ROUNDUP360

Trauma

HIV-related implant surgery in trauma

As outcomes for HIV are improving with the advent of newer retrovirals and triple therapy, patients with HIV are attaining close to normal life spans. Despite living long-term with HIV becoming a reality, there is little evidence to inform the surgeon and patient as to the reality of longer-term immunosuppression and implant usage. Three papers caught our eye at *360* HQ this month, all of which add a little to this as yet unsolved puzzle. Investigators from **Cheshire (UK)** and the Beit CURE International Hospital, **Blantyre (Malawi)** have reported their results of a cohort of 91 HIV positive patients, all of whom underwent fracture surgery.[1] Their cohort of patients underwent 103 procedures using 111 implants and follow-up was achieved to a mean period of 27 months. There was a 10% early infection rate (n = 9), with all of these occurring early in the post-operative period. Of those early infections, the clinical team were able to suppress six with antibiotics, two required removal of metalwork and one required amputation. Despite the high rate of early infection, there were no observed late occurrences of implant-associated sepsis in the remaining patients. The authors concluded that because there was no observed increased risk of late implant-associated sepsis, there is no indication to remove implants in HIV positive patients following fracture union. A study team in **Durban (South Africa)** used a different methodolgy in an attempt to answer the same question.[2] These researchers performed an interval follow-up three years following a prospective cohort study investigating outcomes of patients with open fractures. Their initial study population consisted of 101 patients, all treated with open reduction internal fixation (ORIF) for open fractures. The initial study population consisted of 33 HIV positive and 78 HIV negative patients and, as such, the authors were able to perform a prospective comparative cohort study. The investigators were able to contact 51 patients for interval follow-up (just 13 with HIV) and review them in clinic. While the numbers reported in this study are disappointingly low, only a single HIV positive patient developed delayed implant sepsis. In contrast, there were two late-implant infections in a cohort of 23 HIV negative patients. The authors concluded that HIV positive patients are not at higher risk of delayed sepsis, and they recommended against routine removal of metalwork in HIV positive patients. Taken on its own, given the very low numbers reported in this study, there would not be enough here to recommend treatment with one modality or another. However, given two similar studies with similar findings, it seems likely that there is no higher risk of late sepsis in this group. In a similar third study, researchers from **Denver (USA)** have undertaken a very long-term retrospective follow-up study of 24 HIV positive patients, all presenting initially with closed fractures and treated with fracture fixation over a 12-year period.[3] Although again somewhat limited in its design as a retrospective cohort study, only a single patient with associated end-stage renal failure and diabetes mellitus developed a post-operative infection. All their patients achieved fracture union within 180 days post-operatively, without the need for surgical revision. The authors concluded that there is not a higher risk of surgical site infection or nonunion in HIV positive patients following operative fixation of closed fractures. It is surprising that three differently designed studies undertaken in different healthcare systems, with different injury patterns, have established the same thing. There appears to be no greater risk to long-term infection in patients with HIV. The rates of early infection reported do vary from study to study and this is likely to be accounted for by differences in the patients' anti-retroviral therapy and CD4 counts – these are, after all, still rather small studies.

Major transfusion under the spotlight

The wars in Iraq and Afghanistan have led to much popularised improvements in acute trauma care. One of the major advances that has translated from battlefield care to bedside care is that of initial blood resuscitation, with major transfusion protocols clearly documented in prospective and registry studies as having reduced mortality during initial transfusion. There is, however, little in the way of high-quality evidence to support the various major transfusion stipulations that have been developed based on military protocols. Two of the most common are the 1:1:1 plasma:platelets:red cells and 1:1:2 regimes. Researchers in **Texas (USA)** have undertaken the daunting task of studying two of the most widely used major transfusion protocols.[4] They designed a large pragmatic multicentre randomised trial and were able to recruit a massive 680 patients, all with severe traumatic injuries in one of 12 level I trauma centres. Patients were randomised during resuscitation to receive either 1:1:1 (338 patients) or 1:1:2 (342 patients) transfusion ratios. There was little difference in demographics between the two groups, and a mean ISS of 26 in both groups. Outcomes were assessed primarily as 24 hour and 30-day all-cause mortality. Secondary outcome measures collated included time to haemostasis, volume transfused, complications, surgical procedures and functional status. While there were no differences between overall mortality rates in two groups at 24 hours (12.7% vs 17% in favour of 1:1:1) or 30 days, patients with a ratio of 1:1:1 had significantly lower rates of death by exsanguination at 24 hours (9.2% vs 14.6%). In terms of other outcome measures, as would be expected, more blood products were used in the 1:1:1

group but there were no other significant differences in secondary outcome measures, and crucially no differences in adverse event rates. The authors conclude that physicians should consider using ratios of 1:1:1 for the initial units transfused in major bleeding trauma, before transitioning to laboratory-guided transfusion once available.

Surgery and mortality in elderly acetabular fractures

Treatment of acetabular fractures in the elderly is becoming increasingly topical. Fragility fractures of the acetabulum present a challenge in terms of both technique and management. With more and more older frail patients presenting with severe injury, the medical and surgical management of these injuries has become the focus of a number of small studies. What remains far from clear is if there is any survival benefit conveyed by operative treatment of these injuries. In this retrospective study, authors from **Houston (USA)**, in conjunction with three United States level I trauma centres, attempted to unpick the survival benefit, or otherwise, in elderly patients with acetabular fractures, even when adjusted for comorbidities.[5] The authors included 454 patients over the age of 60 presenting over a seven-year period between 2002 and 2009. Like many centres, a variety of treatments was used, including THA acutely, percutaneous reduction and fixation, ORIF and non-operative management with early mobilisation. In common with other series, patients had a mean age of 74 years and a mortality rate of 16% at one year. Higher raw mortality rates (21% vs 13%) were seen in non-surgically treated patients, however, no differences in mortality were identified when multivariate analysis was undertaken, nor for any of the three operative treatment subgroups. The retrospective nature of this study and the selective nature of operative fixation introduced a selection bias to the results, with a significantly increased hazard for factors such as the Charlson comorbidity index (Hazard Ratio 1.25 per point) and age (Hazard Ratio 1.08 per year). This is one of the few reports of a large series of patients treated with fragility fractures of the acetabulum and describes benchmarks for standard of care. The decision to operate or not should not be based on a reduction of mortality.

Traction pin safety

The use of skeletal traction pins is common practice in institutions taking care of multiply injured patients. Traction pins, splints, external fixation and plaster casts are used (sometimes in combination) as part of a damage control strategy. Pin site infections are one of the chief cited drawbacks of skeletal traction pins, and the incidence of these has not been quantified in the literature, nor specifically if it has any long-term implications for future ORIF. Clinicians in **Lebanon (USA)** have reported a case-control study with the aim of quantifying traction pin site infection and specifically comparing the rate with nationwide and institutional-specific surgical site infections.[6] The investigators report 169 consecutive cases of traction pin application, all of which were retrospectively reviewed and performed in a single centre. The outcomes reported included minor and major infections at 90 days and one year in the pin site area or at the eventual open surgical site. In the entire series there was only a single case of a septic knee and there were no reports of superficial infections or osteomyelitis. The 90-day and one-year rates of infection were identical, with a per-pin infection rate of 0.6%. These observed infection rates were lower than, but statistically similar to, nationwide infection rates for open reduction procedures, and similar to institution-specific infection rates for arthroplasty procedures. Although no direct comparison groups were used in this study, it does seem more than likely that pin placement does not increase subsequent infection rates.

Obesity and trauma

It is suprising to us here at *360* HQ how little is known about obesity and traumatic injury. Given the vast quantities of research covering every facet of outcomes in joint replacement (from complications, to surgical risks, to clinical results), it is surprising that very little is known about the implications of obesity on orthopaedic trauma injuries. Investigators in **Cleveland (USA)** sought to answer this specific question using a prospective observational study.[7] The research team evaluated a total of 376 patients with an Injury Severity Score (ISS) greater than 16 and mechanically unstable, high-energy fractures of the femur, pelvic ring, acetabulum, or spine requiring stabilisation. These patients were recruited in a level I trauma centre and subdivided into two groups consisting of the obese (body mass index > 30) and non-obese. Outcomes assessed as part of the study included rates of deep vein thrombosis, PE, infection, organ failure and mortality. In terms of raw complication rates, obese patients were significantly more likely to suffer complications (38.0% vs 28.4%), with a higher reported incidence of acute renal failure (5.70% vs 1.38%) and post-operative infection (11.4% vs 5.50%). In terms of haemodynamic and cardiorespiratory support, obese patients required longer intensive therapy unit stays and ventilation days (seven vs five days), which unsurprisingly translates to increased hospital stay. There were no significant differences seen otherwise in rates of mortality, multiple organ failure, or pulmonary complications. Medically stable obese patients were almost twice as likely to experience delayed fracture fixation due to preference of the surgeon and were more likely to experience delay overall (26.0% vs 16.1%, $p = 0.02$). Mean time from injury to fixation was 34.9 hours in obese patients *versus* 23.7 hours in non-obese patients ($p = 0.03$). In this level I trauma centre, 42% of patients were obese and complications in this population were significantly more frequent than in their non-obese counterparts. Certainly food for thought.

Salvage of acetabular fixation in the longer term

An area where competing research doctrines exist is in salvage with arthroplasty. Trauma surgeons tend to follow patients until the 'bone heals', whereas arthroplasty surgeons are more used to the longer-term outcome studies required to prove efficacy with modern arthroplasty. Intra-articular fractures, and especially those requiring salvage with arthroplasty require longer-term follow-up. The rates of subsequent degenerative change are not insignificant and patients undergoing total hip arthroplasty following acetabular fracture are a completely different demographic from the fracture population. A study team in **Berlin (Germany)** have reported their long-term follow-up of a previous series of total hip arthroplasties performed after acetabular fractures.[8] In an impressive 20-year follow-up the authors report that functional outcomes remain excellent and report implant survivorship

of approximately 71% for revision free from aseptic loosening. The authors highlight that acetabular loosening is a major issue in patients with a diagnosis of post-traumatic arthritis secondary to an acetabular fracture. Papers like this are crucial in setting standards and serve as a benchmark, allowing surgeons to modify contemporary protocols to minimise long-term complications. For instance, innovations with highly porous metals for the acetabular component may be a reasonable first line option in this cohort of patients based upon the results of this long-term investigation.

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