ROUNDUP360

Trauma

Tranexamic acid stops bleeding in trauma across the board

Here at *360* we avidly read the literature on all aspects of orthopaedics in when preparing the journal, but even amongst the high-quality papers picked by our Editorial Board it is rare to find a game-changing paper, one that changes our practice overnight. However, the CRASH-II study was one such paper. An RCT with a message so strong it could not be ignored. If you give bleeding trauma patients tranexamic acid fewer of them will die. The original collaborative researchers from **London (UK)** have performed this new stratified analysis of the original prospective double-blinded placebo controlled trial (Level I evidence). This new report aims to establish the effect of tranexamic acid on bleeding and prothrombotic events in the original CRASH-II cohort that were also entered into the Trauma Audit Research Network (TARN) database. The researchers included 13 273 trauma patients and stratified them by risk of death on admission based on their Injury Severity Scores. The researchers performed an odds ratio analysis for each of the stratified subgroups. They established that administration of tranexamic acid reduced the risk of death from both bleeding and arterial (but not venous) thrombotic events. The researchers found no evidence of heterogeneity between strata for risk of death, bleeding effects, or thrombotic events. That is to say, the benefit of tranexamic acid is the same in each at-risk group.[1] Wow, we think at *360*, this really is a case of a study that is as good as it looks. With reductions in mortality of between 17% and 36% in each risk strata, this really is a treatment all patients with traumatic bleeding should be receiving, irrespective of the severity of their injuries.

Antibiotic beads and VAC – a recipe for success

There does not seem to be a wound these days that cannot have a negative pressure wound therapy (VAC) applied to it. Despite their almost ubiquitous use, we still struggle at *360* to know exactly when they can be used, and whether we can use them on open fractures and with antibiotic beads. Researchers from the United States Air Force based in **California (USA)** have come to our rescue. The researchers used a porcine model of bilateral open femoral fracture and applied antibiotic PMMA beads, both under the sponge and deep to the fascia. They closed one wound and applied a VAC to the other. Over a 72-hour period they measured antibiotic load in the exudates, and at 72 hours in a periosteal sample. The researchers could not find any differences in vancomycin or tobramycin levels between those with VAC dressings and closures. All animals reieved antibiotic levels of approximately the minimum therapeutic dose.[2] Here at *360* it seems that every time we refer a patient to our plastic surgery colleagues, the advice 'It can wait until tomorrow, could you just apply a VAC dressing for me' is the result, especially in the middle of the night! We are therefore delighted that in addition to aiding the sleep of our plastic surgery colleagues, we can still use PMMA antibiotic-loaded beads to keep our infection rates low. What we are still not at all clear on is whether early flap management or bead pouch will prove to be outperformed by early VAC and subsequent flap in these difficult injuries.

Does the anaesthetic determine the outcome in surgery for distal radial fractures

Few topics in the trauma world have attracted so many new implants or so many reported studies as distal radial fractures in recent years. A definitive answer to the simple question 'How should we manage distal radial fractures?' seems to elude the greatest brains in trauma and orthopaedic surgery. Even in these enlightened times, here at *360* we would never have guessed that part of the answer to long-term outcomes may lie in anaesthetic choice. Researchers in **New York (USA)** reviewed the results of their trauma registry to establish if long-term outcomes were affected by the choice of anaesthesia. The researchers designed a retrospective comparative study (Level III evidence) to establish which anaesthetic technique gave the best results in the longer term. They selected a range of outcome scores, including clinical and patient-recorded measures. In their paper they present the results of 187 patients with AO type 2.3 fractures, operated on with a volar plate. Anaesthesia was achieved in all patients with either a general or regional technique, at the discretion of the anaesthetist, patient and surgeon. The authors report no differences in the data with regards to fracture type or demographics. All patients in the series were reported to a minimum follow-up of one year, and results were also recorded at three months and six months post-surgery. Curiously, the authors report significantly improved range of finger movement, pain scores, and DASH functional outcome scores, sustained across the one-year period in the regional anaesthetic group.[3] Here at *360* we were quite surprised to see such a result. How can the method of anaesthesia reflect outcome in the long term? It seems most likely that this represents a profound selection bias, with patients likely to do well also requesting regional anaesthesia. Whilst an interesting paper, we are not sure just yet that we will trust the long-term outcomes enough for our patients to choose anaesthetic modality.

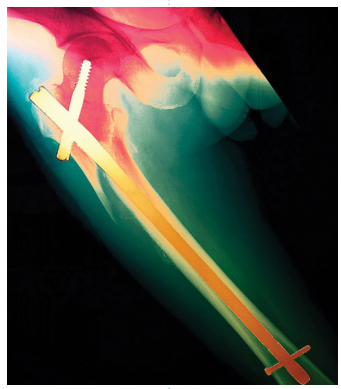
High complications in surgery on bisphosphonate-hardened bone

The tidal wave of bisphosphonate-associated fractures has not yet emerged despite much concern in the orthopaedic and metabolic bone literature. However, bisphosphonate-associated fractures are a new phenomenon and an understanding of the treatment modalities, complications, and long-term consequences of such fractures is currently poorly

established. In order to shed some light on this controversial topic, a research team from **New York (USA)** designed a retrospective comparative case series (Level III evidence) to establish if a diagnosis of osteoporosis, radiological features of bisphosphonate-related fractures, and complication rates differs between patients with bisphosphonate femoral shaft fractures and those not on bisphosphonates with similar fracture patterns. The study team identified 43 patients with bisphosphonate-associated femoral fractures and 20 patients with morphologically similar fractures who were not on bisphosphonates. Both patient groups were treated with similar implants, although fixation adjuvants were used with a higher frequency in the bisphosphonate group. Follow-up was to just over one year (minimum five months). The researchers identified a higher rate of osteoporosis (24% *versus* 5%); proximal fracture location (48% *versus* 40%); cortex-to-shaft diameter (24% *versus* 15%); intra-operative fractures (21% *versus* 0%) and plate failures (30% *versus* 0%) in the bisphosphonate-associated fractures when compared with the standard fractures. Awareness of bisphosphonate-associated fractures is rising, and given the higher complication rates in those with bisphosphonate-associated fractures than morphologically similar fractures, patients presenting with these injuries should be carefully followed up after meticulous surgery with rigorous attention to anatomical fixation.[4] Here at *360* we have been following the debate surrounding bisphosphonate-associated fractures. This is a worrying, but not yet disturbing development. We are less alarmed than many because although significant for the individuals involved, it is important to remember that such fractures, while difficult to treat, are exceedingly rare. In our humble opinion, when taken at a population level, the long-term benefits of bisphosphonates far outweigh the risks.

Better outcomes but more dislocations in femoral neck fractures

Another area of scientific interest with a flourishing of small randomised controlled trials is that of femoral neck fractures in trauma. Over the past six years there has been a large number of randomised controlled trials comparing almost every aspect of treatment for hip fractures. We at *360*, like many others, have been particularly interested in those concerning total hip replacement (THR) and hemiarthroplasty (HA). This offers the potential for improved function and elimination of acetabular pain, but at the potential cost of increased complication rates. The literature is clouded by numerous small trials of multiple different implants, a perfect setting for a meta-analysis. A study team in **Rotterdam (The Netherlands)** set out to determine the role of THR in displaced intracapsular femoral neck fractures. The study team performed a thorough search of the English language literature and included randomised controlled trials comparing all forms of THR with HA. They used a sound methodology and pooled data using a random effects model. There were eight Level I trials, totalling 986 patients, suitable for inclusion in the study. The study team conducted an analysis of pooled results. The all-cause revision rate was significantly lower in the THA group (4% *versus* 7%), with equivalent one-year mortality rates of around 15%. As would be expected, the dislocation rates were significantly higher in the THA group (9% *versus* 3%) but major complications (25% *versus* 24%) and minor complications (13% *versus* 14%) were found to be equivalent. Functional scores suggested a small, but statistically significant, benefit of the THR (4 points on the Harris hip score and 16 points on the WOMAC) over HA. In addition, with data pooling, the researchers identified an increase in quality-of-life scores (EQ-5D 0.69 *versus* 0.57). The majority of studies included in this meta-analysis have similar inclusion criteria, and this study supports the practice of selected THR for patients with a displaced intracapsular femoral neck fracture. Although the evidence suggests a higher dislocation rate, complications as a whole were equivalent.[5] We are delighted at *360* to see such a definitive answer to this outstanding question. We now know which treatment to select for our fit and healthy young patients, without cognitive impairment, who can walk independently. Sadly, in our own practice this is the minority of patients, and we would love to see some more wide-ranging studies investigating the benefits of THR in the more common patient demographic.



The mythical hip fracture

All the way back in orthopaedic pre-history (1961), Garden described four types of femoral neck fracture, the least severe of these being the undisplaced Garden type I. Since then, orthopaedic surgeons and their residents the world over have peered at trabeculations with intent to distinguish the impacted valgus type from the incomplete type 1 fracture. The diagnosis of this mythical fracture has decreased with the development of 3D imaging. Researchers in **Shijiazhuang (China)** designed a prospective study to attempt to prove the hypothesis that in fact the Garden type I fracture is an undisplaced complete fracture. The investigators conducted an impressive prospective diagnostic study (Level II diagnostic study) over a two-year period where patients with a suspected hip fracture received both a plain radiograph and CT scan. During the study period, 825 femoral neck fractures were identified and 17 appeared incomplete on plain radiographs. However, in all these cases the CT scan clearly showed a complete occult fracture extending through the medial cortex. All patients were subsequently treated with cannulated AO screw fixation. A single patient suffered secondary loss of reduction. All fractures healed uneventfully with no signs of avascular necrosis.[6] We agree wholeheartedly with the authors' conclusions that modern imaging may have outdated the concept of an incomplete fracture, although taking the pragmatic approach fixation with cannulated screws is the current standard of care in most centres for both Garden type I and II fractures.

Plate augmentation in nonunion surgery

There is a huge range of treatment options for nonunion, and the experienced trauma surgeon should have a variety of tools in his armoury to address nonunion, preferably treating the cause. The most common sites for nonunions are subcutaneous bones, particularly the tibia as the blood supply is poor. The traditional AO teaching advises addressing the nonunion through optimisation of stability, blood supply and biology. Femoral shaft nonunion is often treated in the first instance with exchange nailing, relying on the physiological insult of intramedullary reaming and the increased stability associated with a large radial nail to optimise biology and stability. Other recognised techniques include dynamisation and compression plating with or without biological augment. A team of surgeons from **Taipei (Taiwan)**

describe a novel approach aimed at optimising the biology and stability retaining the intramedullary nail in situ. The team treated 22 patients over a six-year period, all of whom presented with a femoral nonunion which had failed to unite over a mean period of 20 months. The described surgical technique involved retention of the nail and application of a femoral compression plate in all patients, in combination with autologous bone grafting as required. The study team reported that all 22 patients achieved uneventful bony union at a mean of 22 weeks with no significant complications.[7] While an unusual technique and not quite in line with orthodox teaching on the mechanisms of fracture healing, it is difficult to argue with the presented results. 100% union rates following nonunion surgery are the gold standard, and here at *360* we must applaud the surgical team for developing what in their hands is an effective approach.

SIGN intramedullary nailing and infections

The incidence of infection post intramedullary nailing is relatively low in developed countries with closed injuries, but is known to rise with open- and higher-grade injuries. The particular variety of endosteal osteomyelitis associated with intramedullary sepsis can be difficult to eradicate, so knowledge of causes and risk factors is essential. With low event rates, large studies are required to tease out the risk factors for infection. Researchers from **Bergen (Norway)** report what must be one of the largest case series of single interventions ever reported in the world literature. Using the SIGN database of intramedullary nails inserted into patients from the third world and developing countries, the researchers report a series of 46 722 intramedullary nails performed in 58 countries. The overall follow-up rate was 23.1% and the reported infection rate was 1% (0.7% humerus, 0.8% femur, 1.5% tibia). Within the reported series, prophylactic antibiotics cut the risk of infection by a third, where nonunion surgery doubled it. The researchers were able to establish that the infection rate was directly proportional to the income level of the country.[8] The contribution that the SIGN nail project has made to world health care cannot in any way be underestimated. The report presented here is not only of scientific worth, but shows the contribution to global health care that can be made with a properly established project providing almost Western standards of care in the most challenging of settings.

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