of the presence of symptoms, or with discogenic pain (12.7%). The definitions varied between surgeons and other healthcare professionals, as did whether they were applied to the lumbar or cervical regions. The authors highlight the variable usage and definition of DDD, and state that this could hinder accurate communication and could "create confusion and misconceptions among clinicians, patients and others". In this very simple paper, a very important observation is made. If commonly used terms are not standardized, there are issues with interpretation of the literature, systemic reviews, and evidence synthesis. Perhaps, therefore, a standard definition of DDD is required?

Brace treatment in adolescent idiopathic scoliosis: risk factors for failure

■ Following the 2013 publication of the Bracing in Adolescent Idiopathic Scoliosis Trial (BRAIST) study, bracing in adolescent idiopathic scoliosis (AIS) is enjoying a resurgence, and is now recognized as the most effective nonoperative treatment for AIS. The authors of this study lead from **Halifax (Canada)** have performed a literature review in order to determine what factors reduce the success of this treatment.[8] Although the resurgence of interest has resulted in a plethora of publications, clinicians must start to establish which patients are most suitable for surgery, and which for bracing. The authors undertook an extensive MEDLINE and Embase database search. They looked for studies that identified specific risk factors for curve progression under bracing, with the aim to establish the patient cohort that will do best with nonoperative management. Studies that involved night-time only bracing, comparisons between brace types, and the effect of physical therapy on brace performance were excluded from the analysis. As such, there was a relatively homogenous treatment intervention. Seven clear risk factors were identified: poor brace compliance (eight studies); lack of skeletal maturity (six studies); Cobb angle over a certain threshold (six studies); poor in-brace correction (three studies); vertebral rotation (four studies); osteopaenia (two studies); and thoracic curve type (two studies). Several studies also showed that there was a cumulative risk if multiple risk factors were present. This review is useful to guide surgeons in counselling patients appropriately; those at high risk of progression can be identified and warned that future surgery may be inevitable.

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Trauma

X-ref ***For other Roundups in this issue that cross-reference with Trauma see: Hip & Pelvis Roundup 3; Wrist & Hand Roundups 1, 2 & 7; Shoulder & Elbow Roundups 6 & 7; Spine Roundup 4; Children's orthopaedics Roundups 2 and 7.***

A single screw: a screw too few in the medial malleolus? X-ref

■ Unstable ankle fractures are almost always treated with surgical fixation. When the medial malleolus (MM) is fractured, the traditional accepted treatment is to fix this fragment, usually with two parallel screws (though plate and tension band techniques are described). It is not uncommon to have a fractured fragment that is too small to accept two screws. Alternatives, such as tension band fixation and suture anchor fixation, have been proposed to afford adequate protection against rotational forces. These authors from **New York, New York (USA)** question whether such elaborate fixation methods are needed or whether, in fact, single-screw fixation is enough.[1] They conducted a retrospective database-driven study and identified all patients that underwent surgical fixation of unstable ankle fracture between 2013 and 2017. Following exclusion of patients who were skeletally immature, did not have MM fixation, or had inadequate follow-up, 196 patients were identified. Of these, 47 underwent single-screw fixation; the remainder received dual-screw fixation. The authors utilized a 4 mm partially threaded cancellous screw for MM fixation. Postoperatively, after one to two weeks, the ankle was mobilized in a fracture brace, but all patients were kept non-weight-bearing for six weeks. Radiological and functional outcomes were assessed using the Maryland Foot Score (MFS). Patients had a minimum reported follow-up of one year. Demographics, including body mass index and smoking habits, were similar between the two groups. As expected, MM fragment size was significantly smaller in the single-screw fixation group. However, time to radiological union was 3.7 months (SD 3) for the single-screw group and 3.8 months (SD 2.5) for the dual-screw group. Further, there was no difference with regard to MFS score, infection, revision, or metalwork removal. This research question is very relevant to everyday trauma, as well as foot and ankle practice. Unfortunately, the study methodology and reporting may not have been adequate enough to definitively answer this question. It is unclear whether the spectrum of injury was similar between the two groups, whether any patients had an isolated MM fracture, and whether the postoperative regime utilized was alike. Despite the limitations of this study, it is reassuring to note that the cohort of patients with single-screw fixation for fracture performed comparably to the dual-screw group. Certainly, there is enough here to call into question the use of elaborate fixation methods with a high complication rate.

Lifetime fatal carcinogenesis risk in the first year following polytrauma: a major trauma centre's experience over ten years

■ The advent of the 'traumagram' (a pan-CT scan taken at the time of resuscitation), combined

with an increasing reliance in modern medicine on radiation-intensive investigations such as contrast studies and regular radiographs, has a number of implications for the patient. The radiation doses these patients receive are relatively high, and the risk of carcinomatosis is unknown. Although there are some severe limitations to this study from **Leeds (UK)**, it does ask some valuable questions and provides data to answer at least some of them.[2] The authors aspired to estimate the radiation dose that polytraumatized patients (Injury Severity Score ⩾ 16) were exposed to in their first year of treatment following injury. All patients admitted to their regional level one centre over a 19-year period were included. Their risks of developing cancer were assessed using the patient age and sex, on the basis of the International Commission on Radiological Protection (ICRP) recommendations. Estimates of cancer risk were calculated from exposure received, and then imported into previously developed models. Radiation exposure was assessed using a notes and records review of the 2,394 patients recorded in the study. The mean total radiation dose received was 30.45 mSv and the median dose was 18.46 mSv. In all, 115 patients (4.8% of the cohort) received ⩾ 100 mSv of radiation. The total patient group had a 3.56% mean risk of fatal carcinogenesis relating to medical exposure of radiation as a result of their injuries. There are a number of potential issues with this study. Radiation exposure was only measured in a single centre and, with quoted radiation doses of 7 mSv for a chest CT and 0.2 mSv for a plain chest film, we at *360* wonder exactly how much radiation was given to some patients. One in 20 patients received the equivalent of over 15 CT scans or 500 radiographs in a year. This paper does raise some interesting questions; however, by the authors' own admission, they have not followed up their patients to establish the development of the predicted cancers. Given the long lifespan of the paper, it would be helpful to have this data available to see whether this prediction from a calculated observation is fact or fiction.

Three-week versus six-week ankle fractures: a randomized clinical trial

■ The ankle fracture is the focus of notable clinical research at the moment. Several trials have looked at the types of operative interventions, at whether there is a need to operate at all in closed, reducible fractures, and at rehabilitation strategies. Certainly, in the wake of the recent batch of clinical trials, it will take some time for the dust to settle – and there are even more in the pipeline. Each trial answers a single, discrete question.

In one of the more important studies, researchers in **Oulu (Finland)** asked: do ankle fractures really need to be immobilized for six weeks, or will three weeks do?[3] This trial, reported in the *BMJ*, was a randomized, multicentre, noninferiority trial. The authors recruited 247 skeletally mature patients with an isolated Weber B type ankle fracture and randomized them to conventional six-week cast immobilization (n = 84) or to three-week treatment, either in a cast (n = 83) or in a simple orthosis (n = 80). Outcomes were assessed using a noninferiority margin, calculated from the Olerud-Molander Ankle Score (OMAS) at 12 months, of -8.8 points. Additionally, a range of secondary outcomes were reported, including ankle function, pain, quality of life, ankle motion, and radiological outcome. The patients were assessed through study visits at regular intervals until a year following injury. As expected for the one-year follow-up in a young cohort, the authors reported a 86% follow-up rate. There were no clinically relevant differences in the primary outcome (OMAS was 87.6 in the six-week cast group, 91.7 in the three-week cast group, and 89.8 in the orthosis group). The noninferiority margin was clearly wider than any of the between-group differences. There were no important differences in the secondary outcomes; all groups had similar clinical outcomes, complication profiles, and patient-reported outcome measures. An important thing to focus on in the reporting of this trial was the criteria for a stable Weber B type ankle fracture, which was a congruent ankle mortise with medial clear space < 4 mm and ⩽ 1 mm wider than the superior clear space, and a medial clear space < 5 mm under external rotation stress. The results of this study question the current clinical practice dogma of six-week cast immobilization for treatment of these fractures.

Tranexamic acid use in open reduction and internal fixation of fractures of the pelvis, acetabulum, and proximal femur: a randomized controlled trial

■ It seems that there is almost no operative intervention or bleeding traumatic presentation that is not improved with the use of tranexamic acid (TXA). The increasing use of the clot stabilizer in clinical practice has resulted in a large number of well-conducted studies that aim to establish efficacy and side-effect profile. Here at *360*, we would argue that we are almost at the point with TXA where no further studies are needed. If the goal is to reduce blood loss, TXA is both cheap and effective in a range of diagnoses. However, in one of the better studies investigating the use of TXA in trauma surgery, this team from **Chattanooga, Tennessee (USA)** performed a prospective, randomized controlled trial of tranexamic acid use in patients with major orthopaedic trauma needing surgical stabilization.[4] Included patients had fractures of the pelvic ring, acetabulum, and proximal femur requiring surgical management. The authors were able to incorporate 83 patients into their study, all receiving open surgery for one of the three injuries. Prior to surgery, 47 patients were randomized to receive tranexamic acid (15 mg/kg intravenously before incision and a second identical dose three hours after the initial dose), while 46 patients comprised the control group. Trial outcomes were all related to blood loss, and included measures of transfusion rates, total blood loss (calculated using the haemoglobin-dilution method), and rates of venous thromboembolism. Overall, there were no significant differences in the transfusion rates or venous thromboembolism rates between the two groups. However, there was a significantly higher total blood loss in the control group (TXA, 952 ml; no TXA, 1325 ml). The investigators concluded that further study is warranted before making broad recommendations for the use of TXA in these fractures. Here at *360*, we like this study not in spite of, but because of, its weaknesses. The authors set out to be pragmatic and gave a real-world setting to their results. There was a healthy mix of patients undergoing major orthopaedic trauma surgery, and the take-home message – that you can expect 370 ml less blood loss using a medicine that costs around £1.30 – makes the use of TXA a no-brainer.

Reducing the syndesmosis under direct vision: where should I look?

■ In a cadaveric study, these authors from **Boston, Massachusetts (USA)** answered a very important question: how exactly do you judge the reduction of the incisura?[5] The accuracy of

syndesmosis reduction has come under the spotlight in recent years, with suggestions that outcomes following significant ankle injury are likely prejudiced by reduction of the incisura, and that the quality of reduction in many ankles when examined via CT scanning is not all that one might expect it to be. Coupled with the various head-to-head comparisons (randomized and otherwise) of various devices, this suggests that accurate reduction is essential, whichever device is utilized. Invariably these days, experts and authors are recommending a 'direct' reduction when there is any question. The difficulty with advocating this is that there is no clear and agreed way to achieve a 'direct' reduction. Therefore, the authors of this cadaveric study aimed to establish precisely the best way to achieve direct reduction of the syndesmosis. Seven surgeons operated on ten cadaveric ankles to reduce the disrupted syndesmoses. They used either the relationship of the anterolateral articular surface and anteromedial fibular articular surface, or the location of the fibula within the incisura as a visual reference. The authors measured malreductions in millimetres from the anatomical position of the fibula, and the anterior posterior distances of the tibia and fibula to determine the depth differences. As would be expected with this experienced group of surgeons, when using the articular surface as a reference, translational reduction was within 2 mm in 93%. However, this accuracy was significantly reduced to 80% when the incisura was used as a reference. All seven surgeons achieved better reductions utilizing the joint articular surface as the visual reference. This simple study provides helpful data to support surgeons in achieving an anatomical reduction, and sets the bar as to what can be achieved with each approach. Here at *360*, we commend the authors for their elegant study, and recommend our readers to use direct joint line visualization if they are planning to directly reduce a syndesmosis.

Progress of instability in fragility fractures of the pelvis: an observational study

Fragility fractures of the pelvis (FFP) are on the increase; they have more in common with hip and spinal vertebral wedge fractures than they do with any other form of high-energy pelvic trauma. As with all fragility fractures, and, indeed, fragility diagnoses, there is the certainty that we, as surgeons, will see higher rates of these injuries as time passes. However, unlike spinal insufficiency fractures and hip fractures, very little is known about the natural course of FFPs. The authors of this simple cohort study from **Mainz (Germany)** have done their best to set this right, having reported on a cohort of 148 patients presenting with acute FFP.[6] Their retrospective notes review included patients admitted over a three-year period, who were then analyzed retrospectively. This study mainly focused on clarifying the incidence of these injuries and the characteristics of fracture progression (FP). Of the original 148 patients, 14.2% (n = 21) went on to progress. The authors noted the FP was rarely seen with operative treatment, and, instead, occurred most commonly in younger patients and women. It is helpfully highlighted that, in those patients with ongoing pain and restricted mobility, a CT scan will reveal fracture progression in around 40%. While FFPs are relatively common injuries, they are often regarded as only suitable for conservative management – many do not expect fracture progression in these patients. The authors point out that patients in whom fracture progression does occur can be expected to do well with operative treatment.

Virtual mechanical testing: can time to union be predicted?

In this interesting study, a team from **Cork (Republic of Ireland)** have utilized an unusual technique to evaluate quantitative outcomes following tibial fracture.[7] Although patient-reported outcome measures (PROMs) and radiological assessments such as Radiographic Union Scale for Tibial Fractures (RUST) scores are frequently used, there is very little evidence to support their validity for measuring structural bone formation or biomechanical integrity. In what is essentially a pilot study, the authors collated data from patients presenting with isolated shaft fractures to the tibia. The clinical portion of this study included plain film radiographs and completion of PROMs at regular intervals. At the 12-week timepoint, the patients also underwent a low-dose CT scan. These measures were then used to develop finite element analysis models (FEM), and were subjected to virtual mechanical testing to assess torsional rigidity in the injured tibia at three months. As would be expected, the clinical cohort reported progressive improvement in their clinical symptoms, mobility, self-care, and PROMs over the observation period. Sadly, however, there was no apparent correlation to structural bone healing using the FEM model approach. While the authors found that, on plain radiographs, the RUST scoring showed moderate intrarater agreement (intraclass coefficient = 0.727), the scores at 12 weeks did not predict time to union and were only moderately related to structural integrity. The most interesting finding in this study was that the calculated patient-specific virtual torsional rigidity was significantly correlated with time to union. It is difficult to know exactly how to put this paper into clinical context. The technique described is neat and adds a great deal to the available diagnostic data out there. Because the authors have been able to place a 'number' on bone healing, we at *360* can see this technique being used in research studies. That said, a CT scan is required, and the observation that clinical symptoms and PROMs do not correlate with virtual torsional rigidity calls into question the usefulness of this technique as anything other than a research tool.

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