58° in the MIS group and from 14,79° to 7,03° in the Open group, whereas the hallux valgus angle (HVA) improved from 32,2° to 11,6° in the MIS versus 32,54° to 9,04° in the Open group. However, the MIS group showed significantly lower rescue medication in the early postoperative phase: 23,52% MIS group required tramadol vs 41,18% in the Open group.

Conclusion: Both groups showed comparable good to excellent clinical and radiologic outcomes at 3-month follow-up.

F50- Treatment of displaced intra-articular calcaneal fractures with the intramedullary nail: results of the first twenty-six cases with two years follow-up – J Lucas, A Fourgeaux, O Laffenêtre

Introduction: In 2010, a new closed reduction, internal fixation procedure for displaced intra-articular calcaneus fractures (DIACF) was developed with an intramedullary nail introduced through a channel in the calcaneal tuberosity. The goal was to reduce the rate of skin complications following principles of open reduction procedures. The aim of this prospective monocentric study was to assess the occurrence of complications and the functional results using the AOFAS-AHS score. The secondary objectives were to assess first the restoration of the Böhler and Gissane angles on X-ray and shape of the calcaneus (Height, length, width) on CT scans, then thalamic reduction on 3D CT scans based on Goldzak's global articular reduction classification.

Material and methods: 26 Patients were included prospectively between 2014 and 2016 with analysis of X-rays and CT scans. Two were lost to follow-up and 2 patients sustained a secondary subtalar arthrodesis. After positioning a distractor and drilling, reduction was done with tamps and spatula. The nail was then introduced and locked with screws in the tuberosity and the constant fragment. After 3 weeks of non-weight bearing and 3 weeks with hindfoot off-loading shoe, full weight bearing was allowed. The functional outcome and restoration of the radiographic angles were evaluated postoperatively, at 3 months, 1 year and at the last follow-up. Global calcaneal shape and thalamic surface were evaluated postoperatively, at 1 year and at the last follow-up. The following early complications (delayed healing, infection, annoyed material, sural nerve lesion) and later complications (painful stiffness of the subtalar joint, hindfoot varus malalignment and calcaneofibular conflict) were recorded.

Results: Mean follow up was 2.4 years. The mean AOFAS-AHS score was 79 ± 12 [100; 61] in the 22 patients examined. The mean Böhler angle rose from $-1.29^\circ \pm 18^\circ$ [-35; 28] pre-operatively to $33^\circ \pm 6^\circ$ [22; 44] post-operatively. The mean calcaneal height index and length rose respectively from $0.44 \pm 0,18$ [0,12; 0,83] to $0.86 \pm 0,22$ [0,46; 1,1] and $82,4 \pm 5,4$ [72; 93] mm to $86,7 \text{mm} \pm 4,6$ [76; 97], and the width decreased from $49,8 \pm 4,8$ [38; 59] to $46,3 \pm 3,7$ [38; 55] mm. The Goldzak global articular reduction assessment was excellent in 39% of cases, good in 42% of cases and poor in 19% of cases. One case of deep infection was reported. Three patients needed device removal and two sustained a secondary subtalar arthrodesis.

Conclusion: Our prospective study on this new device has the longest time of follow-up. The results confirm the effectiveness and the reliability over time of the procedure to restore the global shape and the thalamic surface with a low rate of complications and quick return to activities. It appears to be an excellent compromise between the respect of the principles of reduction as applied in the ORIF procedures, and the low cutaneous risk of percutaneous procedures. A subsequent study, with a larger number of patients, will enable analysis of the correlation between the radiological markers and the AOFAS-AHS.

F51- Minimally invasive hallux valgus correction with PBS technique – FM Liuni, L Berni, A Fontanarosa, R Cepparulo, A Guardoli, A Bianchi

Introduction: Many procedures and different osteotomies have been described for percutaneous hallux valgus correction. Percutaneous techniques may lead to reduced morbidity, surgery, and recovery time. The aim of this retrospective study was to evaluate the clinical and radiographic outcome of a new percutaneous procedure (PBS-Percutaneous Bianchi System).

Material and methods: Fifty-eight cases were treated with the Percutaneous Bianchi System procedure to correct mild, moderate or severe hallux valgus deformity. All patients were clinically

assessed preoperatively and then followed up by weight-bearing x-rays, AOFAS (American Orthopedic Foot and Ankle Score), VAS (Visual Analogue Scale) pain score, and patient satisfaction survey.

Results: AOFAS scores improved from 28.6 at the preoperative assessment to 91.7 at the last follow-up. The VAS pain score improved from 6.7 at the preoperative assessment to 0.6 at the last follow-up. The mean Hallux valgus angle (HVA), Intermetatarsal angle (IMA) and Distal metatarsal articular angle (DMAA) decreased significantly from the preoperative assessment to the last follow-up.

Conclusion: The PBS technique is a safe, reliable, and effective procedure for the correction of symptomatic mild-to-severe hallux valgus.

F52- Cost analysis and Revenues comparing Open Chevron and Percutaneous, intraarticular, chevron osteotomy (PeICO) – J Del Vecchio, EA Uzair, M Corradi, D Chan, ME Ghioldi, L Chemes, ED Dealbera

Introduction: Percutaneous surgery is experiencing sustained and responsible growth based on third-generation techniques. There are only few studies attempting to correlate performance measures with outcomes through analysis of large clinical databases and they don't primarily address diseases and procedures common in foot and ankle surgery. Profit and Contribution margin (CM) are generally considered reliable gauges for providers' long- and short-term incentives, respectively. The purpose of this study was to identify patient characteristics associated with increased profit and CM when comparing Open Chevron and Percutaneous, intraarticular, chevron osteotomy (PeICO) for the treatment of hallux valgus.

Material and methods: Profit and Contribution margin were calculated for each patient as reimbursement less total and variable costs, respectively. Variable costs (the sum of all marginal costs attributable to a patient's care) and total costs (variable costs plus fixed, or overhead, costs) were derived from the hospital's cost accounting area. The surgical time and the cost of operating hours were also evaluated. Statistical analysis was performed using R language version 3.4.3. A P value of less than .05 was considered to be statistically significant.

Results: There were 24 (72%) unilateral and 9 (28%) bilateral procedures. Open Chevron was used in 21 feet (50%) and MIS in 21 (50%). The total average surgical time was 61 minutes for open surgery and 42 for MIS surgery (p-value of 0.0016, statistically significant difference). The total cost for open surgery was U\$S 1577.64 (SD 555.83) and U\$S 1394.33 (SD 504.92) for MIS with a p-value of 0.4892. The CM for open surgery was 0.4 or 40% (SD 0.18) and for PeICO was 0.46 or 46% (SD 0.11) with a p-value of 0.7532.

Conclusion: MIS surgery showed that is economically feasible and there is a variation in profitability between open and MIS surgery. Differences in profit and CM between various patient populations may make certain patients particularly attractive (or unattractive) to hospitals. Also, this motivation is likely to grow under shared savings programs. Pay for performance has gained popularity recently, in part due to previous reimbursement arrangements having failed to constrain medical inflation, encourage efficiency, and maximize value for a given amount of health care money. This payment method is growing slowly and progressively. Understanding the relative costs and margins and the factors that determine them will help providers and hospitals target cost-containment projects in light of our current global health care financial crisis.

FREE PAPERS (FP8) - Arthroscopy

F53- Arthroscopic Broström-Gould procedure A retrospective study of 89 consecutive non-select procedure – *J Lebecque, J Ovigie, M Dias, G Cordier*

Introduction: Ankle sprain incidence has a heavyweight on public health. Approximately, worldwide, one ankle sprain occurs per 10,000 person-days. Chronic ankle instability can happen even if an optimal functional treatment is a use, up to 20% at 30%. This instability leads to physical activity restriction, chronic pain and at the end stage severe osteoarthritis. Since Broström in 1966, we know that anterior talofibular ligament direct repair provides goods results. Gould modified the technic, with a retinaculum augmentation for protecting the suture and stabilized the result. For several years the “Broström-Goud” procedure became the gold standard in chronic ankle instability treatment.

Purpose and Hypothesis: Our study aims are to describe an arthroscopic Broström-Gould procedure using an additional lateral endoscopic portal for retinaculum reinforcement, evaluated at midterm the clinical result and the term for professional and sports activities return. Our hypothesis is this technic can improve AOFAS and Karlsson Score with a low rate of complication and an early recovery.

Methods: It is an observational retrospective study between January 2015 and November 2016 with a prospective data collection. All patients complained of an ankle instability with a failure of the medical treatment. A clinical examination assessed it with a comparative anterior drawer test and a talar test. An ultrasonography and an arthroCT was performed to diagnose a lateral ligament lesion and associated injury. Then, an arthroscopic Broström-Gould was performed. An independent observer recorded preoperatively and at the final follow-up the AOFAS ankle-hindfoot scoring system, the Karlsson–Peterson score and ankle range of motion. We registered the term for professional, and sports activities return.

Results: In our study 89 patients were analyzed. The average increased of AOFAS Score was 20 points ($p < 0,0001$). Prior to the surgery, the average Karlsson-Perterson score was 62 points, after it was 90 points ($p < 0,0001$). The average range of motion was 63° in the preoperative and 59° in the postoperative clinical examination. This difference exists mainly on ankle dorsiflexion with a loss of 3° ; there is only a loss of 1° in plantar flexion but it is not statistically significant. The average professional return was 3,7month, and the average sport's return 4,8 month. Overall, 83% of patients were satisfied or very satisfied after the procedure. Our complication rate was 11%. The revision surgery rate was 1,1%.

Conclusion: The arthroscopic Broström-Gould procedure using an additional lateral endoscopic portal improved ankle stability with a low complication rate and an early recovery.

F54- Treatment of bone marrow lesions with subchondroplasty – *T Dewilde, F Michels, S Clockaerts*

Introduction: Objectives Osteoarthritis of the ankle joint is not only characterized by degeneration of hyaline cartilage, but is a disease of the whole joint. Bone marrow lesions (BML) are also involved in the development and progression of symptomatic early osteoarthritis. BML's can be seen on T2 MRI-scan images in both talus and distal tibia. Highly symptomatic patients can be treated arthroscopically with a decompression of the lesion, by disrupting the intact cartilage or by debridement of a cartilaginous defect. Retrograde drilling and filling up the lesion with cancellous bone graft is another option but both treatment strategies are quite invasive and demand a long rehabilitation period. The same approach is used for patients with subchondral cysts without any

overlying cartilage lesions. Intralesional injection of calcium phosphate cement or subchondroplasty is a different way to approach this pathology. This new technique is less invasive for the patient and doesn't require a long rehabilitation. This technique was originally used to treat similar lesions around the knee. Recently, applications around the ankle joint are becoming popular.

Methods We present two first patients that were treated in our institution with the technique as described above. Both patients had talar lesions with intact overlying cartilage and had no improvement with conservative treatment. Technique. The injection site is preoperatively assessed on MRI scan and the location is correlated on fluoroscopy. Next, a fenestrated cannula is inserted into the lesion. When the position is satisfactory, highly porous calcium phosphate cement is injected. This procedure is often accompanied by tibiotalar arthroscopy. Postoperative protocol consists of non-weight bearing for two weeks followed by physiotherapy.

Results Surgical procedures happened without any difficulties. Early results are quite promising. Both patients experienced a complete relief of the preoperative symptoms and follow up MRI imaging showed correct filling of the defect without any residual edema. In addition, the results in our patients are compared with a literature overview and some recommendations for clinical use are given. In addition, the results in our patients are compared with a literature overview and some recommendations for clinical use are given. The current literature on subchondroplasty in the foot and ankle is sparse. Chan et al. recently reported retrospectively on 11 patients that had the same procedure combined with intra-articular bone marrow aspirate concentrate and found good to excellent results at one year follow up.(1) Similar results were obtained around the knee in earlier studies.

Conclusion We conclude that this new, minimal invasive technique can provide good to excellent results in selected cases of persisting pain due to BML's resistant to conservative treatment. Long term effects and the influence on progression to osteoarthritis still need to be assessed.

F55- Arthroscopic Brostrom Technique: clinical and functional outcomes – G Araujo Nunes

Introduction: To evaluate clinical and functional outcomes of a group of patients undergoing lateral ankle ligament reconstruction surgery by arthroscopic Brostrom technique.

Material and methods: This is a case series of 20 patients who underwent lateral ankle ligament reconstruction by arthroscopic Brostrom technique. Eight men and twelve women, average age 33, were diagnosed with chronic ligament instability and underwent surgery only after failure of conservative treatment for 3 months. Clinical evaluation was performed using the AOFAS and Karlsson Peterson (KP) scores, and the pain visual analogue scale (VAS) preoperatively and after 1 year of follow-up. We also evaluated the surgical complications and patient satisfaction.

Results: The mean AOFAS improved from 66.7 to 92.3 points. The average VAS pain from 6.4 to 1.42 and average KP from 57.2 to 91.1. All of them showed a statistically significant improvement ($p < 0.001$). Regarding the satisfaction index, 14 patients rated the result as excellent, five as good and one as regular. Three patients had superficial peroneal nerve neurapraxia solved with clinical treatment. Six patients despite satisfied with the treatment and the clinical and functional improvement patterns still had a degree of stiffness with decreased ankle plantar flexion.

Conclusion: The arthroscopic Brostrom was a safe and effective technique for treating ankle ligamentous instability, with a significant clinical and functional improvement and low rate of postoperative complications. Despite the good results and high rate of patient satisfaction, it is observed that an important percentage of the patients had some degree of ankle stiffness.

F56- The Osteochondral lesions of the talus – therapy strategies with a weak evidence – W Hazibullah

Introduction: Osteochondral lesions (OCL) are defined as a defect in the articular cartilage and subchondral bone. There is no gold standard for management of these. The aim of this meta-analysis is to analyse the different therapy regimes and to provide an evidence-based recommendation.

Material and methods: A Pubmed analysis was performed using a prospective study protocol with rating of the evidence level (Centre-for-Evidence-Based Medicine (CEBM)). The mean value of the pre- and postoperative AOFAS score and the difference (= Δ) were calculated.

Results: The number of articles was reduced from 1144 to 19 with evidence level I and II and 569 patients. 64.3% were male and 35.7% female. The mean age was 36.2 (18 to 74) years with a followed up for 27.5 (6 to 60) months. Lesions were medial in 78.1%, lateral in 21.3% and combined medial-lateral in 0.65%. The size of the OCL ranged between 46-400 mm² (Mean: 127 mm²). 6 studies described the results of microfracture, 2 studies of conservative treatment (PRP and HA), 3 studies of OATS, 2 studies of ACT 2 studies of MACT, 2 studies of allografts and 1 study of metal-inlay.

Conclusion: This study reveals the most successful results were from one step bone-stimulating procedures (MFX and BMDCT). According to the CEBM classification the following recommendation can be made: operative therapy of OCL: BMDCT and MFX: Grade C. OACT, ACT MACT: Grade D. Our data shows the lack of studies with a high evidence level.

F57- Previous Ankle Conflict in the Footballer – M Arssi, A Fennane, H Garnaoui, M Rahmi, A Garch

Introduction: The anterior conflict of the ankle is a reason for frequent consultation at the footballer. It is essential to determine the tissue or bone origin of the conflict. The aim of this work is to show the contribution of arthroscopy in the treatment of this conflict.

Material and methods: The authors report a series of 75 cases of anterior ankle conflict in high-level footballers. The diagnosis was based on clinical criteria (Liu criteria) and on a radiological assessment (standard radiology, computed tomography and / or MRI). All patients were treated with arthroscopy.

Results: The mean age was 24 years (20-32 years), who had antero-external and antero-internal pain and functional impairment in 90%. Imagery revealed the bone origin of the conflict in 100% of cases and associated to tissue lesions in 30% of cases. The treatment consisted of resection the impingement using the arthroscopic technical. The results were very good to good in 80% according to KITAOKA score. 70% of patients have returned to the sport at the same level. Discussion Before the advent of arthroscopy, most of these symptomatic conditions required open surgery, but part of the complaints were not explained by the intraoperative findings. More, recurrences were more frequent following the increase in scar tissue. Arthroscopy has reduced the rates of complications and recurrences by a less invasive and traumatic approach. However, residual pain persists which can be explained by synovial lesions and associated osteoarthritis.

Conclusion: One question remains central, what are the limitations of arthroscopic treatment of previous conflicts and up to what stage of ankle osteoarthritis can anterior arthroscopy debridement relieve the patient?

F58- Reconstruction of focal osteochondral defects of the talus by arthroscopically-assisted Autologous Matrix Induced Chondrogenesis– *FV Sciarretta, P Versari, L Marcellini, E Di Cave*

Introduction: Osteochondral defects of the talus are reported to occur in over two thirds of severe ankle sprains and often are initially misdiagnosed. Autologous matrix-induced chondrogenesis (AMIC) represents the smart scaffold one-step cartilage repair technique more described in the literature, with good long term results in the knee and in the hip and ankle. Aim of this study is to evaluate and confirm clinical and radiological results of patients treated by OCL arthroscopically-assisted debridement, microfractures and sealing of the treated defect by a bilayer collagen matrix.

Material and methods: 10 patients received an AMIC reconstruction procedure consisting of OCL debridement, microfractures and sealing of the treated defect by a bilayer collagen matrix. The procedures were performed arthroscopically, associated to ligament repair in one third of cases, in absence of any malleolus osteotomy. Patients were clinically evaluated pre-operatively and at 6, 12, and 24 months post-operatively using the American Orthopaedic Foot and Ankle Society (AOFAS) ankle score and the the visual analog scale (VAS) for pain. Radiological assessment included Magnetic Resonance Imaging (MRI) and Magnetic Resonance Observation of Cartilage Repair Tissue (MOCART).

Results: : The mean AOFAS score improved significantly from a pre-operative score of $51,3 \pm 11,1$ to $88,3 \pm 8$ ($p < 0.05$). According to the postoperative AOFAS scores 2 cases obtained excellent results, 7 were classified as good, and 1 was fair. VAS score improved from a preoperative value of 7.3 ± 1.5 points to 1.4 ± 1.1 points at last follow-up ($p < 0.05$). The MOCART score for cartilage repair tissue on postoperative MRI averaged 63.9 points (range, 29–86 points).

Conclusion: Several operative treatments have been proposed for talus OCL treatment (OATS, ACI, MACI, allografts) each of them presenting different limitations (donor site morbidity, double-stage procedures, high costs and limited availability) that may limit their use. Our study confirms that the arthroscopically-assisted AMIC procedure guarantees a significative improvement in pain and function progressively furtherly noticeable over the follow-up years and that this technique is safe for the treatment of OCLs in the ankle with overall good clinical and MRI results.

F59- Reconstruction of osteochondral lesions of the talar dome with an arthroscopic assisted Biological Inlay Osteochondral Reconstruction (BIOR) technique—Midterm results – *M Podsiadlo, H Laprus, W Klon, B Sadlik*

Introduction: Surgical treatment for osteochondral lesions of the talus (OCLT) must restore the convexity and curvature of the bone. Here, we present results after 2 years follow-up and describe the biological inlay osteochondral reconstruction (BIOR) procedure. Talar bone defects with the mean size of $14 \times 9,88$ were restored by the same surgeon with the use of autologous bone chips (that were mixed with bone marrow concentrate and fibrin glue) and covered with a xenogeneic collagen membrane infiltrated with bone marrow concentrate and stabilized by fibrin glue during single-step arthroscopic assisted procedure.

Material and methods: In the research 8 patients, who were treated using BIOR technique were included and assessed clinically as well as with the use of MRI after an average follow-up period of 12 and 24 months, using the clinical American Orthopaedic Foot and Ankle Society Ankle Hindfoot Scale (AOFAS) score, Visual Analog Score (VAS) and radiological magnetic resonance observation of cartilage repair tissue (MOCART) score.

Results: : The mean AOFAS score increased further from 71.50 (22.5) points to 88.13 (7.4), the median VAS score reduced from 4.5 (3.0), to 0.00 (1.0) points which was statistically significant using Wilcoxon Matched-Pairs. The average MOCART score was 88.125 in the final follow-up.

Conclusion: The presented BIOR technique permanently reduces pain, increases ankle joint mobility in daily life and recreates the convexity and curvature in osteochondral lesions of the talar dome with a single step surgical procedure.

FREE PAPERS (FP9) - Miscellaneous

F60- Spherical metatarsophalangeal implants of the first ray in pyrocarbon HAPY®: series of 18 cases – *M Maestro*

Introduction: After failure of conservative treatment, arthrosis MTP1 can be treated by arthrodesis of the first metatarsophalangeal joint (MTP1) recommended, or prosthetic arthroplasty MTP1 but with controversial results in the short and medium term.

Hypothesis: The absence of osteointegration of the spheric MTP1 implant HAPY® pyrocarbon and its modulus of elasticity almost equal to that of cortical bone, made it possible to limit the complications of conventional prosthetic arthroplasties, and should be an alternative to arthrodesis.

Material and methods: This was a prospective, mono-centric study. The criteria of clinical and radiological analysis were, before and after surgery: pain (EVA), the AOFAS score, the intermetatarsal angle M1M2, the metatarsophalangeal angle M1P1, the modifications of the bone matrix (bone cyst, osteocondensation, osteolysis). At the last follow-up, the patients answered a satisfaction questionnaire.

Results: : between november 2010 and may 2015, 18 MTP1 pyrocarbon spheres were implanted in 17 patients , 11 of whom had hallux rigidus disease stage 2B MTP1 stages 2B and 3 Regnaud classification (Coughlin stages 3 and 4). The average age was 64 years (36-82 years), the average follow-up was 36 months (12-65 months). The mean EVA score was 1.7 / 10 postoperatively (7.7 / 10 preoperatively). The AOFAS score was 83/100 postoperatively (56/100 preoperatively). There was no significant change in intermetatarsal angle and metatarsophalangeal angle postoperatively. 2 patients had osteocondensation of the first phalangeal, stable on successive Xray control. 2 patients were not satisfied: 1 patient with phalangeal osteocondensation, and 1 patient who had a poorly positioned HAPY® prosthesis initially and salvage by MTP1 arthrodesis.

Conclusion: : The HAPY® spherical implant seems to be a reliable surgical option for the treatment of MTP1 osteoarthritis , done with precise planning for optimal positioning of the implant. Immediate weight bearing is allowed. We did not observe disturbing changes in the bone structure (osteolysis, bone cyst) at the last follow-up.

F61- The influence of the ossification centres on the geometry of the calcaneus – B Pombo Ferreira, R Branco, R Silva, F Ferreira, M Areias, P Goncalves

Bohler's angle and the crucial angle of Gissane are used on the evaluation of calcaneus fractures. However, the variation of the angles when the calcaneus is growing has been described only by few authors. Bohler's angle and the crucial angle of Gissane in paediatric population were measured using lateral foot radiographs of 429 patients, from 0 to 16 years-old. The control group was composed of 70 adult patients. The sample had a mean Bohler's angle of $35.4 \pm 5.9^\circ$ and a mean crucial angle of Gissane of $110.5 \pm 7.4^\circ$. The greater mean difference was identified for Bohler's angle (eight degrees) in the age group from 5 to 8 years-old ($39.6 \pm 5.7^\circ$) and for the crucial angle of Gissane (five to six degrees) in the age group from 0 to 4 years-old ($115.8 \pm 7.3^\circ$) ($p < 0.05$). The influence of the ossification centres on the geometry of the calcaneus across age groups makes Bohler's angle and the crucial angle of Gissane higher in young children. The increase of Bohler's angle points out the relative development of the posterior facet in young children and the importance of the reconstruction of the posterior facet height in the intra-articular calcaneus fractures.

F62- Tissue engineered biphasic stratified scaffold in talus articular cartilage and subchondral bone reconstruction– FV Sciarretta, P Versari, E di Cave

Introduction: There is still no general consensus on the ideal treatment of osteochondral lesions of the talus (OLT) is still. The tissue engineered layered TruFit plug has been investigated as a potential treatment method for osteochondral defects. This is a biphasic scaffold designed to stimulate cartilage and subchondral bone formation. In this study we investigate the long-term functional and MRI outcomes of the TruFit Plug for the treatment of OLT.

Material and methods: Twelve consecutive patients treated from March 2007 to April 2009 for OLT were evaluated. Clinical examination included the American Orthopaedic Foot and Ankle Society (AOFAS) ankle score and the visual analog scale (VAS) for pain. MRI scans were obtained pre-treatment and at last follow-up. The Magnetic Resonance Observation of Cartilage Repair Tissue (MOCART) score was used to assess cartilage incorporation.

Results: Mean follow-up was 7.5 years (range, 6.5–8.7 years). The average age was of 38.6 years (range, 22–57 years). The sex ratio between males and females was 3:1 (9 males, 3 females). The mean AOFAS score improved from a preoperative score of 47.2 ± 10.7 to 84.4 ± 8 ($p < 0.05$). According to the postoperative AOFAS scores 1 case obtained excellent results, 9 were classified as good, and 2 were fair. VAS score improved from a preoperative value of 6.9 ± 1.4 points to 1.2 ± 1.1 points at last follow-up ($p < 0.05$). The MOCART score for cartilage repair tissue on postoperative MRI averaged 61.1 points (range, 25–85 points).

Conclusion: The long-term results suggest that the cartilage and subchondral bone reconstruction through the implantation of TruFit Plug for OLT is safe and demonstrates good clinical post-operative scores including improvement of pain and function, with partially discordant MRI results. Comparative randomized controlled clinical trials comparing TruFit Plug with an established treatment method are needed to confirm synthetic biphasic implants as therapy for osteochondral lesions.

F63- Metatarsophalangeal joint mobility in minimally invasive hallux valgus surgery – JL Castellini, B Boietti, D Goncalvez, M Khoury

Introduction: Minimally invasive Hallux Valgus (HV) surgery has gained popularity despite the potential disadvantage of joint mobility loss. Most studies often evaluated radiographic angles and AOFAS score post HV surgery, however few reports about postoperative mobility were found. The objective of the study was to evaluate metatarsophalangeal joint mobility differences before and after surgery in patients treated with minimally invasive techniques for HV.

Material and methods: A series of 43 HV cases in 34 patients were reviewed. Minimally invasive surgery (31 with distal first metatarsal osteotomy and 12 with distal first metatarsal plus proximal phalangeal osteotomies) without rigid osteosynthesis and a postoperative rehabilitation program were performed. At preoperative and postoperative time, radiographs, AOFAS score and metatarsus phalangeal joint passive total Range of Motion (ROM) were evaluated.

Results: The hallux valgus angle (HVA) median was 27 degrees before surgery and 11 degrees a year after surgery ($p<0.0001$). AOFAS median was 50 points before surgery and 91 a year after surgery ($p<0.0001$). ROM median was 100 degrees before surgery and 91 degrees a year after surgery ($p=0.176$). Compared to preoperative measures, ROM was a 33.82% and 3.75% smaller at 45 days and a year after surgery, respectively.

Conclusion: The clinical and radiographic results improved significantly. There was a loss of ROM at 45 days after surgery but it recovered a year after surgery to 3.75% less than the initial value. The overall results were satisfactory. More studies are needed to evaluate long-term ROM modifications and its relation with joint arthrosis and the age of the patients. Level of Evidence Level IV.

F64- Treatment of tarsometatarsal osteoarthritis using basal metatarsal arthroplasty : a retrospective study of 26 cases at a 8-years follow-up – M Dias, J Lucas y Hernandez, T Fabre, O Laffenêtre

Introduction: The treatment of tarsometatarsal osteoarthritis is poorly discussed in the literature. Although the tarsometatarsal arthrodesis is recognized as the gold standard for midfoot arthritis, this technique involves limitations and complications. The aim of our study was to analyze clinical outcomes of tarsometatarsal basal arthroplasty, initially described by H. ROCHER in 2007, in the treatment of midfoot arthritis.

Material and methods: This was a multicentric retrospective study with single surgeon. There were 2 men and 24 women treated from 2010 to 2017. The average age was 62,5years [40-86 years]. The tarsometatarsal osteoarthritis was diagnosed by weight bearing X-ray. Smoking patients, with a midfoot deformation requiring an axial correction and with local effective infection were excluded from the study. Other surgical acts were associated with the arthroplasty technique: 18 surgery of hallux valgus, 9 lateral rays procedures (DMMO, claws toe) and 9 other procedures (arthrodesis, cyst resection...). 22 patients (24 feet) have been contacted by phone to collect clinical results (pain, edema, footwear, activity) by an independent examiner.

Results: Over the last 8 years, arthroplasty of the metatarsal bases brought 86.4% of good and very good results. The complication rate was 22.7%. The most common was weight transfers with metatarsalgia or adjacent osteoarthritis. No delayed wound healing or nerve damage was observed. There was no evidence of a relationship between patient weight and outcomes, nor with

their activities. Other surgical procedures on the forefoot may have been performed without difficulty on the same surgical time without more complications.

Conclusion: The basal metatarsal arthroplasty appears to be a simple and reliable surgical technique. This is a good alternative to tarsometatarsal arthrodesis. It has a real cost-effective advantage and remains accessible to an arthrodesis revision procedure. Nevertheless, its reproducibility must be investigated in a multicentric and prospective study.

F65- Pearls and pitfalls of calcaneal ossoscopy – A Toepfer

Benign osteolytic lesions of the calcaneal bone consist predominantly of unicameral bone cysts and intra-osseous lipoma. Although these are rare entities which are mostly diagnosed due to unspecific heel pain or appear as an incidental finding, pathologic fractures impose a relevant risk to the integrity of the hindfoot. Minimally-invasive ossoscopy with endoscopic resection of the tumor followed by grafting can potentially minimize risks of open surgery and speed up convalescence. The objective of this study is to present pearls and pitfalls of the first 20 patients treated with calcaneal ossoscopy between December 2013 and December 2018. We come to the conclusion that calcaneal ossoscopy is a simple, safe and cost-effective surgical technique for endoscopic, minimally-invasive treatment of benign osteolytic lesions of the calcaneus.

F66- The role of the MetatarsalSesamoidal Joint in hallux valgus pathology – G Bulstra, B van Dalen, J de Poorter, P van Kampen, G Kerkhoffs

Introduction: In hallux valgus the lateral shift of the medial sesamoid increased in association with progression of the deformity and of degenerative changes within the metatarsalsesamoid joint (MSJ). The importance of the position of the sesamoids after hallux valgus surgery is well described. However still a little is known of the MSJ complex in this population. We hypothesises that in patients with a hallux valgus the medial groove and the intersesamoidal ridge has been affected. And that in the older hallux valgus population it is associated with erosion of the intersesamoidal ridge in comparison to the younger hallux valgus population.

Material and methods: In an observational cohort study, of the MSJ the medial groove, the ridge and the medial sesamoid has been described during hallux valgus surgery by two experience hallux valgus surgeons. On weightbearing radiographs we measured the hallux valgus angle, the intermetatarsal angle and the size and position of the sesamoids.

Results: In the cohort we obtained measurements of in total 104 patients and 117. Of the 117 feet 89% had a more or less affected medial groove, 85% showed a changed ridge and of 47% the sesamoids were not normal of shape or position. Patients by whom the ridge was grind away N=55 mean age 57 (95% BI 54-60) were significantly older compared to the patients with a slightly present or absent ridge N=44 mean age 48 (95 BI 43-53). Discussion Concerning failure of re aligning the sesamoids underneath the metatarsal head in hallux valgus surgery the following must be considered. The development of the groove and or ridge is in most cases not as described in anatomical studies. Also in almost the half of the patients the sesamoids are anatomical different of shape/size or their position.

Conclusion: The MSJ is, especially the medial groove and ridge, almost always affected in patients with a hallux valgus. This might have an impact in the outcome of the hallux valgus surgery.

F67- Comparison of the pain intensity and early functional outcomes after open and percutaneous hallux valgus surgery - prospective randomized control study – H Liszka, M Malczak, A Gadek

Introduction: Comparison of the pain intensity and early functional outcomes after open and percutaneous hallux valgus surgery - prospective randomized control study Liszka H, Malczak M, GÄ...dek A. Introduction Minimally invasive techniques (MIS) in hallux valgus surgery are being increasingly used. We believe that the main advantages of MIS are lower postoperative pain levels and comparable functional outcomes. Objectives The purpose of this study was to compare early postoperative outcomes in patients who received open and percutaneous hallux valgus surgery.

Material and methods: We present prospective, randomized, monocentric study. Patients were randomly qualified into two groups: Group A received open hallux valgus surgery (chevron , scarf +/- Akin) (n=40). Group B received percutaneous hallux valgus surgery (PERC, MICA). Patients were evaluated for pain intensity in 2, 4,8, 12, 16, 24, 48, 72 postoperative hour, 2 and 6 weeks after surgery using Visual Analogue Scale (VAS). We assessed medicament consumption during 6 weeks postoperatively. We used American Orthopaedic Foot and Ankle Society (AOFAS) hallux-metatarsophalangeal-intraphalangeal scale for clinical assessment preoperatively and at 6 weeks follow-up.

Results: Average VAS score was significantly lower in group B compared with group A in 12 hour (3,2 vs 5,8 p< .001) , 16 hour (3,1 vs 5,6 p<.001), 24 hour (2,2 vs 5,1 p<.001), 48 hour (1,9 vs 4,8 p<.001), 72 hour (1,5 vs 4,3 p<.001), 2 weeks (0,8 vs 2,3 p<.05). In both groups average AOFAS score improved after 6 weeks postoperatively (group A 44,2 vs 60,4 p<.05; group B 43,8 vs 79,1 p<.05) with significantly better score in group B (<.05).

Conclusion: Percutaneous hallux valgus surgery gives better early functional outcomes and lower pain levels compared to the open techniques.

F68- Adducted Fifth Toe Deformity treated by Minimally Invasive Surgery – C Biz, R Baracco, I Fantoni, G de Guttry, P Ruggieri

Introduction: Adducted fifth toe is an uncommon deformity of forefoot, first described in 1929 by Stracker. It can be isolated or associated with other forefoot deformities, such as hallux valgus, or other clinical conditions, such as metatarsalgia. The aim of this study was to evaluate the clinical and radiological outcomes in patients treated with minimally invasive surgery (MIS).

Material and methods: From January 2013 to June 2018, 30 patients, who had undergone MIS, were enrolled. All patients were then treated with a hyper-corrective bandage and flat shoes for 4 weeks. Clinical (AOFAS score) and radiological (at 1, 3 and 6 months) outcomes were recorded, together with demographical data, other coexisting correction of the deformities and complications.

Results: : Thirty patients (30 feet) with a mean age of 64.5 (57-71) years were evaluated. Of these patients, 23 were female (76.6%); 14 patients (46.6%), all females, underwent a concomitant omolateral hallux valgus correction and metatarsalgia treatment. Most of the osteotomies (24/30 - 80%) healed by 3-month follow-up, while the 6 feet remaining healed within the sixth month. The mean AOFAS score was 78.7. No complications were recorded.

Conclusion: Correction of adducted fifth toe deformity is still controversial, but MIS is a safe and reproducible method to treat such deformity, with minimal risk for soft tissues. Nonetheless, this procedure should be performed by an expert trained surgeon in M.I.S.

F69- Our experience in UAE with Minimally Invasive Surgery in Foot & Ankle. Extended clinical applications – *M Taba*

We have been using MIS since 2006 in UK and in UAE since 2011.

Indications: Metatarsalgia, Morton's neuroma, Diabetic ulcers, Non union proximal 2nd metatarsal fracture, Claw toes, Taylor and bunionette.

We present our experience in treating Mortons neuroma and metatarsalgias, in more than 10 cases using MIS DMO technique.

None of the operated cases in the last 8 years required revision surgery.

E-POSTERS

E-POSTERS - Arthroscopy

E1- Peroneal Tendoscopy Through Lateral Portals – *D Saraiva, A Rodrigues*

Background Peroneal tendons pathology is a common cause of lateral ankle pain. Differential diagnosis include tenosynovitis, partial or total rupture, intrasheath subluxation or peroneal retinaculum injury with tendon dislocation. Traditionally, open surgery was performed and some of the described complications included infection, scarring, stiffness of the ankle or injury to the sural nerve or superficial peroneal nerve. Tendoscopy is an endoscopy of the tendon sheath and, as a minimally invasive procedure, some of the proposed advantages include less morbidity and reduction of postoperative stiffness of the ankle. The peroneal tendons are particularly accessible for this procedure due to their subcutaneous position along the lateral side of the ankle.

Objectives To present the preliminary results of four peroneal tendoscopies performed in our institution with a minimal follow up of one year.

Study Design & Methods The mean age was 38 years. Three were female and one was male. All patients reported at least one episode of inversion trauma of the ankle. Edema and lateral retromalleolar ankle pain over the peroneal tendons and with eversion of the ankle against examiner active resistance were present on all patients. There were no signs of subjective or objective instability of the ankle in any of the patients. Magnetic resonance imaging (MRI) showed fluid and synovitis on all patients as well as rupture of the peroneal brevis on two of the patients. After failure of a trial of conservative treatment including physiotherapy, resting and oral medication, surgery was indicated. The minimum follow-up was one year. All patients were evaluated according to the AOFAS score for ankle and hindfoot and the visual analogue pain scale (VAS) in the preoperative and at the end of follow up.

Results All patients underwent arthroscopy of the ankle through the anterior portals to exclude intra-articular pathology followed by tendoscopy of the peroneal tendons through the lateral portals. We proceeded with synovectomy and excision of fibrotic tissue, until normal tendon slip was observed. In two cases, open approach was used to perform tubularization of the peroneal brevis due to partial rupture involving over 50% of the tendon. We did not register any complications. The AOFAS score for the ankle and midfoot increased from 72 preoperatively to 90 postoperatively and the mean VAS increased from 5 preoperatively to 8 postoperatively.

Conclusions Our results are retrospective, preliminary and result from a small series of patients. However, the good clinical and functional results and the absence of complications are consistent with the published literature.

E2- How to drill the calcaneal tunnel in calcaneofibular ligament reconstruction? – F Michels, H Wastin, K van Compernelle, S Clockaerts, F Stockmans, E Vereecke

Objectives: Anatomical ankle ligament reconstruction has become a common procedure to treat chronic ankle instability. When performing an anatomical reconstruction of the calcaneofibular ligament(CFL), a graft is often fixed in bone tunnels. On the lateral side, the entrance should be at the normal anatomical insertion point. On the medial side, an transosseous bone tunnel should avoid the neurovascular bundle. The advent of new endoscopic and percutaneous techniques to perform this procedure increases the need for anatomical landmarks and guidelines. The purpose of this study was to determine some guidelines for tunnel positioning based on external palpable anatomical landmarks.

Methods: In ten lower leg cadaveric specimens a lateral and a medial procedure were performed. On the lateral side, a pin was drilled on the intersection of 2 lines based on external landmarks. The first line was parallel with the fibula passing through the posterior point of the lateral malleolus. The second line was placed at an angle of 45 degrees to the first one and passed through anteroinferior border of the fibula. During this procedure also a second pin was drilled(blinded to the earlier marked landmarks and pin) to assess the interobserver reliability. Dissection allowed to measure the distance to the anatomical foot print. The medial side was divided in four quadrants based on the upper posterior edge and the lower anterior edge of the tuber calcaneal tuberosity. Anatomical dissection was performed to assess the position of the neurovascular structures relative to the four quadrants.

Results: On the lateral side, the mean distance to the centre of the CFL footprint was 1.7 mm (0-11mm). The mean distance between both observers was 3.17 mm. The mean distance to the sural nerve was 1.7 mm. The mean distance to the peroneal tendons was 7.1 mm. On the medial side, a safe zone without important neurovascular structures was found and corresponded to the lower inner quadrant. The upper inner quadrant always contained the neurovascular bundle and thus should be avoided. In the upper outer and lower outer quadrants, sensory branches of the tibial nerve were found in a minority of the specimens.

Conclusion: The described guidelines are useful when reconstructing the CFL using a less invasive technique. Lateral landmarks allowed to locate the CFL footprint. A medial safe zone could be determined to guide tunnel direction.

E3- Arthroscopic findings in patients who underwent surgery for ankle fracture type B and C by Denis Weber – AC King Martinez, A Cuellar Avaroma

Introduction: Understand the arthroscopic findings, in patients who underwent surgery consisting on open reduction internal fixation and position screw placement of Weber type B and C fracture at the removal of the situation screw between 6 to 8 weeks post-reduction.

Material and methods: This is a prospective study of patients who underwent open reduction, internal fixation and placement of a position screw for ankle fractures type B and C of Denis Weber and who in which we performed an anterior ankle arthroscopy at the time of the situation screw removal. The arthroscopy was performed, without ischemia, without limb traction, or arthroscopy pump. The arthroscopies were performed during the period between March 2016 and March 2018.

Results: The files of 31 patients were analyzed. 11 women (35%) and 20 men (65%), with an average age of 33. The most common findings presented were as follows: 30 patients presented diffuse fibrosis (96%) and 13 (42%) patients presented synovitis. 23 patients (75%) presented chondral lesions of the talar dome. The regions with the most cases of chondral lesions were region number 3 with 9 patients and region number 4 with 8 patients. Regions 7, 8 and 9 did not present chondral lesions in this series. Of the 31 patients, 3 had instability of the syndesmosis, with an opening greater than 4mm and 3 patients presented free body.

Conclusion: The most common finding was diffuse fibrosis presented in 96% of patients followed by synovitis in 77%. Despite having made an anatomical reduction, the ankle fracture, according to the post-surgical radiographic images, of all the patients had a high incidence of the sequelae associated with the ankle fractures type B and C of Denis Weber. These injuries can have a great impact on the postoperative evolution of our patients. This study needs a larger number of patients, however, it allows us to suppose the advantages that it may be for our patient to perform an arthroscopy either at the time of reduction or withdrawal of the synthesis material. This arthroscopic procedure showed a low rate of complications.

E4- All-arthroscopic AMIC® (AT-AMIC) in the treatment of osteochondral talar lesion: A Case report – G Araujo Nunes, O de Oliveira Junior

Introduction: The objective of this study is to report the postoperative clinical outcomes of a patient with osteochondral talar lesion (LOCT) undergoing the all-arthroscopic Matrix Induced Autologous chondrogenesis technique AMIC® (AT-AMIC®) combined with autologous bone graft placement.

Material and methods: This is a case report of a female patient, 33 years old, diagnosed with LOCT measuring 11.2 x 8.2 mm diameter, submitted by AT- AMIC® surgery technique after recurrence pain and bad evolution with the conservative treatment and treatment surgical performed by arthroscopic drilling. The patient answered to the questionnaire and visual AOFAS scale (VAS) preoperatively and postoperatively after 12 months of follow-up.

Results: The AOFAS score before surgery was 58 points and the EVA was eight. At the last follow-up performed 12 months after surgery the AOFAS was for 90 and the EVA for 03 points. No surgical complications were observed.

Conclusion: We reported a case of LOCT treated surgically by all-arthroscopic Matrix Induced Autologous chondrogenesis technique (AT-AMIC®) combined with autologous bone graft placement that achieved good results.

E5- Posterior ankle bony impingement: outcome of posterior ankle arthroscopy about 5 cases – Y Saadi, Y Benyass, M Boussouga

Introduction: This study aimed to evaluate the clinical outcome of posterior ankle and hindfoot arthroscopy for posterior ankle bony impingement.

Material and methods: We studied 5 patients who underwent a posterior ankle endoscopic procedure during the period between January 2014 to June 2017, with the diagnosis of posterior ankle impingement. For all patients, the ankle functional score of the American Orthopaedic Foot and Ankle Society (AOFAS) was used in pre-operative and at the last check. All patients had for at least two months medical treatment before receiving posterior hindfoot endoscopy using a posteromedial and postérolatéral approach in the prone position.

Results: The average follow-up was 16 months (9-24 months). The average age of our patients was 36 years (29-45 years), 60% of them were men, a slight predominance of the right side by 60% compared to the left side, the etiologies were dominated by the trigone bone fracture (40%), followed by the Stedia process (20%), bone excrecence (20%) and fractures sequellas (20%). Postoperative evolution was marked by the total disappearance of posterior ankle impingement syndrome symptoms. The average preoperative AOFAS scale of 70/100 (65-80) rose to 90/100 (85-100). Our patients returned to their sport activities at a median time of 6 weeks. They rated their personal satisfaction as very satisfied in 4 cases (80%), satisfied in 1 case (20%). No complications have been observed.

Conclusion: Posterior ankle arthroscopy is an ideal option for posterior ankle impingement syndrome as it presents remarkable lower complication and quicker return to sport.

E-POSTERS - Percutaneous Surgery

E6- Percutaneous treatment of a posterolateral calcaneal bump – F Michels

Introduction: Surgical treatment of exostoses of the heel is usually performed with open or endoscopic techniques. Endoscopic techniques are valuable in case of a central prominence without damage of the achilles tendon. Open resection of the exostosis is related to wound healing problems and a longer rehabilitation period. Often the location of hyper pressure is limited to the lateral aspect of the heel. The purpose of this study was to evaluate a percutaneous technique to perform a resection of a bump located on the posterolateral side of the calcaneum.

Material and methods: Five patients with a bump located on the posterolateral side of the calcaneum were included in this study. All patients were resistant to non-surgical treatment (at least 6 months) which included shoe modification, orthosis, physiotherapy, and anti-inflammatory drugs. Pain was limited to the posterolateral border of the calcaneum without any signs of retrocalcaneal bursitis or achilles tendinopathy. The surgical management consisted of a percutaneous removal of the posterolateral bony ridge of the calcaneus. Using a Beaver blade and a periosteal elevator a working area was created. With burr (Wedge burr 3.1 x 13 mm) the bone of ridge was removed and washed out. The procedure was continued until a smooth surface is obtained.

Results: We treated 3 women and 2 men with an average age of 26. Surgery was performed between September 2014 and October 2017. All patients were followed up from 12 to 49 months (mean: 26 months). All surgery was performed in one day clinic under locoregional anaesthesia. Two days of rest and elevation was recommended. Normal walking was possible after 4 days. Local swelling continued until 5 weeks. No wound problems or other complications occurred. At final follow up all patients were without any complaints.

Conclusion: Percutaneous resection of a posterolateral exostosis of the heel can be considered in patients with resisting pain limited to the posterolateral side of the heel.

E7- Distal metatarsal mini-invasive osteotomy (DMMO): a cadaveric study – F Michels, S Clockaerts, E Matthys, L Baekelandt, K Callens, E Verecke

Objectives The purpose of this study was to evaluate a percutaneous technique to perform an osteotomy of the central metatarsals

Methods Ten lower extremity cadaveric specimens were used. An osteotomy of the second, third and fourth metatarsal was performed using a standardised technique. The technique was performed by a trained foot and ankle surgeon with experience in percutaneous foot surgery. The

specimens were dissected to expose the local neurovascular structures. The specimens were assessed for macroscopic lesions of the digital nerves, the arteries and veins. In addition, the aspect of the osteotomy was assessed for completeness and orientation.

Results In total 30 osteotomies were performed. The plantar and dorsal interdigital nerves were intact in all specimens. Digital arteries were exposed but no injuries were found. In 2 of the 10 specimens an injury of the dorsal veins were found. All osteotomies were complete and located in the metaphyseal area. The measured angle between the plane of the osteotomy and the metatarsal varied from 40 to 60 degrees.

Conclusion The described technique, which involves a percutaneous osteotomy of the central metatarsals is reproducible. The risk to macroscopic damage of the local neurovascular structures is low.

E8- Surgery of hallux valgus by SCARF without osteosynthesis – M Yahyaoui, M Benhammou, S Aharram, J Amghar, O Agoumi, A Daoudi

Introduction: The hallux valgus is one of the most frequently encountered osteoarticular deformities in the pathology of the forefoot. Numerous surgical techniques have been described over the years to reach about 150. The aim of this work is to deduce the interest of SCARF osteotomy without osteosynthesis and to evaluate the radiological and functional results of the patients treated by this technique.

Material and methods: Retrospective study of 15 cases of hallux valgus, collected in the traumatology-orthopedics department, UHC Mohammed 6th-Oujda between July 2016 and July 2018, all operated by SCARF osteotomy without osteosynthesis.

Results: Average follow-up: 15 months Average age: 50 years Female gender: 84.61% Gene at boot : 100%, metatarsalgia : 61.53% Egyptian foot : 53.84% Mean angle M1P1 preoperatively 37.31 ° ; postoperative 12.54 ° M1M2 preoperative average 15.85 ° ; postoperative 5 ° Preoperative mean DMAA 20.77 ° ; postoperative 7.08 ° Subjective functional results : satisfied to very satisfied 85% Objective functional results (KITAOKA score) : 58.23 / 100 preoperative; 85.38 / 100 postoperative Complications (residual pain, stiffness of the MTP joint) : 15%.

Conclusion: SCARF without osteosynthesis is compatible with the correction of moderate to severe hallux valgus. It is an economical, reliable and biological technique.

E9- Short-Term Outcomes of First Metatarsophalangeal Joint Hemiarthroplasty in Hallux Rigidus – S Harrington, R Gul, J Hepburn

Introduction: Provide a case series and assess the short-term outcomes of one model of implant, by firstly comparing pre-operative and post-operative ROM (Range of Motion), and secondly by documenting patient satisfaction and post-operative complications.

Material and methods: A retrospective chart review of a consecutive series of 19 patients, who underwent hemiarthroplasty addressing the metatarsal head of the 1st Metatarsophalangeal Joint, was carried out. Pre-operative assessment included age, gender, ROM, radiographs of the joint in AP and Sagittal view, and grading. Post-operative assessment at 6 weeks and 6 months included ROM, repeat radiographs, satisfaction assessment, and complications were recorded. Statistical analysis was carried out using IBM SPSS V24.

Results: 19 patients were included in the review. 4 (21.05%) were male, 15 (78.95%) were

female. 19 surgeries were carried out, 14 (73.68%) were right sided only, 4 (21.05%) were left-sided only, and 1 (5.26%) was bilateral. Mean age was 58.09 ± 10.72 (41.67–79). The results for 6 patients are pending. Mean pre-operative active dorsiflexion was $6.7^\circ \pm 11.55$. Mean post-operative passive dorsiflexion at 6 weeks was $58.2^\circ \pm 17.2^\circ$ (30°-70°), and active was $56.4^\circ \pm 16.9^\circ$ (30°-70°). At 6 months, mean passive dorsiflexion was $63.1^\circ \pm 22.3^\circ$ (10°-80°), and active was $56.3^\circ \pm 23.9^\circ$ (10°-80°). Of the 11 X-Rays, recorded, all were satisfactory, with 1 case of slight subluxation in AP view. At 6 weeks, 11/13 (84.62%) wounds were fully healed, there were 2/13 (15.38%) cases of resolved infections, at 6 months, 13/13 (100%) wounds were fully healed. At 6 weeks, 8/13 (61.54%) experienced mild pain, 5/13 (38.46%) had no pain. At 6 months, 6/9 (66.67%) had mild pain, and 3/9 (33.33%) had no pain. At 6 weeks, 2/13 (15.38%) had mild restriction in routine activities, 11/13 (84.61%) had returned to normal routine, and 13/13 (100%) were using their normal shoes. At 6 months, 8/9 (88.89%) had returned to normal routine, 1/9 (11.11%) had mild restriction, and 9/9 (100%) were using normal shoes. 13/13 (100%) patients were satisfied with the result at 6 weeks and 6 months. At 6 weeks there were 5/13 cases of mild inflammation, 1 of Paraesthesia, and 2 requiring physiotherapy. At 6 months, there was 1 case of Plantar Metatarsalgia.

Conclusion: The short-term outcomes at 6 weeks and 6 months are very good for this implant, in terms of functionality and patient satisfaction. However, longer term studies are required to guide the treatment practice of Hallux Rigidus.

E10- Interest of the percutaneous screwing of the tibial pilon about 4 cases – *EM Sabri*

Introduction: Pilon fracture of the ankle is an intra-articular fracture of the distal tibial metaphysis that occurs in approximately 7% of tibial fractures.² It is usually a high-energy injury caused by the talus impacting into the tibial articular surface. The interest of the percutaneous face is to avoid the infectious and cutaneous complications that are frequent in open surgery of the tibial pilon.

Material et methods: We performed a retrospective analysis of four patients between the ages of 16 and 59 years operated on between September 2014 and December 2017 for closed tibial pilon fractures by closed reduction and internal fixation with percutaneous screwing.

Résultats : Post-operatively, there were no short- or long-term soft tissue complications. The subjective functional assessment of the patients using the Olerud and Molander scale⁷ showed an average ankle score of 90.8. A summary of the injuries and results is shown in Table 3. As the patients in our study scored 80–100, from the derived association, their loss of range of movement in loaded dorsal extension can be expected to be minimal and their assessment of ankle function as good to excellent. Using the subjective part of the AOFAS score, we found that all our patients scored 60 out of 60 points (100%).

Discussion: Persistent controversy exists over treatment of pilon fractures and wide variations in management have been advocated. Ayeni¹ reported treatment of these injuries using a conservative method of closed reduction and a plaster cast. Unhappy with the results of non-operative treatment of these fractures Ruedi and Allgower in 1969 attempted open reduction and internal fixation in 84 fractures. Despite this, soft tissue complications occurred in the form of disturbance in wound healing in 12% and deep infection in 5%. Other authors using the same technique also demonstrated significant postoperative soft tissue complications. Complications with internal fixation lead some surgeons to consider external fixation as a method of treatment. Wyrsh et al.¹³ in a randomised control study compared external fixation with open reduction and internal fixation. In the series reported here there were no soft tissue complications. Although the numbers in this series are small, the technique of closed reduction and fixation by percutaneous cannulated screws was found to be adequate in Types 1 and 2 (AO Type 43 C1) fractures in achieving the desired bony alignment with minimal insult to the surrounding soft tissues and providing necessary stability without use of external fixation. We feel that this technique would be

inappropriate in Type 3 fractures where there is extensive metaphyseal comminution with displacement and or compression as satisfactory restoration of the articular surface cannot be achieved using closed or percutaneous methods.

Conclusion: Closed reduction and percutaneous cannulated screw fixation provides sufficient stability in Types 1 and 2 (AO Type 43 C1) tibial pilon fractures. Extensive soft tissue dissection, periosteal stripping and the use of additional surgical stabilisation can be avoided.

E11- Tibiotalar Dislocation, about a rare case – EM Sabri, L Otmani, R Fekhaoui, R Bassir, HM Boufettal, H Ait Benali, M Kharmaz, MO Lamrani, A Elbardouni, Mahfoud, MS Berrada, N Oubidar, P Palmari

Introduction: The tibiotalar dislocation without fracture associated ankle is an extremely rare traumatic injury due to the stability of the joint, which is provided by the capsule and its strong ligamentous complex. It is always caused by a violent trauma and high energy.

Materials and methods: We report a posteromedial dislocation pure tibiotalar in a patient of 27 years, occurred following trauma to the ankle during a basketball game with a reviewed literature and therapeutic modalities.

Results: Our patient is a young athlete of 27 years without significant pathological history, admitted to the emergency following injury in his left ankle during a following basketball game has a ground reception foot plantar flexion causing severe pain with impotence total of the left lower limb functional. The initial review was objectified deformity of the ankle with an intense pain on palpation and mobilization without any neurovascular deficit or skin lesion. The radiograph of the ankle had objectified a posteromedial dislocation without fracture ankle tibiotalar associated. A reduction in the emergency dislocation was performed in the operating room with general anesthesia. The following reduction radiograph had objectified good articular congruence. The patient was given a plastered immobilization for 6 weeks followed by functional rehabilitation of the ankle. Sixteen months after the trauma there is a very good functional results with a stable and painless ankle and satisfactory mobility.

Discussion: Functional results of tibiotalar dislocation are generally good with little loss of range of motion, sometimes persistent swelling but complications have been described, such as chronic ankle instability and tibiotalar OA [5]. Some items have a poor prognosis: the delay of treatment beyond the fourth time, the status of the integument appearance with areas of necrosis exhibitor at risk of osteoarthritis [10].

Conclusion: Pure tibiotalar dislocation is a rare injury often caused by a violent trauma care in adequate emergency is the only guarantee of a good outcome in the long term. Our observation illustrates the place of orthopedic treatment in the management of the lesion.

E12- Subtalar dislocation with Hawkins' type I talar fracture : Case report and literature review – M Nassiri, A Chaoui, M Madhar, H El Haoury, R Chafik, Y Najeb

Subtalar dislocation is the simultaneous dislocation of the distal articulations of the talus at both the talocalcaneal and talonavicular joints. It can occur in any direction and always produce significant deformity. Most common is the medial dislocation. Unusual presentations are lateral, anterior and posterior dislocations. It is an orthopedic emergency. We here report the case of a patient presenting with Cauchoix and Duparc type II open medial subtalar dislocation with

Hawkins' type I talar fracture following a road accident. The patient underwent orthopedic treatment. At 6-months follow-up, functional outcome was satisfactory.

**E13- Minimally invasive internal fixation of calcaneal fractures using a locking nail –
A Pantalone, F Fascione, M Di Mauro, M Guelfi, F Malagelada, V Salini**

Objectives: The aim of this retrospective study was to evaluate the outcome of patients with intra-articular calcaneal fractures treated using a minimally invasive locking nail (Calcanail®).

Methods: Between January 2016 and April 2017, 15 patients (9 men and 6 women) with a calcaneal fracture were consecutively treated with Calcanail®. The Böhler angle was recorded on standard X-rays pre- and post-operatively. The articular reduction of the posterior facet was evaluated with the Goldzak index in a CT scan 3 months post-operatively. The mean age of the patients was 53 years (range, 24-78). Mean final follow-up was 18 months (range, 12-24).

Results: Six fractures were classified as Sanders II, 7 as Sanders III and 2 as Sanders IV. In 13 out of the 15 patients treated, the post-operative Böhler angle was of more than 20°. Goldzak index was deemed as excellent in 73.5% of the cases (11 patients), good in 20% of cases (3 patients), and poor in 6.5% (1 patient). Post-operative mean AOFAS score was 85 (range, 60-96).

Conclusions: The Calcanail® provides good restoration of the subtalar joint and the calcaneal angles with the advantages of a minimally invasive approach. It was effectively used in Sanders types II and III, even in the presence of poor cutaneous conditions.

**E14- The sinus tarsi approach in calcaneal fractures. A case report –
P Aragonese Lopez, G Lopez Hernandez, P Bustos Bedoya, A Sutil Blanco**

Introduction: The calcaneus is the most commonly fractured tarsal bone, representing 60% of all tarsal fractures in adults. ORIF has been considered the gold standard treatment for displaced intra-articular fractures of the calcaneus. The main disadvantage of the open repairs is the rate of wound complications, which may occur in up to 30% of patients. We present a patient with an intra-articular calcaneal fracture treated using the sinus tarsi approach.

Material and methods: A 38-year-old male, who fall down from a truck platform, presented to our orthopedic clinic with pain, moderate swelling of his left ankle and tenderness to palpation anterior and inferior to the lateral malleolus. Radiographic evaluation included anteroposterior, lateral and mortise view shows a calcaneal fracture who was confirmed by CT scan and described like a type 3 of Sanders classification left calcaneal fracture. Two weeks after the injury we performed open reduction and internal fixation through the sinus tarsi approach combined with percutaneous cannulated screwing from the posterior calcaneal tuberosity. Finally, a combination of allogeneous cancellous chip bone and desmineralized bone matrix (DBM) was impacted into the bone void to keep in line the elevation of inferiorly impacted fracture fragments of the posterior facet. A short leg splint was applied for two weeks until soft tissues swelling reduction. Range of motion exercises of the ankle joint began two weeks postoperatively, as the wound healed and sutures were removed. After 6 weeks p.o patient were allowed to bear partial weight on his ankle with a boot, as tolerated, and then advanced to full weight bearing eight weeks p.o.

Results: : Radiographic union was assessed by x-ray and bone union was confirmed after 4 months postoperatively. We confirmed as well the restoration of the Bohler angle, heel alignment and postoperative reduction quality of posterior facet fracture on CT. There was no major soft tissue complication and he restores his normal activities and return to work after 6 months.

Conclusion: The sinus tarsi approach may be a good option to treat intra-articular calcaneal fractures in select cases (Sanders type II and III) while preventing the major soft tissue complications of the extended lateral approach.

E15- Percutaneous tenorrhaphy of acute ruptures of the calcanea tendon in athletes with minimal cost – M Yahyaoui

Introduction: The rupture of the calcaneal tendon is one of the most frequent lesions in sport; If its diagnosis is easy, its treatment is finished today still controversial. The two main therapeutic attitudes are orthopedic treatment and open surgery. Our study aims to evaluate the results of percutaneous surgery at the athlete who insist on the early resumption of his sporting activities, minimizing the risk of iterative rupture of orthopedic treatment and infectious risks and skin scarring of conventional surgery, with a minimal cost for the patient and the hospital.

Material and methods: Retrospective study to collect 9 athletes presented to emergency department in a clinical form of acute subcutaneous rupture of calcaneal tendon, operated by percutaneous technique, between September 2014 and December 2016, within the department of orthopedic and traumatological surgery UHC-Oujda (Morocco).

Results: : All our patients were male with an average age of 29 years. The sports activity in question was the Basketball at 6, the football at 2 others, and the athletics at a single patient. 3 patients were professional athletes, while the rest were amateur athletes with regular sport's activity. The diagnosis was made clinically, while standard ankle radiographs were only required to eliminate an associated lesion or avulsion of tendon insertion. The operation was carried out the following day, a percutaneous tenorrhaphy with vicryl 2 was considered with an average operating time of 43 minutes. The hospital stay was 24 hours. A plastered boot is made now the equine obtained during the suture and replaced at 3 weeks by a second ankle boot at right angle for 3 weeks. Support is allowed from the 3rd week and the effective sport from the 6th months. The patients were reviewed at 3 weeks, 6 weeks, 3 months, 6 months and 1 year, always assessing the skin condition, the delay in resumption of support and sports, calf muscular atrophy, monopodal support, the monopodal jump on the tip of the feet, the articular amplitudes in dorsal and plantar flexion, and the satisfaction of the patient. A minimum follow-up of 2 years, we have not objectified any anomaly of criteria mentioned above except a patient who can not make the monopodal jump on the tip of the feet forcing him to stop the sport finally (previously basketballeur amateur) and this is the only unsatisfied case of treatment.

Conclusion: : It seems to us that this technique is very suitable for athletes provided that the sport is renounced effectively only after the 6th month.

E-POSTERS - Miscellaneous

E16- Contribution of gait analysis in bilateral spastic feet: a case report – *Y Habdelfettah*

Spastic foot can cause several deformations. These deformations will affect the quality of gait. There are a variety of deformation: the swinging foot, spastic equinovarus foot and claw toes. The gait analysis is an interesting tool for the initial spastic foot evaluation; it allows to classify the type of deformation and to guide interventions: surgery, botulinum toxin, rehabilitation and casting. Our aim is to show the experience of the first gait analysis lab in Morocco e in assessment of kinematics of bilateral spastic foot and ankle through a case report. We report a case of bilateral spastic foot in an eight-year-old girl, having spastic diplegia related to cerebral palsy. Clinical evaluation showing predominantly lower spasticity in the hamstrings and triceps sural with limited range of motion. Video analysis showed a triple flexion walking unaided with fatigability. Gait analysis notes: asymmetry of temporo-spatial parameters, bilateral permanent dorsal ankle flexion during the entire support phase due to weak triceps, both knees flexion during the support phase due to weak triceps and retractions of hamstrings and permanent flexion of the both hips due to permanent flexion of the knee. A Gait analysis is a measurement, an understanding and functional assessment tool. It provides a better understanding of abnormalities, to treat more optimally. However, it requires precision and rigor because it offers many data that must be interpreted strictly.

E17- Kinematics of unilateral spastic foot: a case report – *Y Habdelfettah*

Spastic foot can cause several deformations. These deformations will affect the quality of gait. There are a variety of deformation: the swinging foot, spastic equinovarus foot and claw toes. The gait analysis is an interesting tool for the initial spastic foot evaluation; it allows to classify the type of deformation and to guide interventions: surgery, botulinum toxin, rehabilitation and casting. Our aim is to show the experience of the first gait analysis lab in Morocco, in assessment of kinematics of unilateral spastic foot and ankle through a case report. We report a case of unilateral spastic foot in an 11-year-old girl with cerebral palsy. Clinical assessment revealed a right spastic hemiplegia with spasticity at 2+ overall. The video analysis shows the first step contact by the forefoot, a limitation of knee flexion. Gait analysis notes: a light asymmetry of temporo-spatial parameters. Kinematics of the ankle and right foot shows: a first step contact with slight plantar flexion, at the oscillating phase there is a loss of dorsal flexion due to spasticity of the triceps sural and weakness of the dorsal flexor muscles. Kinematics of the knee: At the stance phase, there is a loss of the initial flexion peak in relation to spasticity of the rectus femoris. A gait analysis is a measurement, an understanding and functional assessment tool. It provides a better understanding of abnormalities, to treat more optimally. However, it requires precision and rigor because it offers many data that must be interpreted strictly.

E18- Medial proximal elongation of Gastrocnemius and percutaneous section of Plantar Fascia in patients with chronic Achilles Tendinopathy and Plantar Fasciitis – *F Parals Granero, X Gonzalez Ustes, X Conesa Munoz, J Novell Alsina*

Objectives: We present the results of the surgical treatment in 15 patients affected by chronic Achilles Tendinopathy and Plantar Fasciitis who have performed the double intervention of the proximal Gastrocnemius recession and section of the plantar Fascia.

Methods: We analyzed the results in 15 patients that underwent surgery from January 2015 to January 2018 with the double intervention of the section of the proximal Fascia of the medial Gastrocnemius for mini-incision simultaneously with the percutaneous partial section of the plantar Fascia for the treatment of Achilles tendinopathy, and the plantar Fasciitis with a positive Silverskiold test and retraction of the plantar Fascia. Diagnostic tests and previous treatments are described with a minimum follow-up of 6 months postoperative. We use the AOFAS, VAS and EF12 test scales for the analysis of the results.

Results: The results have been satisfactory in 85% of the patients, returning to their activities and sport in an average of 10 weeks, with minimal complications registered.

Conclusions: The double surgical approach for the treatment of the Achilles tendon pathology and plantar Fascia is indicated only in highly-selected patients who present both pathologies related to the shortening of gastrocnemius and recurrent clinics that do not improve with conservative treatment.

E19- Histologic characteristics of the arciform fibers – *F Michels, J Batista, D Quintero, JJ Del Vecchio*

Introduction: The arciform fibers are an expansion of the regular, collagenous and elastic dense connecting tissue, in the shape of a triangle or a semicircle, and an anteroinferior base, that connects the inferior band of the anterior talofibular ligament, and the calcaneofibular ligament, in a constant manner. These fibers play a critical role within the ankle's lateral ligament complex. The purpose of this study was to perform a study of the macroscopic and microscopic morphology of these arciform fibers.

Material and methods: Ten lower leg cadaveric specimens were included in this study: 5 men, 5 women. Four specimens were fresh frozen, 6 embalmed. Anatomical dissection was performed to assess the presence of these arcuate fibers. After preparation, different histologic colourings were performed: Hematoxylin-eosin and Masson's Trichrome.

Results: These arciform fibers were present in all specimens. The histologic structure of these fibers was similar to the ligamentous structures, with an abundance of collagenous fibers, low adipose cell content, plus high vascular content.

Conclusion: The arciform fibers have all characteristics of ligament tissue. This suggests an important mechanical function in the stability of the ankle.

**E20- The lateral fibulotalocalcaneal complex of the ankle: Intra-articular connecting fibers –
M Dalmau Pastor, F Malagelada, J Vega**

Recently a new ligament complex has been described in the lateral aspect of the ankle. This abstract represents the second part of that work, aiming to describe intra-articular connecting fibers between the three components of the lateral collateral ligament complex of the ankle (anterior talofibular ligament, calcaneofibular ligament, posterior talofibular ligament). It is an ongoing study, and we expect to have 20 specimens analyzed by the time of presentation at the congress.

E21- Application of minimally invasive surgery as a definitive solution in hard management of pathological foot – C Lopez Munoz, D Gallach Sanchis, V Garcia Martin, LE Hernandez Castillejo

Background In recent years there has been increasing interest in the knowledge and management of diabetic foot complications. Approximately 15% of diabetic patients will develop an ulcer on the foot, similar to the percentage of patients that present a Charcot foot. The best treatment for neurogenic bone and joint pathology is controversial. Recurrent ulcers in diabetic patients are the main cause of amputation, assuming its presence a therapeutic challenge in patients who have received multiple treatments. The Charcot foot is even today a misunderstood and frequently neglected complication of diabetes mellitus and other diseases, like compressive neuropathies or central nerve lesions. The evolved neuropathy entails a loss of protective sensitivity, along with a lack of vasomotor control. This is how in some patients an evolutionary mechanism of osteoarticular fragmentation and resorption is initiated, which involves large deformities of foot and ankle. If these deformities are not orthopedically controlled and there is risk (bursitis, erythema...), or presence of ulceration, a surgical treatment may be indicated. In this paper we will analyze the percutaneous techniques in comparison to the classic surgical techniques used in Charcot foot surgery.

Objectives: To evaluate the results obtained by the application of Dwyer's instrumented percutaneous osteotomy in patients with Charcot arthropathy of difficult handling and presentation of the technique in comparison with traditional procedures.

Study Design & Methods: Series of cases of long evolution diabetic patients with poor metabolic control and microangiopathic involvement, as well as erosive rheumatoid arthritis that condition chronic ulcers of poor evolution for years. We analyze: type of surgical technique used and time of consolidation and closure of cutaneous ulcers. In some cases, it was necessary to add gastrocnemius or Achilles tendon enlargement, because excessive plantar flexion is often the cause that initiates the breakdown of the midfoot, which is the most affected area. The AOFAS scale of the foot was used to evaluate patients' symptoms and range of movility before and after surgeries.

Results: More than 90% of patients have achieved consolidation of the osteotomies performed through minimally invasive surgery, with improvement of plantar support and disappearance of ulcers that motivated the surgery. In all cases a clear improvement of both subjective and objective symptomatology and mobility was recorded, based on the results obtained after evaluating them using the AOFAS scale.

Conclusions: Minimally invasive surgery is revealed as an effective and non-aggressive alternative in patients with torpid evolution ulcers caused by poor biomechanical support. Its application supposes a new therapeutic approach to treat the sequels of Charcot Foot, obtaining very satisfactory results, in addition to all the benefits of using a less invasive surgery than open

techniques: less blood loss, shorter hospital stay and decreased probability of surgical wound infection, among others.

E22- The interest of radial shock wave therapy in foot diseases: about 11 cases – Y Abdelfettah

The interest of radial shock wave therapy in foot diseases: about 11 cases Aim : assess the efficacy of radial shock wave treatment Radial shock wave therapy is used increasingly in chronic and musculoskeletal of the foot conditions. It seems to be effective for the treatment of tendinitis. The objective is to assess the effectiveness of radial shock wave treatment. It is a prospective study of approximately one year, including 11 patients aged 33 to 68 years. Our study involved nine women and two men, 45.45% of whom presented with unilateral or bilateral calcaneal spurs, 9.10% with calcaneal tendinitis and 45.45% with plantar fasciitis. The protocol used had a maximum of 6 sessions per member reached, twice a week. The therapy was done according to the protocol of 1500 pulses on average, 10 Hz of frequency and 90 mJ of intensity. The effectiveness of the treatment was assessed at least 6 weeks after the last session by the digital visual scale before and at the end of the treatment. Discussion: Studies have shown that radial shock wave therapy has a positive response in more than 80% of patients regarding pain reduction and function improvement. The results were considered good or very good in 70% of patients. In this regard, it is interesting to note that the greatest number of positive results was found at low to medium energy levels (90 and 120 mJ) and at frequencies around 10 Hz as in our clinical case. Conclusion: Radial shockwave therapy appears to be a treatment of choice in the management of musculoskeletal foot diseases because of its high efficiency, reduced treatment time and long-term effect.

E23- Foot and ankle disorders in an obese population – AC King Martinez, A Cuellar Avaroma

Introduction: Foot and Ankle disorders in an obese population Ana K., MD, Alejandro J., MD, Ramos R. **INTRODUCTION:** Obesity has become one of the most important health issues worldwide. Identifying and treating the main disorders affecting the routine of the patient will improve significantly their quality of life and will help to prevent further complications. The intent of the study is to determine the disorders that are present on the foot and ankle of the obese patient through an specific physical examination in order to implement better policies of prevention and treatment with the purpose of limiting the disability, preserving to the fullest the normal function of the foot, improving the quality of life and reduce the possible further medical or surgical complications. **OBJECTIVE:** Identify which are the most frequent disorders found in the obese patient.

Material and methods: An observational descriptive, prospective and cross sectional study was made in The General Hospital “Dr. Manuel Gea Gonzalez” in Mexico City in which we took into account obese patients from 18 years and older, from both genders, who came to the obesity clinic consultation and were seen by the orthopedic service from January 2017 to July 2018.

Results: From a total of 73 patients, 83.56%(n:61) were females and 16.44% (n:12) were males. The average age was of 42.14 years with an average weight of 111.23 kg and a bmi of 42.45 with a standard deviation of 9.38. From the total of the patients, 31.51% referred foot pain, while only 17.81% referred ankle pain. The most frequent foot disorder was the plantar hyperkeratosis with an average of 52.05% (n:38) being most frequent on patients with type 3 obesity (56.10%). Not much forefoot disorders were observed. The most frequent plantar disorder seen was flat foot with an average of 21.92%. From the total of the patients with type 1 obesity (13.70%) the shortening of the hamstring was the most frequent disorder found.

Conclusion: High BMI (type 3 obesity) is associated with a higher foot and ankle number of disorders. It's important to mention that the most frequent problem found was flat foot and foot pain. This is explained given that the 100% of the total body weight goes directly to the weight bearing joints, affecting the morphology and the anatomy of them. That's the reason of the importance of this study, showing that not modifying the population's dietary habits, overweight and obesity will affect directly the patient's quality of life. The results shown in this study are quite enough to analyze diverse disorders not only on the foot and ankle, but also on the knee, being this a not included variable in the study but which the 52.05% of the total of the analyzed population referred pain in that zone.