thromboprophylaxis following lower-limb arthroplasty, this multicentre randomized controlled trial from **Canada** makes a useful contribution to the existing evidence base.[8] Across 15 centres, 3427 patients undergoing joint arthroplasty surgery (1804 hips, 1620 knees) were randomized to receiving a total of 35 days of postoperative rivaroxaban *versus* five days of rivaroxaban followed by 30 days of aspirin. Patients and assessors were blinded to which patients received which regimen. The study was a superiority design and the primary effectiveness outcome was assessed as the presence of symptomatic deep vein thrombosis or pulmonary embolism within 90 days (asymptomatic patients did not undergo radiological evaluation). The study also reported safety outcomes in terms of major bleeding complications and clinically relevant non-major bleeding. Specifically, pre-specified secondary outcome measures were death, myocardial infarction, cerebrovascular accident, and wound infection. Symptomatic venous thromboembolism rates for the aspirin and rivaroxaban groups were, respectively, 11 of 1707 patients (0.64%) and 12 of 1717 patients (0.70%). For bleeding complications, the observed rates were 0.47% (n=8) and 0.29% (n=5). No differences were statistically significant in superiority analysis, and an additional noninferiority analysis suggested no differences between the aspirin and extended rivaroxaban groups. These findings certainly align well with other recently published work in supporting aspirin as a cheap, clinically non-inferior alternative to post-discharge thromboprophylaxis following joint arthroplasty surgery.

REFERENCES

1. Dowsey MM, Choong PFM, Paxton EW, et al. Body mass index is associated with all-cause mortality after THA and TKA. *Clin Orthop Relat Res* 2018;476:1139-1148.

2. Atrey A, Wolfstadt JI, Hussain N, et al. The ideal total hip replacement bearing surface in the young patient: a prospective randomized trial comparing alumina ceramic-on-ceramic with ceramic-on-conventional polyethylene: 15-year follow-up. *J Arthroplasty* 2018;33:1752-1756.

3. Griffin DR, Dickenson EJ, Wall PDH, et al. Hip arthroscopy versus best conservative care for the treatment of femoroacetabular impingement syndrome (UK FASHIoN): a multicentre randomised controlled trial. *Lancet* 2018;391:2225-2235.

4. Esposito CI, Carroll KM, Sculco PK, et al. Total hip arthroplasty patients with fixed spinopelvic alignment are at higher risk of hip dislocation. *J Arthroplasty* 2018;33:1449-1454.

5. Matharu GS, Judge A, Murray DW, Pandit HG. Outcomes after metal-on-metal hip revision surgery depend on the reason for failure: a propensity score-matched study. *Clin Orthop Relat Res* 2018;476:245-258.

6. Balazs GC, Donohue MA, Brelin AM, et al. Reaction time and brake pedal depression following arthroscopic hip surgery: a prospective case-control study. *Arthroscopy* 2018;34:1463-1470.e1.

7. Werner J, Hägglund M, Ekstrand J, Waldén M. Hip and groin time-loss injuries decreased slightly but injury burden remained constant in men's professional football: the 15-year prospective UEFA Elite Club Injury Study. *Br J Sports Med* 2018;bjsports-2017-097796 (Epub ahead of print). PMID: 29691289

8. Anderson DR, Dunbar M, Murnaghan J, et al. Aspirin or rivaroxaban for VTE prophylaxis after hip or knee arthroplasty. *N Engl J Med* 2018;378:699-707.

Knee

X-ref ***For other Roundups in this issue that cross-reference with Knee see: Hip & Pelvis Roundups 1 & 8; Children's orthopaedics Roundup 1; Research Roundups 1, 2, 5 & 7.***

Intra-articular injection of microsphere triamcinolone acetonide on knee osteoarthritis pain

■ Pain secondary to osteoarthritis is on the increase in an ageing population who are keen to remain active as they get older. Injecting joints with hydrocortisone is nothing new, and a number of studies have documented its therapeutic benefit. However, the effects tend to be short-lived. In the light of any viable alternative, the use of intra-articular corticosteroid is relatively common in primary care, as well as in orthopaedic and rheumatology clinics, and is again on the ascendency, as, although beneficial in some studies, SynVisc never quite lived up to expectations. The authors of this study headed by a team in **Leeds (UK)** reviewed the therapeutic benefit of injecting 'FX006', a microsphere-based, extended release formulation of triamcinolone acetonide (TA).[1] Previous studies have suggested that measurable concentrations of TA can be demonstrated in the joint for up to 12 weeks. They performed a multinational (41 sites), randomized controlled trial comparing FX006 with a saline solution placebo, as well as the standard 40 mg TA crystalline suspension (TAcs) in patients with knee osteoarthritis. Importantly, painkillers were withheld except paracetamol. Patients were reviewed on a regular basis. A total of 486 patients were enrolled, with 161 patients in the FX006 group, 163 patients in the saline/placebo group, and 162 patients in the TAcs group. A total of 443 patients completed the study. The mean age of the patients was 62 years; the majority of patients were female (61.2%) and 50% were obese (BMI $\geqslant$ 30 kg/m^2). Pain was significantly improved in those patients treated with FX006 compared with those treated with a placebo. In addition, patients treated with FX006 demonstrated better Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC scores) and Knee Injury and Osteoarthritis Outcome Scores (KOOS) compared with patients treated with a placebo. FX006 also performed better than TAcs in terms of WOMAC subscale scores for pain, stiffness, and physical function, and had a similar onset of action to TAcs. The analgesic effects of FX006 was shown to last beyond 12 weeks and there were no incidences of joint infections, although other side effects were noted, which were not especially significant. Further work is needed into the cost-effectiveness of this treatment compared with other treatment modalities. More research is certainly needed into the non-arthroplasty management of osteoarthritis. The nonoperative management of osteoarthritis is a huge industry but with very little high-quality evidence to support individual treatments. This multicentre, multinational randomized controlled trial is a significant step in the right direction when comparing relatively new treatment modalities with current established techniques. Studies of this type should be used to provide treatment algorithms to health practitioners with an interest in managing osteoarthritis, so that best practice is observed and health resources are not wasted on techniques with little merit.

Mechanical axis, survival, and functional outcomes of modern total knee arthroplasties

■ Recent literature has suggested that restoring the mechanical axis in total knee arthroplasty (TKA) is not quite the nirvana that it was previously thought. Increasingly, there has been more of a focus on

kinematic or anatomical alignment, as no difference has been found in the long term between those TKA implants that are mechanically aligned, within a range of ± 3° of the mechanical axis, and those TKA's outside this range. This study from **Rochester, Minnesota (USA)** reviews the impact of coronal alignment with respect to the mechanical axis on TKA survivorship and function, with a 20-year follow-up.[2] This retrospective review of a consecutive series of 398 primary TKAs revealed that 292 knees were within a range of ± 3° of the mechanical axis and a total of 106 knees deviated by > 3°. Multivariate analysis showed that postoperative alignment within ± 3° of the mechanical axis did not improve implant survival at 20 years. Even adjusting for age and body mass index, a deviation of > 3° did not affect either survival or the Knee Society function and knee scores. Traditional teaching has emphasized the importance of creating a neutral mechanical axis when undergoing a TKA. Not only is this felt to be aesthetically pleasing to the patient, it has also been widely believed amongst Orthopaedic Surgeons that a neutral mechanical axis will confer a significant advantage regarding long-term TKA survivorship. This has led to the development of navigational as well as robotic technologies to aid the surgeon in attaining a neutral mechanical axis. However, this is one of several studies that does not support this view; increasingly, alignments that focus more on function are thought to be the way forward. The drawback of this and other studies is that it reviews the impact of knee alignment in one plane, as sagittal and rotational planes could also factor in implant survivorship. In addition, there may be other surgical factors that could impact implant survivorship that were not considered in this study. There is now a considerable volume of literature dispelling the myth that a normal coronal mechanical axis is essential to ensuring excellent long-term results. Clearly, the secret to achieving excellent long-term survivorship following TKA is more complex.

Concomitant ankle osteoarthritis and clinical outcome following total knee arthroplasty

■ The age-old question for patients with concomitant hip and knee osteoarthritis (OA) is: which procedure should be done first? Studies have shown that doing a total hip arthroplasty (THA) before a total knee arthroplasty (TKA) may provide the best outcome for the patient. This study from **Seoul (South Korea)** asks a slightly different question: which of the tibial joints should take prescience, the knee or the ankle?[3] The authors report a retrospective review of a prospective cohort of 56 patients (99 knees) treated with TKA. The authors used their routine clinically collected data to review the outcomes of the concomitant ankle OA seen in 24 ankles. The study is based on radiographic and clinical outcomes data up to two years postoperatively and includes clinical outcomes for ankle pain and knee outcomes. The overall orientation of the ankle joint improved from 9.4° of varus to 3.4° of varus, and the valgus compensation of the hindfoot for the varus tilt of the ankle joint showed a 2.2° decrease following TKA. In the hindfoot OA group, there was less preoperative valgus compensation. The postoperative hindfoot alignment was similar between the two groups, which was accounted for by a smaller adaptation between the two. The group with ankle OA had a higher rate of increased ankle pain (38% compared with 16%) as well as a worse Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) score (mean of 22.2 compared with 14.2) following TKA. The authors have ably demonstrated that treating ankle arthritis prior to TKA may be the most beneficial approach for patients, especially if they want to improve their walking. Thus, this information can help guide surgeons who see patients with concomitant knee and ankle osteoarthritis.

High failure rates of concomitant periprosthetic joint infection and extensor mechanism disruption

■ Although rare, the combination of infection and extensor mechanism disruption is widely regarded as disastrous in patients approaching a revision total knee arthroplasty. This straightforward paper, by authors from **Salt Lake City, Utah (USA)**, confirms this. In what must have been a Herculean effort, these authors assembled a multicentre study from five institutions of 60 patients, all with a diagnosis of both periprosthetic infection (PJI) and extensor mechanism disruption (EMD). Of these 60 patients, the vast majority (n = 53) had an attempted extensor repair at the time of revision surgery; only around a quarter of these were successful. Of the original 60 patients, the authors classified around two thirds as failures, with recurrence of infection as most common failure (80%). Of the failures, 26 ended in fusion, ten in above-knee amputation, three with chronic resection arthroplasty, and two with chronic spacers. Of those seven patients who had no attempt at EMR, all proceeded directly to fusion (n = 6) or amputation (n = 1). This series really does paint a bleak view of the treatment of patients with EMD and PJI at the same time. The authors rather sagely council that, given so many of these patients end in fusion (or amputation), these should be at least considered at the time of initial revision.

MACI *versus* microfracture: five-year follow-up of a prospective randomized trial

■ Perhaps all of the time and effort put in by regenerative surgeons and scientists in an attempt to heal cartilage defects is starting to bear fruit. The authors of this study from **Kungsbacka (Sweden)** report a large multicentre randomized study with encouraging five-year results.[5] The authors set out to examine the efficacy and safety at five years after treatment with autologous cultured chondrocytes on porcine collagen membrane (MACI), and to compare these with the efficacy and safety of microfracture for patients with symptomatic cartilage defects of the knee. The authors report the five-year follow-up of the Superiority of MACI Implant Versus Microfracture Treatment (SUMMIT) trial, which included 144 patients who were eligible to enrol in the extended analysis. The authors were able to recruit 128 patients into the extension, which included 65 patients allocated to MACI (90% of the potential cohort) and 63 microfracture patients (88% of the potential cohort). The original SUMMIT study described improvements in Knee Injury and Osteoarthritis Outcome Score (KOOS) scores across all the patients in the study, which were maintained in the newer five-year follow-up. Perhaps most importantly, five years after treatment, the benefit in terms of KOOS score favouring the MACI group had been maintained in both pain and function scores. This was also reflected in measures of activities of daily living, which again significantly favoured the MACI patients. In addition, the authors conducted further

MRI scanning in 120 patients at the five-year follow-up, and the MRI evaluation showed improvement in defect-filling for both treatments; however, neither group was found to be superior at this stage. There is now growing evidence typified by trials like this that cartilage grafting is better than microfracture for large articular cartilage defects in the knee, particularly those that are >3 cm.

Return to pivoting sport after anterior cruciate ligament reconstruction

■ One of the primary reasons to undergo anterior cruciate ligament (ACL) reconstruction is to allow a return to pivoting sports. Whilst research has, for the most part, focused on short-term outcomes, there are few studies looking at the longer-term outcomes of ACL injury. Here at *360*, we were interested to see this report from **Oslo (Norway)** looking at the outcomes of ACL reconstructions in the longer term.[6] The 258 patients included in this study were all involved in pivoting sports, and had undergone ACL reconstruction at least 15 years previously. Data were collected through interviews, patient-reported outcome measures, and radiographs. The authors defined the development of osteoarthritis as Kellgren and Lawrence grade ⩾2 plus almost daily knee pain in the last month. Of the 210 patients at 15 years of follow-up, 109 (52%) reported that they had returned to pivoting sport. Return to play was associated with less symptomatic OA (odds ratio (OR) 0.28) as well as a lower chance of radiographic OA (OR 0.40), adjusted for age, sex, combined injury, self-reported knee function, and time between injury and surgery. Those who returned to pivoting sport had better function in activities of daily living (ADL). Whilst there is no attempt to establish causation here (and it would be impossible to do so given the design of the paper), the authors make a number of interesting observations. There are, to our knowledge, very few other long-term follow-ups post-ACL reconstruction. The finding that around 50% of patients return to play in the long term following ACL reconstruction makes the procedure potentially of benefit. What is, of course, not clear is whether it is the return to play that sees off the arthritis, or, perhaps more likely, that those who go on to develop arthritis do not return to play.

REFERENCES

1. Conaghan PG, Hunter DJ, Cohen SB, et al. Effects of a single intra-articular injection of a microsphere formulation of triamcinolone acetonide on knee osteoarthritis pain: a double-blinded, randomized, placebo-controlled, multinational study. *J Bone Joint Surg [Am]* 2018;100-A:666-677.

2. Abdel MP, Ollivier M, Parratte S, et al. Effect of postoperative mechanical axis alignment on survival and functional outcomes of modern total knee arthroplasties with cement: a concise follow-up at 20 years. *J Bone Joint Surg [Am]* 2018;100-A:472-478.

3. Chang CB, Jeong JH, Chang MJ, et al. Concomitant ankle osteoarthritis is related to increased ankle pain and a worse clinical outcome following total knee arthroplasty. *J Bone Joint Surg [Am]* 2018;100-A:735-741.

4. Anderson LA, Culp BM, Della Valle CJ, et al. High failure rates of concomitant periprosthetic joint infection and extensor mechanism disruption. *J Arthroplasty* 2018;33:1879-1883.

5. Brittberg M, Recker D, Ilgenfritz J, Saris DBF. Matrix-applied characterized autologous cultured chondrocytes versus microfracture: five-year follow-up of a prospective randomized trial. *Am J Sports Med* 2018;46:1343-1351.

6. Øiestad BE, Holm I, Risberg MA. Return to pivoting sport after ACL reconstruction: association with osteoarthritis and knee function at the 15-year follow-up. *Br J Sports Med* 2018; bjsports-2017-097718 (Epub ahead of print). PMID: 29550753

Foot & Ankle

X-ref *For other Roundups in this issue that cross-reference with Foot & Ankle see: Trauma Roundup 7; Research Roundups 5 & 7.*

End-stage renal failure and Achilles tendon rupture X-ref

■ Patients on renal dialysis start to collect pathology as their disease progresses. These authors from **Baltimore, Maryland (USA)** have set out to establish what the incidence, ramifications, and long-term outcomes are for patients who are dialysis-dependent or have had a kidney transplant.[1] The authors utilized the Medicare data set and included patients treated between 1999 and 2013. The authors classified all 1091 patients with an Achilles tendon rupture and renal failure into patients on the waiting list for a transplant, patients on long-term dialysis, or post-transplant patients. The authors went on to identify risk factors, and to determine treatment patterns and outcomes in this group of patients. There was a lower incidence of Achilles tendon ruptures in patients who were stable on dialysis as compared with those who had received transplants (relative risk (RR) 0.44); however, those on and off the transplant waiting list were compared with those who were not. In general, patients who sustained an Achilles tendon injury were more likely to be younger, have higher body mass index, and have fewer comorbidities. Overall, 17% of patients received operative treatment within two weeks of diagnosis. The overall 30-day cumulative incidence of postoperative infection was 6.5%. The results of this study suggest that the bad reputation that renal failure/transplant patients have with Achilles tendons, both in terms of higher incidence and unacceptably high rates of complications, may not be true. It seems that, based on this large series, the best option for patients with an Achilles tendon injury and renal impairment would in fact be to treat them like other patients.

Ankle instability: is rehabilitation the answer?

■ Chronic ankle instability is a tricky condition to treat and can be associated with significant function restriction, particularly when playing sports or walking over rough ground. The mainstays of treatment are surgery or rehabilitation and strengthening exercises. Surgery is usually seen as a last resort in these patients, as the complication burden from the surgery itself is not insignificant and, in addition, the tightening of the ankle can result in secondary degenerative changes. Although rehabilitation forms the workhorse for treatment of instability in many centres, there are a range of different options, and it is far from clear which patients will benefit from which treatments. A study team from **Thessaloniki (Greece)** have undertaken and published a comprehensive network meta-analysis with the aim of unpicking which of these treatments are successful and which are not.[2] Their study was designed to answer two different questions: which of the variety of standalone or combined nonsurgical interventions was successful in treating chronic ankle instability as measured by 1) the Cumberland Ankle Instability Tool (CAIT) and 2) treatment-related