ROUNDUP360

Trauma

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Re-operation for intertrochanteric hip fractures

■ Bucking the trend for large registry-based studies using prospective data from thousands of patients, researchers in **Aachen (Germany)** have set out to establish the risk factors for re-operation (and hence failure) for patients undergoing surgery with the Percutaneous Compression Device (PCD) for stabilisation of intertrochanteric hip fractures. The authors conducted a retrospective notes review of patients, and recorded information potentially likely to relate to fracture failure. This included demographic details: age, gender, body mass index, comorbidities, fracture type and surgical details (surgeon experience, tip-apex distance (TAD)), and operation time. A total of 96 patients underwent surgery from ten different surgeons. Of these, eight (8.3%) underwent revision surgery. Initial univariant screening suggested that age, body mass index, TAD, experience of the surgeon, and operation time were suitable for inclusion in the multivariant model. Of these factors, only TAD proved to be a significant predictor of re-operation rate.[1] While the authors conclude that their results suggest that the PCD is a technically demanding procedure and has a significant learning curve, we are not sure here at *360* that this review presents anything new. Although the implant is marginally different, these results are strikingly similar to a number of studies examining failure of the dynamic hip screw device. Perhaps sliding screw and plate constructs are not as different as implant manufacturers would suggest.

Are twin incisions better than one round the acetabulum?

■ Fixation of the acetabulum starts in the planning room, a lesson all residents should be taught. Taking the wrong approach to a complex fracture nearly always results in a substandard result. Authors in **Marburg (Germany)** have developed a novel two-incision approach to add to the armoury of the pelvic and acetabular surgeon. Their minimally invasive approach is designed for fixation of anterior acetabular fractures and is proposed as an alternative to the ilioinguinal approach. The first incision is located in line with a pararectal incision at the level of the proximal third of the arcuate line of the ilium. The iliac vessels are mobilised medially and neuromuscular bundle laterally. The second window for visualisation lies above the medial pubic bone and gives access to the anteromedial portion of the acetabulum. Not content with simply describing the approach, the authors report the results of 26 patients (mean age 67) treated with the twin incision approach, lag screws and a neutralisation plate. The operation took, on average, a little over an hour and a half (mean 109 minutes (SD 30)). There were no significant post-operative complications and all incisions healed primarily. Radiographic reduction was excellent in 77% (n = 20) of patients and good in the remaining 23%. Outcomes were successfully assessed in 19 patients at 12 months who presented with a Harris hip score of 86.6 and comparable quality of life scores to an age-matched population.[2] This approach offers a number of tantalising benefits over the traditional ilioinguinal approach. The two incisions allow for different screw placement to the ilioinguinal approach, along with the added benefit of a smaller incision and, consequently, is kinder to the soft tissues. Many surgeons are now using the Stoppa approach for acetabular fractures, which can offer similar benefits without the added complication of working with two incisions.

Salvage osteotomy for calcaneal fractures

■ The very nature of decision making in calcaneal fractures is embodied by the uncertainty principle. We simply do not know how best to treat patients, who will do well and who will not. Consequently, we occasionally get things wrong. The symptomatic malunited calcaneal fracture is not an uncommon sight in any orthopaedic surgeon's clinic. However, there are few effective salvage options with patients with symptomatic subtalar joints often facing subtalar fusion. **The Dresden (Germany)** reconstructive foot and ankle service have been performing what represents perhaps the most complex calcaneal reconstructive surgery we have come across. In a staged procedure, Zwipp and colleagues have been performing a primary osteotomy across the fracture line, realignment, soft-tissue balancing and secondary fixation. In a ten-year period, only five patients have been treated in this manner in their institution. This surgery was performed around three months after the initial injury, and follow-up was to just over four years. The authors report that there were no secondary fusions required, although there were two patients who required implant removal and subtalar arthrolysis one year following surgery. Clinical outcomes (assessed using the Orthopaedic Foot and Ankle Society hind foot score) improved significantly (19.0 to 81.2), as did radiographic parameters (the Böhler angle, talocalcaneal height, and heel width).[3] The authors present a thought-provoking paper, raising the option of joint preserving osteotomy as a treatment option for malunited intra-articular calcaneal fractures encountered early on, before the development of subtalar arthrosis. It is important to remember that even in a large regional trauma centre such as that in Dresden, a patient suitable for this operation was only encountered once every two years.

Stable or not?: posterior dislocation to expert eyes

■ The diagnosis of 'stability' in posterior wall fractures of the acetabulum is an essential part of the

treatment algorithm. The decision as to whether a fracture is stable or not is usually deferred to an expert or regional service. Researchers in **St Louis (USA)** set out to establish how accurately regional experts were able to determine stability using a combination of high-quality anteroposterior and oblique plain radiographs and a computed tomography scan. The study looked at 15 patients with acetabular fractures, consisting of 20% to 50% of the posterior wall. Each patient had a known clinical outcome and had undergone gold standard stress fluoroscopy views to determine the stability. In a reliability and validation study, the authors presented the radiographs and CT scans to four fellowship-trained orthopaedic surgeons in a random order who were asked to determine the stability of the hip. After a one-month washout period, a second session was undertaken with the same cases presented in a different order to determine the intra- and inter-observer correlation coefficients.[4] While the intra-observer reliability was good at 0.65, the inter-observer reliability was poor at 0.12. With only around 50% of patients given the correct stability diagnosis, the authors' conclusions suggest that if the diagnosis is in doubt, open reduction and internal fixation clearly is the much safer course than non-operative treatment. At the very least it would seem sensible to undertake stress fluoroscopy views.

Should MRSA be covered in open fractures?

As the prevalence of MRSA grows, one has to wonder if the trusty combinations of 'cef and met' or 'fluclox and gent' really are cutting the mustard in today's aggressive environment of antibiotic resistant organisms. Researchers in **Colorado (USA)** were not convinced that the handed-down antibiotic wisdom would still hold true, and designed a prospective randomised controlled trial (RCT) (Level I evidence) to establish if a new combination of antimicrobial prophylaxis covering MRSA would be justified in these patients. They report their initial safety study evaluating the efficacy of prophylaxis with either a cephalosporin alone or in combination with vancomycin. The study population consisted of all patients presenting with open fractures to their hospital and the study was designed to establish the safety of such a regime. Outcomes measured were post-injury carriage of *Staphylococcus aureus* (nasal and on wound swabs) and surgical site infections within 30 days of the surgery. Their randomised prospective clinical study recruited 130 patients. There were no differences in the rates of SSI between the two groups, at 16% and 19% (although the study was not powered to report this outcome). There were significantly lower rates of carriage of MRSA and MSSA between the treatment group (3%) and control arm (20%), respectively. The authors noted that the majority of post-operative infections were caused by *Staphylococcus aureus* (55%). Although they comment that 18% of infections are caused by MRSA, the event rate is so low as to be meaningless in this study.[5] The authors have presented an elegant RCT to establish the safety of vancomycin in the prophylaxis of open fractures. Based on this work, it is reasonable to use vancomycin in combination with a cephalosporin. However, a larger interventional study powered sufficiently to establish benefit would be required to make this new prophylactic regime gold standard.

Characterising the saline load test

The saline load test has been used commonly in hospitals across the globe to characterise the presence or absence of an open knee. Variously, the saline load test (SLT) has been described as a method for identifying open joint injuries and closed arthrotomy. However, the sensitivity and specificity of the SLT is not currently known, thus a flawed diagnostic test could result in compromised treatment decisions. Researchers from **New York (USA)** performed a retrospective review of a consecutive series of patients undergoing the SLT with at least 14 days' prospective follow-up. The definitive diagnosis of traumatic arthrotomy was defined as intra-operative confirmation of an open knee joint or subsequent septic arthritis. A true negative for the test was defined as an operative evaluation with no evidence of an open knee joint or a negative SLT with no subsequent development of septic arthritis. They took septic arthritis development as the marker for determining true positives and negatives. The authors were able to recruit 50 serial patients into their retrospective diagnostic study (Level III evidence). They established the mean wound size was 3.9 cm and a mean saline load volume given was surprisingly high at 74.9 ml. Within the group, 19 patients had a positive SLT, of which 16 were found to have an intra-operative traumatic arthrotomy. Of the 31 patients with a negative SLT, only one was found to have a traumatic arthrotomy. This yielded a sensitivity of 94% and a specificity of 91% for the saline load test. However, the false-positive rate was slightly higher than desirable at 9%.[6] The authors qualify their conclusions due to the relatively small sample size, but note that knees with no other signs of an open joint (such as gas on the radiograph), small peri-articular wounds and a negative saline load test have an infection rate of 0% with non-operative management.

Has it healed: hip fractures under the spotlight

One of the big limiting factors for any study can be poor inter- and intra-observer agreement on an expected end point. This can be a particular issue when designing large RCTs when the accuracy of an end point needs to be known. Researchers in **Ontario (Canada)** hypothesised that there may be significant inter- and intra-observer reliability issues when assessing the healing rate of fractures of the femoral neck between orthopaedic surgeons and radiologists. In order to potentially improve the diagnostic accuracy for clinical and research studies, the investigators also investigated the performance of a checklist system for hip fracture healing. The study group first developed a scoring system (radiographic union score in hip fracture (RUSH)) as a method of determining the validity of diagnoses of fracture healing. The study team assembled radiographs of 150 femoral necks and used six expert reviewers (three orthopaedic surgeons and three radiologists) to assess fracture healing, both subjectively and using the RUSH system as a framework. The exercise was repeated on two occasions, four weeks apart, to allow calculation of intra- and inter-observer reliabilities. The subjective assessment had only fair intra-class agreement (0.22) and there was no difference in agreement between orthopaedic surgeons and radiologists (0.17 *versus* 0.21). The more structured RUSH assessment gave a higher agreement with an intra-class coefficient 0.53. The doctors' impression of healing was poorer in terms of intra-class reliability but intra-class reliability was consistently high across all measures for surgeons and radiologists.[7] The RUSH tool has been demonstrated in this study to be a

reliable and accurate measure that can be confidently applied between observers. However, this study does not validate the tool against CT scanning which would be the obvious next step.

Stem cells present in atrophic non-union

One of the central tenets of orthopaedic traumatology for decades has been the supposed difference between the hypertrophic non-union (where stability is the problem) and the atrophic non-union (where biology is the problem). Traumatologists and researchers alike have started to recognise these two as a spectrum where perhaps the biology is less important than previously thought, the central difficulty being control of stability. Researchers in **Jakarta (Indonesia)** undertook a deceptively simple study where they sampled tissue from the atrophic non-union site in five patients and from the iliac crest of the same patients. They reasoned that should biology be the problem, the patients would have a lower (or absent) number of mesenchymal stem cells at the non-union site compared with healthy uninjured bone. The researchers undertook cell culture (three weeks incubation) for both samples in identical conditions. The outcomes were assessed through cell counting (using a haemocytometer) and cell viability (assessed with trypan blue stain). Cell type was confirmed through quantification of appropriate cell surface markers (including CD105, CD73, HLA-DR and CD34 amongst others).[8] At the three-week evaluation point there were no significant differences in the numbers of cultured cells or their viability (87.1% *versus* 89.8%) between the two sampling sites. Although not a definitive study, the research team have taken an important step in understanding the biology of non-union. We are very excited by this study, here at *360*; perhaps there is more going on in atrophic non-union than meets the eye (or the radiograph).

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