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## Trauma

**X-ref X-ref** For other Roundups in this issue that cross-reference with Trauma see: **Foot & Ankle Roundups 2 & 8; Wrist & Hand Roundups 1 & 3; Shoulder & Elbow Roundups 1, 2 & 8; Children's orthopaedics Roundup 8.**

### Is one screw a screw too few? X-ref

■ A recent prospective randomized controlled trial from **Calgary (Canada)** examined a simple but previously unanswered question: are two screws needed for fixation of the medial malleolus or will a single screw suffice? A total of 140 patients were initially enrolled and randomized to receive either one or two screws for fixation of the medial malleolar component of their ankle fracture. Outcomes were assessed out to 24 months postoperatively. The 36-Item Short-Form Health Survey questionnaire (SF-36) was used as the primary outcome, with the Ankle Hindfoot Scale and radiological assessment as secondary outcomes. Of the 140 patients, 127 completed the 24-month follow-up. There were 14 patients who were initially randomized to receive two screws in whom the fragment size was felt to be too small by the operating surgeon; these patients crossed over to the single-screw group. In the final analysis, there were 75 patients in the single-screw group and 52 patients in the two-screw group. However, the authors were unable to find any differences between the two groups in the SF-36 physical functioning score. There were also no differences found in the secondary outcome measures or in operating room times. The investigators concluded that single-screw medial malleolar fixation was as safe and effective as standard two-screw fixation. While this trial has some methodological flaws, and has evidently been undertaken on a relatively small budget (the use of sealed envelope randomization, for example), it also has some real strengths and answers a previously unexplored and important question: is it adequate to fix the medial malleolus with a single

screw? On the basis of this trial, it would seem so. The authors have also helpfully established that the addition of a second screw does not appear to have any disadvantages, nor does this significantly impact on operating times. Here at 360, we would therefore suggest that either approach is fine, and that fixation can happily be tailored for the ease of the surgeon in response to the fracture in front of them.

### Screw fixation or hemiarthroplasty X-ref

■ A group of investigators from multiple centres in **Norway** examined the treatment of elderly patients with non-displaced femoral neck fractures.<sup>2</sup> Their trial started from the hypothesis that those treated with a hemiarthroplasty would have superior function over those treated with screw fixation alone. While the prevailing wisdom is to fix those fractures that are deemed to be 'stable' *in situ*, usually with cannulated screws, there is some evidence that hemiarthroplasty has a higher complication rate in the perioperative period. However, evidence also exists suggesting that fixation *in situ* is associated with a higher complication rate and that this may be associated with poorer long-term outcomes from revision surgery. In this multicentre randomized controlled trial, patients were treated with either screw fixation or hemiarthroplasty. The primary outcome measure was the Harris Hip Score and secondary measures were: mobility, as measured by the timed 'up and go' (TUG) test; numerical pain score; and quality of life, as assessed by the EuroQol (EQ)-5D. It should be emphasized that the focus of this trial was on eventual function, not on perioperative complications. The authors recruited 219 patients, all with minimally displaced femoral neck fractures, who were randomly allocated to receive either a hemiarthroplasty or fixation. Outcomes were assessed at 3, 12, and 24 months postoperatively. The authors recruited 111 patients allocated to fixation and 108 patients allocated to hemiarthroplasty over a three-year period. The

investigators found no significant difference in hip function as measured by the mean Harris Hip Score (74 (SD 19) vs 76 (SD 17)); however, faster TUG tests were reported, on average, in the hemiarthroplasty group (16.6 seconds vs 20.4 seconds). There was a higher rate of revision surgery in the screw fixation group (20% vs 5%). The authors concluded that hemiarthroplasty was not superior to screw fixation but was associated with better mobility and fewer reoperations. This trial is interesting in that the authors report slightly superior outcomes and a lower reoperation rate (both secondary outcomes for this study), favouring the hemiarthroplasty group. The reported reoperation rate of 20% for the screw fixation group is in line with other reports in the literature, such as the FAITH (Fixation Using Alternative Implants for the Treatment of Hip Fractures) trial. However, the 24-month follow-up for hemiarthroplasty is a very short follow-up interval, and it is certain that this trial is underpowered for adverse events such as infection, revision due to acetabular wear, and periprosthetic fracture.

### The posterior malleolus fragment determines syndesmotric stability X-ref

■ There has been a great deal of interest in trauma circles surrounding the role of the posterior portion of the syndesmosis, which is both stronger than the anterior and tight in dorsiflexion in ankle stability. This has led to interest in treating posterior malleolar fractures with open reduction and internal fixation (ORIF), rather than using simple reverse-lag screws or ignoring the fracture all together. Although there are some series to support this approach, most are rather small. Here at 360, we were therefore delighted to read this large retrospective study from **Munich (Germany)**, in which the authors reviewed 236 patients with trimalleolar fractures in an attempt to evaluate the various management strategies.<sup>3</sup> The authors divided their group to compare ORIF, closed reduction and internal fixation (CRIF),

and untreated posterior malleolus fragments. The outcomes were assessed with regard to the frequency of trans-syndesmotric fixation and the overall quality of reduction. The groups were unevenly distributed, with 33% receiving ORIF, 19% receiving CRIF, and 48% being untreated. The main outcome of this study was that ORIF of the posterior malleolar fragment significantly reduced the need for trans-syndesmotric fixation (from > 60% in both CRIF and untreated groups to 25% in the ORIF group). There was no significant effect of the posterior malleolar fragment size on the outcomes, suggesting that the advice that those fragments greater than 25% of the joint surface should be fixed is highly dubious. In terms of quality of reduction, as would be expected, those patients who underwent ORIF had a better quality of reduction compared with the other two options. All in all, ORIF of the posterior malleolar fragment significantly reduced the frequency of trans-syndesmotric fixation and resulted in a significantly better quality of reduction compared with CRIF and untreated posterior malleolar fragments.

#### Mortality after pelvic fractures: a retrospective cohort study

■ There are few very large series of patients with pelvic fractures reported in the literature. As registries and outcome data have become more available, decreases in the absolute number of pelvic fractures have been observed in many parts of the world, perhaps in part due to improved car safety, speed cameras, better side-impact systems, and a culture of risk aversion. The strength of this retrospective cohort study from **Assiut (Egypt)** lies in the high number of pelvic fracture patients (1188) that the authors present from the registry of the Assiut University Trauma Unit.<sup>4</sup> The aim of the study was to identify the predictors of in-hospital mortality after pelvic ring injuries. An abdominopelvic collection was seen on a Focused Assessment with Sonography for Trauma (FAST) scan in 11% of the patients. Overall, associated injuries were present in 67.3% of patients, with abdominal-urogenital injuries being the most prevalent (66.3%). The authors reported that just under 5% were admitted to an intensive care unit (ICU); the median hospital stay was five days. Despite the low admission rate to ICU, there were more deaths (8.7%) than ICU admissions, which were seen in two peaks: the first 24 hours and between 48 hours and one week. The authors went on to undertake a multivariable analysis to establish what factors were associated with a high risk of death in this series. They identified that

increasing age, fractures with soft-tissue injury, associated head injury, positive FAST examination, and admission to an ICU were all significant predictors of in-hospital mortality.



#### Trifocal transport

■ One of the most difficult and time-intensive treatments that any orthopaedic surgeon undertakes is that of bone transport. Transport has found application in tumour surgery and acute trauma, but is predominantly used for bone infection, with Ilizarov memorably quoted as having said that “infection burns in the fire of the regenerate”. The treatment often involves long transport segments, which can be given either through a bifocal transport (with a single transport segment, which has the advantage of being the ‘best’ bone), or through a trifocal transport technique, which reportedly reduces the transport time but is more intensive for patients and surgeons. As there is little reported in the literature surrounding the use of trifocal transports, we were delighted, here at **360**, to see this paper from **Lecco (Italy)**, **Hyderabad (Pakistan)**, and **Tanta (Egypt)**, which compares the use of bifocal and trifocal transports in the management of patients who require long transport segments.<sup>5</sup> The paper sets out to compare the outcomes between the two techniques in terms of complications and additional procedures. The authors included patients who had segmental defects of 8 cm or more, although these were arguably not all true ‘long’ transport segments. They reported the outcomes of 86 patients, 41 treated with a trifocal transport technique and 45 treated with a bifocal transport technique. The groups were not terribly well matched, as one might expect with a comparison series like this where there has not been a change in the standard of care. Bigger

defects, longer operating time, and longer transport distances were observed in the trifocal group. However, the number of complications, additional procedures, and healing index were significantly in favour of the trifocal group. This result may be self-evident for the healing index, which is a measure really designed for a single transport segment. As there are two transport segments in the trifocal group, one might expect there to be an excess of return trips to theatre; however, that does not appear to be the case.

#### Improved survival with a hip screw X-ref

■ There is significant debate still surrounding the question of whether sliding hip screws or intramedullary (IM) nails should be used for stable pertrochanteric fractures. While it is now widely accepted that an IM nail is superior for reverse-oblique and subtrochanteric fractures, there is little agreement as to the best treatment option in stable fractures. The larger European registries demonstrate lower complication and reoperation rates, while small randomized trials conducted on the other side of the Atlantic have variably pointed to shorter inpatient stay and improved functional results. The aim of this study was to approach this issue from a different perspective: that of mortality. There is a reasonable argument to be made that instrumentation and reaming of the medullary cavity carries with it a morbidity and mortality burden. A group from **Bristol (UK)** investigated the mortality impact of IM nailing and sliding hip screws when used for patients presenting with a trochanteric hip fracture, utilizing data on 82 990 patients treated over a four-year period and reported in the United Kingdom National Hip Fracture Database (NHFD).<sup>6</sup> The use of short and long IM nails in this series was associated with an increased 30-day mortality (odds ratio 1.125). The authors recognize that there are issues with this kind of uncontrolled study and that, although the mortality increase seems marked and an adjusted analysis has been undertaken, there is no way to know whether this is causative or associative. The authors comment that “If this were causative, it would represent 98 excess deaths over the four-year period of the study and one excess death would be caused by treating 112 patients”. There is a plausible mechanism by which excess mortality may be expected in the reaming group: longer operative time, increased blood loss, and physiological stress associated with instrumenting the canal. However, there are equally reasonable explanations for why this may be associative. This study was conducted in the United Kingdom, where IM nails are usually reserved for more unstable fracture configurations where a

longer operative time may be expected in any case, and the patients could be expected to have had a more significant injury. The NHFD does not collate data on other injuries and, as such, the populations are not likely to be identical. While there is plenty of food for thought in this article, further investigation is clearly needed.

### Far cortical locking: not all it's cracked up to be? X-ref

■ Far cortical locking (FCL) is a topic of increasing interest, viewed by its proponents as a way to potentially reduce bending moments in locked plating constructs while also aiding axial motion required for healing. The development of FCL was driven by a need for more flexible fixation, particularly in the distal femur, where use of complete locking constructs resulted in a high rate of nonunion and catastrophic metalwork failure following the introduction of the Less Invasive Stabilization System (LISS) plates. There are now three accepted and widely used strategies for dealing with this problem: the use of mixed constructs with standard screws in the diaphyseal shaft; unicortical locking on the near cortex; or unicortical locking on the far cortex alone. The rationale behind FCL is that moving the fixation point to the far side of the bone from the plate will reduce the bending moments and thereby reduce shear forces and maintain axial translation. However, there is no real clinical or biomechanical evidence to support one fixation method over another in the most commonly used bridge fixation constructs. This biomechanical paper from **Charlotte, North Carolina (USA)** sets out to establish what the stability implications are for FCL constructs.<sup>7</sup> The authors tested distal femur locking plates with simulated femora and bridge constructs using various methods of diaphyseal fixation (bicortical locking, bicortical nonlocking, near cortical locking, and FCL). The investigators then measured the axial and shear components of the displacement under load, which were measured at five different bridge spans for each fixation method. The results of this paper suggest that the type of diaphyseal fixation does impact on the recorded shear forces, but not on the axial displacement seen. In what will be a disappointment to proponents of far cortical fixation, there were greater shear type displacements seen in all constructs fixed with FCL screws when compared with bicortical locking (4.6 mm vs 2.9 mm) and bicortical nonlocking (4.6 mm vs 3.4 mm). The authors point out that this observation is the opposite of what might be expected, and is due to the interaction of the bridge span construct that

interacts negatively with the FCL (each exhibiting a bending moment). The authors conclude, given the complexity of these relationships, that computational modelling should perhaps be used more often in the future, rather than the traditional simple Instron testing with surrogates, to establish the likely relationships.

### Reverse shoulder arthroplasty in the older patient X-ref

■ The publication of the PROFHER (Proximal Fracture of the Humerus Evaluation by Randomisation) trial has questioned where and when proximal femoral fractures should be treated with a plate and screws. A group of authors from **Berlin (Germany)** have reported on a series of 81 elderly patients who received a reverse arthroplasty for treatment of their proximal femoral fracture.<sup>8</sup> The authors aimed to establish if there was any effect on outcome of the healing of the tuberosities or not. They dichotomized the group into those with and without tuberosity healing and assessed outcomes in terms of objective measurements (range of movement, Constant score) and patient-reported outcome measurements (American Shoulder and Elbow Surgeons Shoulder Score) at regular intervals up to two years following fracture. All patients reported in this series were deemed to have a non-reconstructable proximal humeral fracture. Treatment was with a modular reverse fracture shoulder arthroplasty and patients were recruited from two centres. Overall, the tuberosities healed in 70 patients (37 entirely and 33 partially) by two years following the surgery. However, there were no significant differences in functional outcomes reported in this series between the three groups. This series runs somewhat counter to the conventional wisdom, where healing of the tuberosities would be intuitively expected to improve fracture healing. The results reported here would suggest that the reverse shoulder arthroplasty is suitable for use in the older population with proximal humeral fractures.

### Conversion to total hip arthroplasty after posterior wall fractures X-ref

■ The posterior wall is supposedly the most benign of acetabular fractures. Although often more difficult to fix than the occasional surgeon may appreciate, the surgical approach is one of the least challenging, and the decision-making process is relatively straightforward. While the presence of marginal impaction is universally accepted as resulting in a poorer outcome than those without, there is, however, a paucity of decent-quality evidence to inform the surgeon and patient as to the likely longer-term outcome of an operatively

treated posterior acetabular wall fracture. This group from **San Francisco, California (USA)** report on a retrospective cohort of patients with acetabular fractures involving the posterior wall, all of whom were managed with open reduction and internal fixation (ORIF).<sup>9</sup> The series consists of patients with follow-up to at least four years, with the aim of identifying risk factors for early conversion to total hip arthroplasty (THA). In this single-centre series, the authors reported that overall rate of conversion to THA was 5%, 14%, and 17% at two years, five years, and nine years, respectively. The authors reported that cases with less than 1 mm of diastasis/step-off did not result in conversion to THA, while there was a 10% conversion for displacements of 1 mm to 4 mm, and a 54% conversion with a step-off > 4 mm. There were no differences in functional outcomes between those who did and did not undergo total joint arthroplasty.

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