

X-ref For other Roundups in this issue that cross-reference with *Knee* see: [Research Roundups 1, 5; Hip Roundup 3.](#)

Hyaluronic acid equivalent to steroid injections in knee osteoarthritis X-ref

■ There has been a great deal of controversial evidence regarding the efficacy of hyaluronic acid for treating early knee osteoarthritis. Whilst many patients and clinicians are convinced of the benefits, some studies have found no difference between hyaluronic acid and corticosteroid injections. However, other studies have concluded that hyaluronic acid provides greater pain relief. The cynical among us may not be surprised to realise that the positive studies are usually sponsored by the manufacturer. This prospective, randomised controlled trial comparing a specific viscosupplementation formulation and corticosteroid injections was undertaken by a trial team in **Khlong Nueng (Thailand)**. The study team undertook a well conducted, double-blinded randomised controlled trial comparing a single-shot, intra-articular injection of either 6 ml of hylan G-F 20 or 6 ml of a solution comprising 1 ml of 40 mg triamcinolone acetonide and 5 ml of 1% lidocaine with epinephrine.¹ Outcomes were assessed using clinical scores at six months with VAS pain scores and WOMAC knee scores. One hundred patients, all with a clinical diagnosis of osteoarthritis severe enough to experience pain on most days, were recruited into the study. The bottom line is that this study fails to demonstrate any differences between cohorts at six months of follow-up. In fact, there was earlier improvement in pain and function within the first two weeks after corticosteroid injection, but no differences at final follow-up. This is yet another well conducted study demonstrating equivalence between these two injections. However, there

is significantly less cost associated with performing corticosteroid injections. Clinicians often confuse equivalence studies with negative results. Here there is a clear difference in health economic outcomes, although not in clinical outcomes.

Accelerated discharge may be more successful in selected patients

■ One of the difficulties with the two competing pressures applied by modern healthcare funders – shorter hospital stay and reduced unplanned readmissions – is that interventions to improve one are likely to adversely affect the other. An arthroplasty group in **Stratford, New Jersey (USA)** took a novel approach to risk stratification, to reduce length of hospital stay without resulting in higher unplanned emergency department attendances.² The study focuses on the outcomes of 995 patients, all of them inpatients undergoing primary total knee arthroplasty. The group was arbitrarily divided into short (< 3 days) or longer stays. The cohort was then analysed according to comorbidities, length of stay, deep vein thrombosis history, discharge location and requirement for post-discharge emergency department visits. The authors established that the likelihood of return to hospital after discharge could be explained by risk stratification for patient comorbidities alone. When the authors went on to further evaluate the outcomes of the emergency department visits, just 50% resulted in an admission, suggesting that emergency room visits could be decreased by resolving problems in the outpatient setting.

Cardiac Risk Index: a way of making arthroplasty safer? X-ref

■ Despite the relative frequency with which major joint arthroplasty is performed, there are some significant complications associated with what

is a routine operation. One of the most devastating complications, for patients and clinicians alike, when a relatively independent and healthy patient undergoes a total hip or knee arthroplasty is a perioperative myocardial infarction. Despite the relative frequency of the surgery and the devastating effects of the complication, there are currently no validated scoring systems which are able to predict the likelihood of a major adverse cardiac event. A study team from **Boston, Massachusetts (USA)** set out to establish what the options were using the National Surgical Quality Improvement Program (NSQIP) dataset with regard to development of a consistent and reliable score for risk of major cardiovascular event following lower limb large joint arthroplasty.³ The authors undertook an analysis of the currently described risk factors, and defined these as age \geq 80 years, history of hypertension, and a history of cardiac disease. The results from 85 129 patients who had data available on the NSQIP dataset allowed the investigators to establish how useful these factors were in predicting cardiovascular events. An equal weighting for all three identified risk factors has given equal discrimination to weighted models and around 75% of events could be explained by the risk model for intra-operative cardiac events. However, the model was not able to account for post-operative events in total knee arthroplasties. Whilst this study has supported other studies in the literature that demonstrate that older age, hypertension, and cardiac disease were all predictors of post-operative cardiac complications in total joint arthroplasty patients, it failed to support the use of the Revised Cardiac Risk Index in TKA patients. This means that there is still room to develop a useful index that can be used to predict outcomes after TJA, and it may include physical measurement factors in addition to patient comorbidities.

All-polyethylene offers little over modular components

■ This very useful systematic review from **Rome (Italy)** and **Melbourne (Australia)** revisited the age-old question, should we be using all-polyethylene tibial components?⁴ Since the 1970s, materials have changed considerably, and several recent survivorship studies have demonstrated that more modern all-polyethylene tibial components have at least equivalent, and in some cases superior, rates of survival, as well as comparable clinical outcomes when compared with metal-backed tibial components for total knee arthroplasty (TKA). The advantages of all-polyethylene tibial components have been well documented, and include minimal backside wear, low component migration and minimal bone resection at the time of implantation. What's more, all-polyethylene components are cheap! Metal-backed tibial components were developed in the late 1970s to increase the polyethylene component strength. A number of biomechanical and clinical outcome studies subsequently demonstrated improved survivorship coupled with the advantage of modular intra-operative flexibility and the option for liner exchange revision. Modular components, however, introduce the concern of backside wear due to the micromotion between the metal tray and the polyethylene insert. A total of 32 papers were included in the analysis, reporting the outcomes of 58 942 patients. The average age at surgery was 69 years for the all-polyethylene group and 70 years for the metal-backed group. Follow-up was reported to an average of six years (range 2-22 years). Clinical outcomes reviewed included clinical scores such as the Knee Society Score (KSS), Knee Society Functional Score (KSS(F)) and the Hospital for Special Surgery (HSS) score, as well as an objective assessment of range of

movement. The authors were able to conclude that there was no statistically significant difference in the majority of outcome scores except for the KSS(F) between metal-backed and all-polyethylene components. On the other hand, there were significant differences in terms of complications and revision rates, with fewer complications (1.92% metal-backed vs 2.22% all-polyethylene) and revisions (1.85% metal-backed vs 2.02% all-polyethylene) in the metal-backed group. The authors estimated that the additional cost of using metal-backed components compared with all-polyethylene comes to a total of \$95 000 per 100 patients, however, this is just an indirect cost estimate and does not include the costs of higher revision and complication rates associated with the all-polyethylene components. Before dismissing all-polyethylene components entirely, the authors raise an interesting point. Since elderly patients (> 70 years) are less active, possibly all-polyethylene components could be considered in this age group. Alternatively, in the younger age group, metal-backed tibial components may convey advantages of a lower revision rate and therefore justify the increased cost. These are interesting theories and ones that are currently not examined in the medical literature but with an ageing population with an increasing demand for TKA, all-polyethylene tibial components may experience a renaissance in the not-too-distant future!

Tranexamic acid: better by both routes? X-ref

■ Intra-operative and post-operative bleeding remains an important issue and a cause of pain, swelling and anaemia following total knee arthroplasty (TKA). Other concerns associated with haematoma, wound complications and the potential for deep infection may have a long-term impact on the longevity and clinical outcomes achieved by the arthroplasty. There is little remaining debate in joint replacement

circles as to the value of tranexamic acid in reducing these complications, and this excellent study from **Copenhagen (Denmark)** probably answers the final question: how best to administer the drug of the moment? This single-centre randomised, double-blinded, placebo-controlled study compared the outcomes of combined IV (1 g TXA) and intra-articular TXA (3 g diluted in 100 ml of saline solution) with IV TXA and placebo.⁵ In this study, 60 patients underwent a unilateral TKA without tourniquet under spinal anaesthesia. The mean 24-hour blood loss was significantly lower in the combined group (466 ml vs 743 ml). The difference between the two groups at the second day of 373 ml was also statistically significant. There were no thromboembolic complications at 90 days, and there was one transfusion each in the TXA and placebo group. With more and more studies supporting the safety and efficacy of TXA intravenously, with no evidence that it increases the overall risk of thromboembolic complications when using doses of between 1 g and 3 g, and the added advantage of using intra-articular TXA which prolongs the TXA effect in further reducing blood loss, this intervention should be considered a key component of enhanced recovery programmes.

Vascular calcification a poor pre-operative observation

■ It is hardly uncommon to notice the calcified popliteal artery prior to undertaking a knee arthroplasty; in some patients the appearance is almost like that of an angiogram. Here at 360 we have often wondered if this is associated with excess complications. It's certainly a sign of vascular disease, however, does that equate to complications? This observational study from a study group in **Ulm (Germany)** was designed to establish if the presence of visible calcification on plain radiographs was associated with an increased complication rate.⁶ Their two-year study encompassed 825 patients, all

undergoing total knee arthroplasty. The study team excluded patients with an absent pulse or occult vascular pathophysiology. There were signs of calcification in 268 patients, of which 54 were medial type and 214 intimal type. Whilst there were no differences in major vascular complications (just two across the whole cohort, one with and one without vascular complications), there was a higher rate of minor vascular complications (essentially wound healing problems) in patients with intimal calcification when compared with either of the other groups (6.1% vs 1.9% and 1.6%). This simple paper has quantified the excess risk associated with a commonly remarked upon radiographic sign. Quite clearly, although there is no evidence to support major complications associated with intimal calcification, the rate of minor complications is significantly higher. A simple sign with a relevant clinical message.

Robotic surgery reaching its zenith?

■ Robotic and computer-assisted surgery in orthopaedics have really been a solution without a problem. The accuracy of bony cuts is not limited by the surgeon's skill but by the limitation of the power tools, and in the absence of evidence to the contrary, robotic surgery has failed to gain traction in orthopaedics. Surgeons in **Glasgow (UK)**, presumably reasoning that achieving accurate positioning with a unicompartmental knee may well be an area in which a robot may be helpful (given the variable data on outcomes in the literature), designed a randomised prospective single-blinded study, reviewing the outcomes of 139 patients. The patients were randomly assigned to treatment with either a robotic-assisted

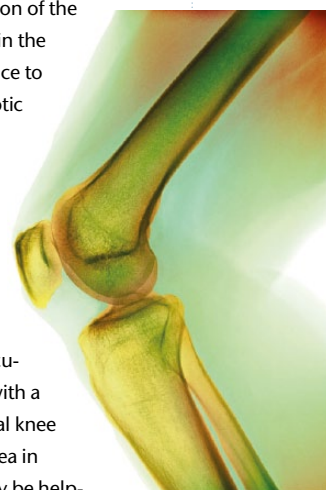
surgical procedure using the Mako robot (Stryker, Kalamazoo, MI) or conventional surgery to implant the Zimmer Biomet (Warsaw, IN) Oxford phase 3 unicompartmental knee.⁷ Final follow-up assessed 120 patients who were available, who underwent a CT scan at three months to confirm component positioning. Although the robot was far from perfect, it did improve the positioning accuracy, with 57% positioned within 2° of the target position as compared with 26% with traditional implantation. This study does demonstrate that implantation can be made more accurate using a robot. Nonetheless, we are slightly sceptical about the study design. The use of an arbitrary 2° of the target position as the surrogate outcome measure is slightly concerning in this study, which essentially demonstrates that the robot is slightly more accurate. If 3° or 4° had been used, would there have been any difference? And perhaps most important of all, the unanswered question is still: where should the knee be placed?

Revising the stiff knee?

■ Surgeons in **Toronto (Canada)** offer insight into perhaps one of the trickiest of clinical decisions to make:

when, and how, to revise a stiff knee?⁸ Undoubtedly, patients whose post-operative result includes some significant stiffness are a bit of a mixed bag. Some will have had considerable pre-operative stiffness, some difficulties with physiotherapy, and some will have a degree of component malalignment.

These authors describe the outcomes of 48 patients where they have taken the plunge and undertaken a revision arthroplasty for stiffness. The authors were able to report on a relatively large cohort of 48 patients,



all presenting with a stiff knee following total knee arthroplasty. The mean age at revision was 65.5 years and all surgeries were performed by a single surgeon with pre-operative arc of stiffness < 70° or flexion contracture of > 15°. Essentially, the authors describe an open revision and arthrolysis combined with a downsizing of the polyethylene liner by 4 mm, giving a 'sloppy' revision. There are no long-term outcomes published for this approach (which may well open the door for catastrophic wear and macroscopic failure). However, within the constraints of the outcomes reported, this can be described as a successful approach. At a mean of

60 months' follow-up, the authors report a mean improvement in composite flexion arc of nearly 45° – a remarkable achievement. It is easy to be either sceptical about the results presented here, or simply to write this off as a series of 'overstuffed' knees at initial surgery. However, it is an interesting technique and from a reputable unit it would be churlish to ignore such an honest account of treating complications.

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Foot & Ankle

X-ref For other Roundups in this issue that cross-reference with *Foot & Ankle* see: [Trauma Roundups 3, 6, 8;](#) [Research Roundup 5.](#)

First metatarsophalangeal joint arthroplasties: perhaps some more work to do

■ The treatment of arthritis of the first metatarsophalangeal joint (MTPJ) continues to evolve, and in the last few years replacement arthroplasty has largely been the focus in attempts to improve outcomes. There is now a wide variety of hemi and total joint arthroplasty implants available commercially, however, there is less in the way of evidence to support their use. The data recently published from the Cartiva Motion Study Group concern the early results of their viscoelastic hemiarthroplasty for the first metatarsal head. The literature reflecting the mid-term results of these implants is conflicting, but some series have reported revision rates of 24% at 33 months, leading to abandonment of the procedure.¹ The recurrent difficulty appears to be failure of osseointegration of the metatarsal implant. In response to this, efforts to find range of movement-preserving solutions to end-stage MTPJ arthritis are

ongoing. The study team designed their own prospective, randomised non-inferiority study involving patients from 12 centres in the **USA, Canada** and the **UK**. A total of 202 patients were enrolled in the study and randomised to receive either the implant or arthrodesis.² This non-inferiority study reveals no difference in pain relief or patient satisfaction at two-year follow-up, but a quicker recovery and return to function in the early post-op phase for the implant group. The conversion rate to arthrodesis at two years was 9.2%, all of which were undertaken for persistent pain of unknown cause. This would appear to compare favourably with a secondary surgery rate of 14% in the arthrodesis group (7 of 50), however, these were usually small operations, mostly metalwork removal. Five-year follow-up data are awaited, but with a failure rate of nearly 10% at two years, patients should be counselled carefully prior to receiving this novel implant.

The neuropathic foot: understanding the muscle drivers

■ Acquired deformity and abnormal weight distribution, combined with the loss of protective sensibility,

are the major factors in the development of ulceration in the diabetic neuropathic foot. The well recognised changes of metatarsophalangeal joint (MTPJ) hyperextension leading to abnormal forefoot weight distribution is probably the most common acquired deformity seen in neuropaths. This forefoot abnormality is commonly seen in conjunction with subtle contractures of the tendoachilles complex, which manifest as ankle stiffness and contribute to the plantar forefoot overload which is causative in diabetic foot ulceration. The initial driver for this whole process is largely unknown but is ascribed to a general imbalance between the long extensor and short flexors of the foot. An interesting paper from **St Louis, Missouri (USA)** sheds some light on the potential underlying causes. The authors aim to categorise intrinsic muscle fatty infiltration, peripheral neuropathy and the presence of accumulated advanced products of glycosylation with the degree of deformity measured at the MTPJs of diabetic patients, in an attempt to understand the pathological process.³ Their study reports data from 34 patients, all with diabetic

neuropathy. Cross-sectional CT and MRI imaging of the foot was undertaken, allowing the deformity and muscle changes to be measured. In addition, glycosylation was measured with skin fluorescence and kinematic studies to establish range of motion in the hind- and forefoot. The authors established that the lean muscle volume correlated well to the MTPJ deformity, as did hindfoot deformity, and were able to account for 35% of the variation in forefoot deformity. Whilst neuropathy did have a predictive effect on forefoot deterioration, the level of skin fluorescence did not. The paper also usefully describes a novel algorithm which can be applied to MRI scans of the forefoot to accurately measure total lean muscle volumes within the flexor compartment. Previous studies have used single slice acquisition techniques and applied atrophy criteria as determined by a clinician. This is interesting in itself as a possible screening tool to identify feet at risk of ulceration, with a view to initiating preventative measures. (total contact innersoles, stretching programmes, etc.). Given the enormous cost burden of diabetic feet, any measure which prevents