

**X-ref** For other Roundups in this issue that cross-reference with Knee see: *Trauma Roundups 1 & 3; Research Roundups 1 & 2.*

### Adductor canal: single injection versus catheter technique

■ Adductor canal blocks have increased in popularity as femoral nerve blocks have decreased in use. However, initial reports described the utilization of femoral nerve catheters, with the concern that single-shot adductor canal blocks (ACB) would be inadequate for controlling postoperative pain. This study from **Vancouver (Canada)** set out to establish if a 'single-shot' technique is as effective as the catheter technique.<sup>1</sup> The authors enrolled 180 patients in the study; 177 were allocated to one of three treatments and completed the study such that they formed part of the final analysis. The three study interventions were: 0.5% ropivacaine 20 ml; 0.5% ropivacaine 20 ml, plus intravenous (IV) Dex 8 mg; and 0.5% ropivacaine 20 ml, followed by continuous infusion of 0.2% ropivacaine at 5 ml/hour for 48 hours. The study was designed to evaluate the primary endpoint of cumulative opioid consumption at 24 hours, with a non-inferiority limit set at 30 mg. The research team evaluated the usual gamut of secondary outcome measures, including opioid consumption at 12 and 48 hours, pain score at rest, quality of recovery survey, length of stay, and anti-emetic usage. In terms of the primary outcome, single-injection ACB with and without IV Dex had a mean difference of -24.2 mg and -21 mg relative to catheter, demonstrating non-inferiority given the specified non-inferiority margin of 30 mg. Non-inferiority was also shown by this margin at 12 hours with and without IV Dex (mean difference of -20.4 mg and -15.1 mg, respectively).

There were no differences in any other secondary outcome measures. The authors here demonstrated that single-shot ACBs with and without dexamethasone provided as much pain relief as adductor canal catheters. Thus, replacing the standard adductor canal catheter with a single-shot block can provide adequate relief, allow for use in the outpatient setting in combination with enhanced recovery after surgery (ERAS) protocols, and reduce costs. There is, as ever, a methodological caution here. What the authors have actually shown is that, given an inferiority margin of 30 mg morphine/24 hours, there are no differences between interventions. The question, of course, is whether we would regard a difference of 30 mg morphine in 24 hours as clinically equivalent.

### Cemented versus cementless primary total knee arthroplasty

■ With the increasing use of cementless primary total knee arthroplasty (TKA) implants, the promise has been made of easier implantation and an improvement in longevity of the bone-cement interface. Nonetheless, there have been problems with these designs before, probably due to the dissipation of shear forces at the tibial baseplate. The use of uncemented designs, particularly in more constrained knee arthroplasties, has not been met with universal triumph. There are newer designs but there is a paucity of literature available on their success, or lack thereof. Manufacturers have claimed that design changes, such as placement of pegs and porous coatings, have reduced the rate of implant aseptic loosening compared with older designs. This study from **Louisville, Kentucky (USA)** has the advantage that, although it is a retrospective comparative case series, the authors compare the same implant (Stryker Triathlon; Stryker Corp., Mahwah, New Jersey), with the only difference being cemented or cementless

fixation.<sup>2</sup> The authors report the outcomes of a round number of 400 primary TKAs. There were 200 cemented Triathlon TKAs matched to 200 primary cemented TKAs and there were no significant differences in any of the matching characteristics. Clinical and radiological outcomes were reported. In terms of adverse events, there were similar incidences of post-operative complications, and revision rates were similar (seven cementless revisions vs eight cemented revisions) by final follow-up. The message in this study is that there was no difference in clinical outcomes, but there was a higher rate of aseptic loosening in the cemented group. While longer follow-up is needed, this is a promising study at two years. It may support the idea that cementless TKA is less likely to harm our patients than previously, when older cementless implant designs were used.

### Anterior cruciate ligament reconstruction to prevent meniscal and cartilage lesions

■ The inherited wisdom from the fathers of anterior cruciate ligament (ACL) surgery is that early ACL reconstruction results in the extremely undesirable complication of arthrofibrosis at a somewhat alarming rate. The accepted regime following acute ACL injury is therefore an extensive programme of rehabilitation with the aim of restoring range of motion, and, as much as is reasonably possible, protecting muscle tone and maintaining proprioception prior to surgery. On the other hand, we have the argument that ACL injury in itself can predispose to meniscal injury. Given the alteration in knee kinematics that occurs with a defuncted ACL, the meniscus is at increased risk of injury, particularly in deep flexion and when playing sports or pivoting. The authors from **Tokyo (Japan)** report a retrospective study of 226 patients, all of whom underwent primary ACL reconstruction.<sup>3</sup> The time interval from ACL injury to surgery and concomitant meniscal and cartilage lesions form the basis of this

review. The authors used the dichotomous outcomes of new meniscal or cartilage lesions to undertake a receiver operator characteristic (ROC) curve analysis. Overall, the incidence of medial meniscus, lateral meniscus, and cartilage lesions were 43.8%, 32.7%, and 27.4%, respectively. The ROC analysis revealed that the ideal threshold value for avoiding all of these injuries was to undertake surgery at around the five-month mark, but preferably before four months. Patients who underwent ACL reconstruction more than seven months after injury had an odds ratio of 4.1 for the presence of a medial meniscal lesion, as compared with those who underwent reconstruction within six months.

### The medial sural artery perforator flap: the first choice for soft-tissue reconstruction about the knee

■ Soft-tissue reconstruction around the knee for soft-tissue defects, either primary (such as in trauma) or secondary (such as in infection), has always been a somewhat difficult area. The use of local pedicle flaps such as the gastrocnemius flap allows for a rapid and reliable reconstruction of the local area with vascularized tissue without the difficulties of anastomosis around the level of the trifurcation. A downside is that these flaps do not always fare incredibly well, as the tissue being transferred can itself be compromised, being either in the zone of injury or infection. For all its potential shortcomings, the gastrocnemius flap has become the workhorse flap reconstruction for soft tissue about the knee. The drawbacks specific to this flap are the limited arc of rotation and limited area of coverage that can be achieved without a very bulky flap. One alternative local flap option is the medial sural artery perforator flap (MSAPF). Surgeons in **Basel (Switzerland)** have developed this method and report on a consecutive series of 17 cases of soft-tissue defect



management using the MSAPF.<sup>4</sup> In general, the outcomes reported were excellent with no major flap-related complications, although two patients had minor complications after direct closure of the donor site. Although this is an early report of what is not, as of yet, a tried-and-tested technique, here at 360 we are left thinking that, when the situation demands, the MSAPF may be an alternative to the reliable gastric flap around the knee.

### Crosslinked polyethylene and infection in the knee

■ The use of crosslinked polyethylene has significantly reduced wear rates and aseptic revision for hip arthroplasty. Some of the most impressive long-term outcome series suggest that ceramic-on-crosslinked polyethylene provides the lowest wear rate. There has never been the same improvement seen in longevity with knee arthroplasties. This is probably due to the manufacturing process. Although treated differently by different manufacturers, the general approach to the manufacture of crosslinked ultra-high-molecular-weight polyethylene (UHMWPE) is a heat anneal process in the presence of gamma radiation. The gamma irradiation generates the free radicals, which then cause cross-linkage of the UHMWPE chains. Various approaches are used to ensure minimal chain scission (such as a heat anneal process). What tends to happen to the

polyethylene is that it is harder when crosslinked and has more resistance to adhesive and abrasive wear. However, it is also more brittle and, as such, can suffer from subsurface delamination and macroscopic failure. Tibial polyethylene inserts are subject to subsurface stresses and, as conformity and constraint increase, they are also subjected to higher torsional forces, placing crosslinked polyethylene (XLPE) at greater risk of macroscopic failure in total knee arthroplasty (TKA). Perhaps one of the most attractive bearing couples in TKA is the Oxinium (oxidized zirconium) and XLPE, which appears to have overcome the higher rates of wear-related revision seen in other XLPE. This raises a question, which these researchers in **Adelaide (Australia)** have addressed: if infection is one of the most common reasons for failure, does the use of alternative bearing surfaces have an effect on the risk of revision due to infection in minimally stabilized TKA?<sup>5</sup> This is not as farfetched as it might sound. Reducing the immunomodulating polyethylene wear-particle burden (which has a direct effect on macrophage activity) could alter infection risk, as, potentially, could presenting a polyethylene with different surface properties requiring different bacterial adhesion properties. We would draw our readers' attention to this analysis from the Australian Joint Registry, which looks at the outcomes of 326 603 primary TKAs, of which 1511 (0.46%) implants underwent revision for infection. For this paper, the authors excluded the results of procedures with posterior-stabilized or fully stabilized TKAs, as well as prostheses with a known higher risk of revision. The headline results of the paper are that risk of revision for infection was lower for cobalt/chromium (CoCr)-XLPE than for CoCr-UHMWPE (hazard ratio (HR) 0.74) overall and in all subgroups, barring female patients  $\geq 65$  years of age, where there was no difference. With regard to the Oxinium femoral component, Oxinium-UHMWPE

had the same revision risk as CoCr-UHMWPE in uncemented knees; however, it did significantly better in knees with cemented fixation (HR 0.69). Nonetheless, these differences were not seen when compared with UHMWPE. It seems, then, that CoCr-XLPE is as good as anything if XLPE is to be used. However, if 'normal' polyethylene is used, there is an argument to use Oxinium based purely on the infection rate presented here.

### Early, persistent, and late dissatisfaction after total knee arthroplasty

■ Satisfaction levels in total joint arthroplasty remain high. However, a noteworthy proportion of patients who undergo total knee arthroplasties (TKAs) have ongoing problems with pain and dissatisfaction. Most surgeons quote these rates of dissatisfaction at 5%, but some studies quote these rates as high as 20%. Although these ongoing problems are ever-present in clinic, there is little known about their type and cause. Here at 360, we were therefore delighted to see this paper from **Newcastle (United Kingdom)**, which sets out to shed some more light on which patients sustain these problems.<sup>6</sup> The primary aim of the authors' study was to assess the longer-term outcomes of dissatisfied patients beyond a year's follow-up. This retrospective study evaluated a cohort of 1369 patients, all of whom underwent a primary TKA for osteoarthritis. Outcomes were assessed using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scores and Short Form 12 (SF-12) questionnaires preoperatively, and at one and five years postoperatively. The groups were analyzed according to a patient satisfaction survey at one and five years, and regression analysis was used to identify independent predictors of satisfaction at the follow-up points of one and five years. The headline satisfaction rate was average for the United Kingdom, with 91.7% at one year. Interestingly, this did not

change at five years postoperatively (90.1%), although around half of the patients who were initially dissatisfied ( $n=53/114$ ) became satisfied with their TKA by five years. A smaller proportion (6%,  $n=74/1255$ ) of those who were initially satisfied went on to become dissatisfied at five years. The predictors of poor satisfaction rates at one year were lung disease, depression, back pain, unilateral TKA, and poor preoperative WOMAC pain score, while the predictors of satisfaction at five years were different: gastric ulceration and a poorer WOMAC stiffness score. This interesting paper, which examines the types of problems from which patients suffer and what puts them at risk of poor satisfaction after their TKA, is deserving of a read.

### Synovasure 'quick test' versus laboratory-based $\alpha$ -defensin immunoassay

■ The attraction of Synovasure, at least in part, is that it offers a 'bedside' test for  $\alpha$ -defensin, which is part of the innate immunity system and is an active peptide usually produced in response to bacteria, although there is evidence that  $\alpha$ -defensin is also produced in response to fungal challenge. It has become a popular method for establishing that a joint arthroplasty is infection-free during revision surgery as a 'quick and easy' bedside test. The evidence has, nonetheless, lagged behind the excitement, and there are conflicting studies on the use of  $\alpha$ -defensin in a clinical setting. The authors from **Victoria (Australia)** undertook a systematic review that was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) approach.<sup>7</sup> It included all studies reporting the accuracy of  $\alpha$ -defensin in a clinical setting and measured against the Musculoskeletal Infection Society (MSIS) or modified MSIS criteria. As per the standard PRISMA approach, two independent reviewers extracted data and undertook bias analysis. A meta-analysis was

then carried out to establish pooled sensitivity, specificity, positive and negative likelihood ratio, heterogeneity, and areas under curves. Overall, the authors were able to include ten studies (759 patients), of which seven studies (reporting 640 patients) evaluated the laboratory-based  $\alpha$ -defensin immunoassay, and three (reporting 119 patients) investigated the Synovasure test. There was a marked difference in pooled estimates of both sensitivity (0.95 vs 0.77) and specificity (0.97 vs 0.93) between the laboratory assay and Synovasure, respectively. This is another major paper that demonstrates that the bedside test is not as accurate as the laboratory-based test. Our view here at 360 is that testing for  $\alpha$ -defensin, in itself, is definitely useful. However, such tests need to be used with caution, and the results must be taken in context, particularly if the Synovasure version of the  $\alpha$ -defensin assay is used.

### Irrigation and debridement may not be a realistic option in infected knee arthroplasty

■ The approach of debridement, antibiotics, irrigation, and implant retention (DAIR) is gaining

popularity in joint arthroplasty circles with the concept that implant exchange, and all the attendant issues with revision joint arthroplasty surgery, may not be required in every event. Surgeons from **Pittsburgh, Pennsylvania (USA)** have investigated the success (or otherwise) of this approach with the knee.<sup>8</sup> While the knee offers better exposure than a hip of the implanted prosthesis, where the effective joint space often extends down the femoral shaft in taper slip stems, it also has much poorer soft-tissue coverage. Noting wide variations in success rates, the arthroplasty group in Pittsburgh sought to establish their outcomes with a remarkably large series of 216 cases. Patients were all treated with a DAIR approach, and 206 patients are reported in this study. The authors give a realistic estimate of failure rate at four years of 57.4%, and also undertook a time-to-event analysis revealing a median survival time of 14 months. With a series of this size, multivariable modeling is a reasonable approach and revealed that time symptomatic and cultured organism were predictors of failure. The authors reported an

estimated failure rate of 39.6% in what they established were patients with a high chance of success. The failure rate of DAIR in infected TKA is higher here than has been reported before, especially in the seminal DAIR papers from the Oxford group. On the one hand, this means that there is a 60% success rate of implant retention at four years in those patients who are likely to achieve success. However, overall, just 40% of implants are successfully salvaged at four years, and those patients without a successful salvage run the risks of failed salvage, including inducing resistance in the colonizing organism, poorer soft tissues, and more extensive bone loss. Clearly, this is a balancing act, and, more so than ever, 'picking your winners' is essential if embarking on DAIR in the infected knee arthroplasty.

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## Foot & Ankle

**X-ref** For other Roundups in this issue that cross-reference with *Foot & Ankle* see: **Trauma Roundup 1**.

### Classification of the navicular and associated injuries to the midfoot

■ This month, a group from **Sheffield (United Kingdom)** presents some interesting work that they have produced on a new classification system for navicular fractures.<sup>1</sup> Their system also incorporates the injuries often associated with these fractures in the rest of the foot. They propose a system described as logical, all-inclusive, and mutually exclusive. Their

findings come from a large consecutive series (285 fractures) from a tertiary referral foot and ankle unit and major trauma centre. Five common patterns of injury were identified and classified. These were as follows: type 1, dorsal avulsion related to the capsule of the talonavicular joint; type 2, isolated avulsion injuries to the tuberosity of the navicular; type 3, a variant of tarsometatarsal joint (TMTJ) fracture/dislocations, creating instability of the medial ray; type 4, the body of the navicular with no associated injury to the lateral column; type 5, fractures in conjunction with disruption of the midtarsal joint, with crushing of the medial,

lateral, or both columns of the foot. The reliability and reproducibility of the classification was tested using a cohort of 30 patients. Six independent assessors were asked on two separate occasions to classify the fractures in their subset. The authors demonstrate a high intra- and inter-observer reproducibility. Navicular fractures are complex fractures of the medial column, and this classification is straightforward and can be used as a simple aide memoir and guide to treatment. This allows the orthopaedic surgeon to recognize more complex patterns and associated injuries, as well as potentially acting as a guide to treatment.

### Capsular interposition arthroplasty for hallux rigidus

■ There are many treatment options in the literature for arthritis of the first metatarsophalangeal joint (MTPJ). Surgically, the gold standard remains for most surgeons a fusion of the first MTPJ. However, many patients fear the consequence of permanently sacrificing range of motion at the MTPJ, leading surgeons to seek alternative motion-preserving procedures. In this large series from a unit in **New York, New York (USA)**, the long-term outcome of capsular interposition arthroplasty was presented in a series of 42 patients.<sup>2</sup> All