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Foot and Ankle Free Papers
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THE NEED FOR FURTHER PROCEDURES FOLLOWING DORSAL CHEILECTOMY FOR HALLUX RIGIDUS - ARE MINIMALLY INVASIVE PROCEDURES ANY BETTER THAN EXISTING OPEN TECHNIQUES?
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Background: Dorsal cheilectomy of the first metatarso-phalangeal joint is a proven treatment to alleviate impingement, pain and loss of movement in hallux rigidus. Traditionally done via a dorsal incision, this procedure has increasingly been performed using a minimally invasive technique despite limited published evidence to suggest this method offers any advantages.

Methods: A retrospective review of all cheilectomies performed in our area was carried out from 2012, when minimally invasive techniques first started being used, until December 2017. Surgical technique was recorded as well as any further procedures carried out and the reasons for these. Complications were also reviewed. Comparison between open and minimally invasive outcomes was performed.

Results: One hundred and seventy-one cheilectomies were performed during this period. Thirty-eight were open and 133 minimally invasive procedures. The revision rates for the two groups were different with one (2.6%) of the open cheilectomy group requiring a subsequent fusion, while 17 (12.8%) of the minimally invasive group required further surgery, at a mean follow-up of three years. All of these were for persistence or recurrence of pain. In the open cheilectomy group, there was one (2.6%) complication, compared to 15 (11.3%) in the minimally invasive group.

Conclusions: In this series the re-operation rate following minimally invasive procedures is far higher than open procedures. While patients may like the improved cosmesis offered by this option they should be informed of the potential need for further surgery.

Implications: Further work is needed to establish the reproducibility and significance of this finding, with implications for technique recommendations in the future if corroborated.

Disclosure: Nothing to disclose.

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THROMBOPROPHYLAXIS DURING TOTAL CONTACT CASTING IN DIABETIC PATIENTS
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Background: Total contact casting (TCC) has increasing use in diabetic patients in the last years. The most common reason for the use of total contact cast is the treatment of acute Charcot disease, with the aim to prevent the deformity or avoid progression. Chronic diabetic ulcers, wound healing after surgical reconstruction in diabetic patients, and foot and ankle fractures are other indications for the use of TCC. Protocols differ amongst Trusts with regards weight bearing status and the use of throboprophylaxis whilst in a cast. The aim of the study was to identify the potential risk of developing a deep vein thrombosis (DVT) during casting and provide guidance for thromboprophylaxis.

Materials and methods: All patients treated in our hospital with total contact cast from January 2010 until December 2017 were included. All patients were non-weight bearing for the duration of treatment (as per our protocol) and thromboprophylaxis was not given during this period.

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Retrospective data collected from the medical records included the reason and duration of the total contact cast and whether the patients had documented evidence of a DVT during the treatment period.

Results: A total of 63 patients were identified to have treatment with TCC during the study period. Mean age was 61.6 ± 11.5 years with the majority being female (59%). Most of the patients were treated for acute charcot. The mean time in the TCC of the cohort was 7.5 months. None of the patients developed DVT during or immediately after the application of the TCC.

Conclusions: Non-weight bearing during the treatment with TCC for diabetic patients is safe. The risk of developing DVT whilst in a TCC appears to be low. Therefore, we would advise that provided there are no additional risk factors the use of thromboprophylaxis is not required when being treated in a TCC.

Disclosure: Nothing to disclose.

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COMPARATIVE STUDY ASSESSING SPORTING ABILITY AFTER ARTHRODESIS AND CARTIVA HEMIARTHROPLASTY FOR TREATMENT OF HALLUX RIGIDUS

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Background: Arthrodesis and Cartiva synthetic cartilage implants (SCI) are accepted treatments for hallux rigidus. Arthrodesis is the gold standard treatment of hallux rigidus. Although good functional outcomes have been reported for both procedures, there is little data available on post-operative sporting ability for these patients. As of now, there are no independent comparative series for treatment of hallux rigidus utilising polyvinyl alcohol implants.

Objectives: To compare sporting ability after Arthrodesis and Cartiva SCI hemiarthroplasty of the first metatarsophalangeal joint.

Study Design and Methods: Patients at a single centre with symptomatic hallux rigidus who underwent Arthrodesis or Cartiva SCI hemiarthroplasty were identified. Sporting ability was assessed at a minimum of 12 months post-operative utilising the patient reported outcome measure, Foot and Ankle Ability Measure (FAAM) sports questionnaire. First metatarsophalangeal joint arthritis was radiographically graded according to the Hattrup and Johnson (HJ) classification.

Results: Forty-two Arthrodesis and 26 Cartiva patients were included in this study. Mean ages for this cohort were 64 and 58 respectively with a follow-up time of 19 and 18 months respectively.

Arthrodesis patients consisted of 6.8% HJ1, 40.9% HJ2 and 52.3% HJ3 and Cartiva SCI patients 31% HJ2 and 69% HJ3 with no HJ1 patients.

Mean post-operative FAAM scores were 80.9% for Arthrodesis and 78.9% for Cartiva SCI. Mann-Whitney U testing revealed no statistically significant difference between Arthrodesis and Cartiva SCI ($p > 0.3$).

Comparing age (< 55 and > 55) and gender matched cohorts revealed no statistically significant results.

Conclusions: Our results suggest that both Arthrodesis and Cartiva SCI result in similar post-operative sporting ability. Cartiva SCI results in a faster return to activities and preserves joint flexibility with adequate pain reduction. More research with larger cohorts and longer follow up is indicated. Initial results of Cartiva SCI are favourable and comparable to arthrodesis.

Disclosure: Nothing to disclose.

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CARTIVA SYNTHETIC CARTILAGE IMPLANT HEMIARTHROPLASTY FOR TREATMENT OF HALLUX RIGIDUS

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Background: The Cartiva synthetic cartilage implant (SCI) has been licenced for use in management of symptomatic hallux rigidus in several countries including the UK.

Objectives: The Cartiva synthetic cartilage implant (SCI) is licenced for use in management of symptomatic hallux rigidus in several countries including the UK. As of now, there are no independent comparative series for treatment of hallux rigidus utilising polyvinyl alcohol implants.

Study Design and Methods: Patients at a single centre with symptomatic hallux rigidus who underwent Cartiva SCI implant procedure were identified. First metatarsophalangeal joint arthritis was radiographically graded according to the Hattrup and Johnson (HJ) classification. Pre-operative and post-operative patient-reported outcomes were evaluated using the Foot and Ankle Ability Measure (FAAM) activities of daily living subscale and the Manchester-Oxford Foot Questionnaire (MOXFQ).

Results: Sixty-six patients (19M, 47F) (43R and 23L) were followed up for an average of 14 months (min = two, max = 36). Seventeen patients suffered from HJ2/moderate arthritis and 49 patients with grade HJ3/severe arthritis.

Post-operative mean FAAM scores showed statistically significant improvement ($p < 0.0001$). Patients reported a 40% increase in functionality during activities of daily living. All three MOXFQ Domain scores improved significantly ($p < 0.02$). The Index score improved by 28 points ($p < 0.0001$).

There was no correlation between length of follow up or age and PROMs ($r = 0.129$). No statistical difference was demonstrated between sexes. However clinically, males and older patients exhibit better outcomes.

Twenty patients underwent manipulation under anaesthesia and steroid injection. This cohort displayed no complications, including infection.

There was an 89.4% patient satisfaction with the use of Cartiva.

Conclusions: Our study shows excellent results with statistically significant improvements in functional outcomes, and promising short-term follow-up with low early revision rates. Pain in particular was significantly reduced. One third of patients developed post-operative stiffness requiring a manipulation under anaesthesia.

Disclosure: Nothing to disclose.

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SUBTALAR JOINT PREPARATION USING THE TWO PORTAL POSTERIOR ARTHROSCOPIC TECHNIQUE VERSUS THE SINUS TARSI OPEN APPROACH: A CADAVER STUDY

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Introduction: Subtalar fusion is the treatment of choice for subtalar arthritis when conservative management fails, and can be performed arthroscopically or through the open approach. While the open approach has been associated with satisfactory patient outcomes, it is more invasive than the arthroscopic technique. Adequate preparation of the joint via denudation of articular cartilage is crucial to achieve fusion.

The purpose of this study is to compare the efficacy of subtalar joint preparation between the sinus tarsi open approach and the posterior 2-portal arthroscopic technique.

Materials and methods: Nineteen below-knee fresh-frozen cadaver specimens were used for this study. The subtalar joints of nine specimens were prepared through the sinus tarsi open approach; 10 were prepared arthroscopically. After preparation, all ankles were dissected at the subtalar joint. Photographs were taken of the posterior facets of the calcaneus and talus. Total and prepared surface areas of the facets were measured using ImageJ software and compared between the two approaches.

Results: Overall, 92.3% of the subtalar joint surfaces (talus and calcaneus combined) were prepared using the open technique, compared to 80.4% using the arthroscopic technique (p = 0.010). The posterior facet of the calcaneus was 94.0% prepared using the open technique, while only 78.6% prepared using the arthroscopic technique (p = 0.005). Average prepared surface area of the posterior facet of the talus did not differ significantly between the two approaches (p = 0.071).

Conclusions: The open approach for subtalar arthrodesis provides superior articular preparation compared to the 2-portal posterior arthroscopic technique, and may therefore be more efficacious for fusion. The lesser amount of joint preparation with the arthroscopic technique is most likely due to difficulty accessing the anterolateral corner of the calcaneus. Therefore, when using the posterior arthroscopic technique, it is advisable to use an accessory portal to distract the joint and aid in preparation.

Disclosure: Nothing to disclose

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POSTOPERATIVE ASPIRIN USE AND ITS EFFECT ON BONE HEALING IN THE TREATMENT OF ANKLE FRACTURES

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Introduction and Purpose: There is hesitancy to administer nonsteroidal anti-inflammatories (NSAIDs) within the postoperative period following fracture care due to concern for delayed union or nonunion. However, aspirin (ASA) is routinely used for chemoprophylaxis of deep vein thrombosis (DVT) and is gaining popularity for use after treatment of ankle fractures. We examine the incidence of nonunion of operative ankle fractures and risk of DVT in patients who did and did not receive postoperative ASA. We hypothesize that time to clinical and radiographic union and the risk of DVT are no different.

Methods: A retrospective chart review was performed on all patients treated between 2008 and 2018 for ankle fractures requiring operative fixation by three Foot and Ankle fellowship trained orthopaedic surgeons at a single institution with a minimum of three months follow-up. Demographics, preoperative comorbidities, and postoperative medical and surgical complications were compared between patients who did and did not receive ASA postoperatively. For both groups, union was evaluated by clinical exam as well as by radiograph.

Results: Five hundred and six patients met inclusion criteria: 152 received ASA and 354 did not. Radiographic healing at six weeks was demonstrated in 95.9% (94/98) and 98.6% (207/210) respectively (p-value .2134). There was no significant difference in time to radiographic union between groups. The risk of postoperative DVTs in those with and without ASA was not significantly different (0.7% (1/137) vs 1.2% (4/323), respectively; p-value .6305).

Conclusions: Postoperative use of ASA does not delay radiographic union of operative ankle fractures or affect the rate of postoperative DVT. This is the first and largest study to examine the effect of ASA on time to union of ankle fractures.

Disclosure: Nothing to disclose.

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ENTRY POINT SAFE ZONE FOR ANTEROPOSTERIOR SCREWS IN POSTERIOR MALLEOLUS FRACTURE FIXATION: A CADAVER STUDY

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Background: Percutaneous anterior-posterior (AP) screw is an option for posterior malleolus fracture fixation when the fracture fragment can be reduced indirectly by the mean of ligamentotaxis. However, anterior anatomic structures could be injured during screw placement. We assessed this risk in cadavers.

Methods: Eleven below-knee cadavers were employed for the placement of AP screws in an attempt of fixing assumed Haraguchi Type-I posterior malleolar fractures. Three entry point, medial, middle, and lateral, were selected as medial to the tendon of tibialis anterior (TAT), lateral to the TAT, and lateral to the extensor digitorum longus (EDL). On each cadaver, three AP screws were placed under the guidance of fluoroscopy. After dissection, measurements were made (mm) from each screw to nearby structures.

Results: Mean, minimum, and maximum distances from the medial screw to the saphenous vein, TA, EHL, anterior tibial artery (ATA), and deep peroneal nerve (DPN), were 18.1 (12 - 25) mm, 2.0 (0 - 5) mm, 13.6 (9 - 20) mm, 16.6 (9 - 25) mm, and 20.1 (12 - 27) mm. From the middle screw to the ATA, DPN, TA, EHL, and EDL, were 1.2 (0 - 3) mm, 4.9 (3 - 9) mm, 3.8 (1 - 7) mm, 0.4 (0 - 2) mm, and 13.6 (10 - 18) mm. From the lateral screw to the superficial peroneal nerve (SPN), EDL, DPN, and ATA, were 10.8 (0 - 16) mm, 1.2 (0 - 4) mm, 15.9 (11 - 25) mm, 19 (15 - 27) mm. The SPN was found partially cut by the lateral screw on one specimen. The middle screws were adjacent to the ATA and DPN without damaging to them.

Conclusions: Lateral and middle percutaneous AP screw placement put certain anatomic structures at risk of injury. Medial screw placement did not result in appreciable damage to adjacent structures. Entry point of AP screws should be selected with respect to posterior malleolar fracture and anatomic structures. Meticulous dissection should be performed when placing anteroposterior screws.

Disclosure: Nothing to disclose.

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MEDIUM-TERM OUTCOMES FOLLOWING A SINGLE CORTICOSTEROID INJECTION FOR MORTONS NEUROMA: FOLLOW-UP OF A RANDOMISED CONTROLLED TRIAL

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Background: Morton's neuroma is a common degenerative and entrapment degenerative neuropathy. Our objective was to establish what the medium-term outcomes are following a single steroid injection as a primary intervention for Morton's neuroma.

Methods: A randomised controlled trial was conducted in UHL in 2013-2014 whereby 45 Morton neuromas were injected in 38 patients. The patients were split between having ultrasound guidance or not to facilitate the injection. This study found no difference in outcomes at one year. We re-contacted these patients via postal questionnaire. Outcomes assessed were if they had any subsequent treatment, satisfaction, functional outcomes and surgical excision rate.

Results: We were able to contact 34/45 (76%) Mortons neuromas with a mean follow-up of 4.0 years (range; 3.3-4.8). 76% were female. Mean age 63 (range: 34-90). Single injection alone was undertaken in 19/34 (56%) with mean MOxFQ of 10.8 and 76% satisfied (Johnsons 1 or 2) at a mean 4.2 years. Second injection alone was required in 3/34 (9%) with mean MOxFQ of 5.0 and 100% satisfaction at a mean of 4.5 years. Surgical excision was required in 12/34 (36%) with mean MOxFQ of 31.7 and satisfaction 33% at a mean of 4.3 years.

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Conclusions: Single injection alone can be curative in 42% of cases with second injection proving beneficial when performed in 100%. Surgical excision was required in 36% but there remains poorer functional outcomes and higher dissatisfaction in this group.

Disclosure: Nothing to disclose.

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AUDIT ON THE CONSERVATIVE MANAGEMENT OF ACHILLES TENDON RUPTURES AT EAST LANCASHIRE HOSPITALS

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Background: The Achilles tendon is a commonly ruptured tendon in the United Kingdom. Hence, it is crucial to establish high-quality and effective management protocols for good clinical outcomes and speedy recovery. At East Lancashire Hospitals NHS Trust (ELHT), two management options are available: Surgical and Conservative with a VACOped boot.

The primary aim of this audit is to compare the current practice of conservative treatment of Achilles tendon ruptures with the local standard protocol in place at ELHT to influence future orthotic guidance and practice. This will thereby improve delivery and quality of care.

Methods: A retrospective review of 137 patients was performed for patients who sustained an Achilles tendon rupture that was treated conservatively between June 2015 and December 2017. Data was obtained through patient notes and letters from orthotics department and hospital electronic systems. Adherence to local protocol for non-operative management and complication rates were assessed.

Results: Analysis of the data showed overall poor adherence to treatment protocol (mean adherence rate of 49.18%). The main reason for this was the lack of adherence to the angle settings of the VACOped boot. A small proportion of the cases (5.11%) had a tendon re-rupture. However, this was lower than the expected re-rupture rate of 8.8%, as described in a meta-analysis (Wilkins & Bisson, 2012). The complication rate was 26.2%. This included foot ulcers, oedema, fungal infections and pain.

Conclusions: This audit demonstrated poor adherence to treatment protocol.

Implications: Our recommendations include, mandatory training, teaching sessions and routine departmental meetings for orthotists. Increasing awareness, through the use of pasted protocol posters in rooms, for staff concerned with the management of Achilles tendon ruptures will improve adherence to protocol too.

Disclosure: Nothing to disclose.

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EARLY PATIENT-REPORTED OUTCOMES IN THE TREATMENT OF MIDFOOT ARTHRITIS: COMPARING FUSION AND CONSERVATIVE MANAGEMENT

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Background: Arthritis of the mid-foot is a common presentation to the foot and ankle clinic. Treatment in the initial stages is conservative, with midfoot fusion widely regarded as the operative treatment of choice in the latter stages; however there is a paucity of comparative and patient reported data measuring outcomes.

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Methods: Patient reported outcome measures (PROMS), were prospectively collected for 93 patients (93 feet). Diagnoses were confirmed with image guided injection and initial management was conservative in all patients. In total, 60 patients were managed conservatively and 34 treated with mid-foot fusion. Manchester Oxford Foot Questionnaire (MOxFQ) and Euroqual (EQ-5D-3L) PROMS were collected pre-operatively, at 26 weeks and at 52 weeks.

Results: In the operatively managed group, the female to male ratio was 5.8:1, with a mean age of 59 (range 24 - 80) and BMI 31.7, while in the conservatively managed group, the ratio was 2.0:1 with mean age 63 (range 29 - 86) and BMI 31.9. In the surgically managed group, 88.3% of patients reported improvement in symptoms at both 26 weeks and at 52 weeks. This was significantly greater than the conservatively managed group, in which 46.1% reported improvement at 26 weeks and 29.0% at 52 weeks. The mean time-trade-off improvement in the surgically managed group was +32.3 and +35.5 at 26 and 52 weeks respectively, and in the conservative group, +2.4 and -3.8, at 26 and 52 weeks. Similarly, favourable surgical outcomes were reported across all domains of MOxFQ. There was a single deep infection in the operative group (three percent) with and two (six percent) superficial infections. No complications were found in the conservative arm.

Conclusions: To our knowledge this is the largest study to date comparing patient reported outcomes after surgical treatment of midfoot arthritis with non-operative management and may represent promise for those patients for whom conservative management fails.

Disclosure: Nothing to disclose.

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FIRST RAY/MEDIAL COLUMN INSTABILITY: A PATHOLOGICAL ENTITY NEW CLASSIFICATION SYSTEM BASED ON PATHOGENESIS AND SPRING LIGAMENT FAILURE

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The rigid first ray allows good foot propulsion in stance, taking 60% weight. First ray instability arising from failed plantar/interosseous ligaments is strongly associated with planovalgus. This gives poor foot propulsion and middle column overload (synovitis, deformity and OA). We believe proximal spring ligament failure (SLF) drives secondary first ray instability in the absence of hallux valgus. This paper tests the null hypothesis that there is no association between the presence of first ray instability and SLF or the IMA. We derive a classification system of first ray instability based on pathogenesis and define different subtypes.

Methods: Ethical approval obtained. Patients (n = 43 / 35F:8M; mean age: 55) with first ray instability recruited. Weight-bearing contralateral feet as controls. FR dorsal translation measured with a digital Klauemeter (ankle in neutral). Less than 8mm represents instability, > 20mm lateral translation (neutral heel lateral push test) represents SLF. AP/lateral radiographs used to measure IMA and other radiographic angles.

Results: High incidence of SLF in feet with TMT instability was present $p < .001$. Feet with FR instability and no SLF had significantly higher incidence of high IMA hallux valgus > 18 degrees ($p < 0.014$). Contralateral feet with no FR instability had no SLF. Two feet/ one patient with FR instability attributed to midfoot degeneration.

Conclusions: This is the first study that links first ray instability to SLF in absence of high IMA hallux valgus and classifies it based on pathogenesis. First ray instability is strongly linked to SLF in absence of hallux valgus $p < 0.001$. All first ray instability can be attributed to SLF and high IMA hallux valgus 98% or rarely midfoot degeneration 2%.

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First ray instability is a pathognomonic sign for spring ligament failure in the absence of hallux valgus.

Type 1: Secondary to SLF
Type 2: Primarily due to high IMA
Type 3: Midfoot degeneration
Type 4: Combined type 1 and 2.

Disclosure: Nothing to disclose.

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ACHILLES TENDON ELONGATION AFTER FUNCTIONAL MANAGEMENT OF ACUTE RUPTURES

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Background: Achilles tendon elongation after treatment of acute ruptures has been linked to suboptimal clinical outcomes. The magnitude of elongation has also been suggested to be adversely correlated with clinical outcomes. Although there are variable treatment protocols for management of acute ruptures, no study has investigated Achilles tendon elongation after functional management.

Methods: Between August 2014 and June 2018, 150 consecutive patients with acute Achilles tendon ruptures were included. They were treated non-operatively according to a functional management protocol. Achilles tendon lengths were measured indirectly using the difference in the maximal ankle dorsiflexion angles between injured and non-injured sides at six months. Previous studies have shown that a 12º increase in maximal ankle dorsiflexion angle correlates with a 10mm increase in Achilles tendon length. The Achilles tendon total rupture score (ATRS), EQ5D and heel-rise height were also recorded.

Results: Among the study cohort, only 14 (9.3%) patients develop Achilles tendon elongation (>5 degrees). The elongation was significant (> 10mm) in only three patients. There was no significant difference in the ATRS and EQ5D scores between patients who develop elongation (ATRS 67.5; EQ5D 69) compared with patients with elongation less then 5mm (ATRS 69.9; EQ5D 73). All three patients with elongation > 10mm had a significant limitation in their heel-rise ability.

Conclusions: Although functional management protocols of acute Achilles tendon ruptures are proving to be safe and effective, these protocols should be optimised to avoid excessive elongation, which will be associated with poor clinical outcome.

Disclosure: Nothing to disclose.