

ROUNDUP³⁶⁰

Knee

Graft tension and outcome:

ACL under the spotlight

■ Anterior cruciate ligament (ACL) reconstruction is one of the most studied interventions in orthopaedic surgery, offering high levels of patient satisfaction. However, previous authors have often struggled to demonstrate differences in degenerative change or knee functional scores between the various interventions; or even on occasion between intervention and expectant treatment. As our understanding of the normal biomechanics of the knee increases, the goal posts (like the tunnels themselves) have moved several times with ACL reconstruction, with two and three bundle repairs, anatomical tunnels and the ideal tension having all been well described. A research team in **Providence (USA)** have waded into the debate with an interesting (and slightly controversial) randomised controlled trial. They designed a prospective RCT (Level I evidence) to test a dual hypothesis that higher tension ACL reconstruction would result in less laxity and improved functional scores than lower tension reconstruction. Bearing in mind the hypothesis that higher tension grafts are thought to be associated with increased joint contact pressures and adverse cartilage health, the research team also tested a second hypothesis, that outcomes over three years in the high-tension reconstruction group would be the same as those in a matched control group. The investigators included patients with unilateral isolated ACL injuries. Patients who were undergoing reconstruction

were randomised to a low- or high-tension reconstruction. The low-tension group underwent tensioning to match physiological laxity, and those with a high-tension repair were tensioned to over constrain AP translation by 2 mm. Outcomes were assessed using the International Knee Documentation Committee (IKDC), Knee Osteoarthritis Outcome Scores (KOOS) and SF-36 outcome measures, and were assessed with radiographs and MRI. In addition, a matched cohort of 60 patients without ACL injury was enrolled to act as a control group. Patients were reviewed at six, 12 and 36 months following surgery. The study successfully enrolled 90 patients, with 46 randomised to low tension and 44 to high tension. The study was unable to detect any significant differences in any outcome between the two intervention groups by 36 months. The control group, however, had significantly lower AP laxity (by approximately 2 mm) than either intervention group, and all scores were poorer, as would be expected in the intervention groups, than in the control group. Crucially, however, although the radiographs and MRIs showed some changes over the study period, these were small differences and likely to be clinically insignificant.¹ This study beautifully summarises the difficulties with ACL reconstruction with neither the low- nor high-tensioned group achieving baseline functional scores. Here at 360, we would be concerned that any long-term cartilage damage due to over tension would not manifest for several years. Consequently, in light of the

lack of difference in outcome scores we will not be over tensioning our ACL reconstructions.

Chondrocytes at the midterm

■ Management of osteochondral defects is challenging, although much progress has been made with potential biological therapies including stem cells, chondrocyte cultures, matrix substitutes, growth factors, and platelet-rich plasma. However, like all evolving therapies, there is precious little long-term follow-up outcome data. Researchers from **Bologna (Italy)** were early adopters of one variety of chondrocyte supplementation using a matrix-assisted method where autologous chondrocytes are cultured on a 3D matrix prior to implantation. The researchers report the nine-year follow-up of a prospective case series (Level IV evidence). A total of 44 patients, with a mean age of 42 years and a mean defect size of 4 cm² were enrolled when receiving a matrix-assisted autologous chondrocyte transplantation (MACT) technique for isolated full thickness cartilage lesions in osteoarthritic knees. Outcomes were assessed with the International Knee Documentation Committee (IKDC), EuroQoL, visual analogue scale (VAS) and Tegner score, taken pre-operatively and at regular intervals up to nine years. Symptoms improved significantly from initial presentation to follow-up for all patients and in all scores. The IKDC improved from a mean of 38 pre-operatively to nearly 60 at final follow-up with similar patterns seen in the Tegner and EuroQoL scores. Despite these apparent improvements,

a clinical failure rate of over 25% was observed, with 39% of patients reporting that they considered their condition to be no better than prior to treatment. The researchers identified that patients with concomitant meniscal injuries or those requiring meniscal surgery at the same time had particularly poor outcomes.² It is surprising to us that despite significantly improved outcome scores, 39% of patients reported that they would not repeat the treatment. It seems curious that despite a significant (and beyond the minimally clinically important) change in knee scores, the patients reported such disappointing satisfaction levels. When considered in combination with the observed 25% clinical failure rate, here at 360 we would tend to agree with the authors that based on the results here, tissue-engineered cartilage implantation (and particularly with this method) likely has no role to play in the treatment of this condition.

Pre-operative deformity and failure

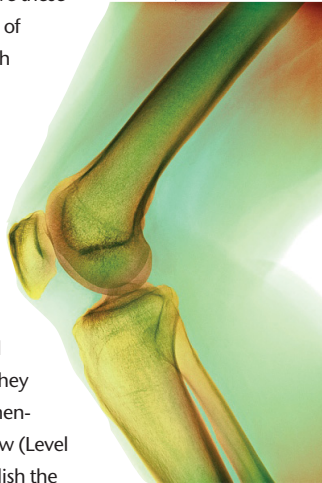
■ Despite the maturity of modern arthroplasty registers they are much less complete in scope than the larger prospective cohort arthroplasty studies. If we are truly to understand how to improve outcomes for our arthroplasty patients, our understanding must be informed by a combination of high-detail quality prospective studies in addition to the global 'top down' view the arthroplasty registers give. We were delighted to see a report from **Mooreville (USA)** with a high quality prospective cohort study. Rationalising the observation that unex-

pectedly early arthroplasty failures are seen in some patients with completely satisfactory post-operative radiographs, Dr Ritter and colleagues reasoned that pre-operative alignment might have a bearing on post-operative survival. They devised a prognostic study (Level II evidence) using a retrospective cohort of patients, designed to establish whether pre-operative coronal alignment had an impact on post-operative implant survival. The study population was 5342 patients who underwent an arthroplasty using the anatomic graduated component (AGC) knee between 1983 and 2006 at a single centre. The overall alignment was measured on the pre-operative and post-operative radiographs by an independent observer and the effect of both was then established using survivorship analysis and a Cox proportional hazards model. The investigators observed an overall failure rate of 1% ($n = 54/5342$) due to aseptic loosening with a pre-operative population mean of 7.7° of varus (25° varus to 35° valgus). The coronal alignment was corrected post-operatively to 4.7° (SD 2.5°) of valgus. The investigators identified some highly significant results with patients with larger pre-operative varus ($>8^\circ$ varus, 2.2% failure) or valgus ($>11^\circ$ valgus, 2.4% failure) deformities having higher failure rates. The situation was even worse in patients with an incomplete correction. The lowest failure rates were seen in knees corrected to between 2.5° and 7.4° valgus with a 50% higher failure rate in patients with prostheses outside of this range.³ The authors have established a higher failure rate associated with pre-operative deformity. From their results, this can be marginally reduced with careful operative correction, although this does not completely negate the effect. This straightforward paper highlighted to us again at 360 the importance of careful correction of coronal alignment. Even in a world transformed by the arthroplasty registers (which are essentially population studies) there remains a lot to learn from a large case series like this.

The designer effect

■ Much is made of the reporting bias on a 'designer' series where the paper

or published series originates from the designer of a specific implant or the originator of a technique. It is widely accepted, and we agree, that these will most likely represent the best possible results. Although often attributed simply to bias, the picture is much more complex than that. These series often have very tightly controlled inclusion criteria, do not include the 'learning curve', and are the results of an expert surgeon. Often, other reported series (and certainly the joint registries) do not have these advantages in terms of outcomes. A research team in **Innsbruck (Austria)** set out to establish if there was a difference in results between a published series, the originator surgeon results, and joint registry data. They designed a comprehensive systematic review (Level II evidence) to establish the revision rates reported for TKR from these various sources, hypothesising that the revision rate for all given studies of a specific implant would not differ significantly. They identified 36 arthroplasty systems widely reported in the national joint registries (21 total knee, 14 unicompartmental knee and one patello-femoral). Worryingly, the research team were unable to identify any literature reporting revision rates for 13 of these systems (36%) and for a further 17 implants (47%). Although publications were available, the power was too low to perform any meaningful comparison. The researchers identified six implant systems (17%) for which there were sufficient data published to allow estimation of risk of revision. They identified that there were no significant differences in rates of revision between joint registry data and independent series for these six implant systems, with overall revision rates of 6.2% (TKR) and 16.5% (UKR) at ten years. However, they did identify that a disproportionate number of



observed component years for all implants were from originator series and that there were significant differences (in favour of the originator series) between these papers and the registry data.⁴ We find it heartening to see that the wealth of indexed literature is supported by the national joint registries (at least in the field of TKR). While we would agree with the authors that an independent series must be interpreted in the context of the source of the information, we would argue that

a designer series should be indicative of the 'best case scenario' and that without any intentional or unintentional bias one would expect the results presented. This study certainly highlights the widely recognised importance of interpreting results in the context of their origin.

Chondroitin sulphate really does work

■ Treatment of early osteoarthritis with dietary supplements and natural remedies is a divisive issue within orthopaedic practice. While a number of studies support the use of glucosamine and other herbal remedies, there are many vitamins and supplements that literally do more harm than good. While most surgeons would agree that alternative medicines are unlikely to ever solve end-stage osteoarthritis, they can be very helpful in relieving the symptoms of early disease and in patients adverse to, or not suitable for, surgical intervention. Chondroitin sulphate has been proven in a number of studies previously to have some efficacy, particularly when combined with glucosamine. Researchers in **Liege (Belgium)** designed a comparative double-blind randomised controlled multicentre trial (Level I evidence) to establish the efficacy of the use of chondroitin sulphate *versus*

placebo. The inclusion criteria were patients with knee osteoarthritis and Lequesne index > 7 and a VAS pain score > 40 mm. The primary outcome measure was pain (as measured by the VAS score) and secondary outcomes of pain and function as measured by the Lequesne index. Patients were recruited and randomised to either single dose of chondroitin sulphate (1200 mg OD), multiple dose (400 mg TDS) or placebo. Outcomes were assessed regularly for three months. At three-month follow-up there were no differences between the two treatment regimens, however, there were significant differences between both treatment groups and the placebo group in VAS and Lequesne index. Further, there were no differences in adverse events or side effects between the three groups.⁵ The authors have eloquently demonstrated the analgesic effect and safety of chondroitin sulphate when given as either a once daily or TDS regime for patients with isolated osteoarthritis of the knee. This study adds scientific weight to the practice of recommending its use as a once daily regime.

Is anterior cruciate ligament reconstruction really required?

■ Back in 2010 a controversial paper from **Lund (Sweden)** rocked the ACL boat, suggesting that half or more ACL reconstructions could be avoided in favour of rehabilitation.⁶ In the ensuing turbulent discussion the authors were heavily criticised due to their short-term follow-up. The sharp intake of breath among soft-tissue knee surgeons could be heard again this month as the long-awaited five-year results of this randomised controlled trial (Level I evidence) were published, testing the 2010 results over a longer period. They also indicate that the risk of osteoarthritis and meniscal surgery remains similar for the operative and conservative groups. Patients with isolated ACL tear were randomised to either rehabilitation and early ACL reconstruction or rehabilitation and optional delayed reconstruction. The team recruited 121 patients into the study, and impressively have been able

to report the outcomes of 120 at five years. The primary outcome measure was the knee injury and osteoarthritis outcome score (KOOS). Other outcome measures included the SF-36, Tegner activity score, re-intervention (meniscal surgery) and radiological signs of osteoarthritis. A total of 62 patients were assigned to early ACL reconstruction and 59 were assigned to the option of having a delayed ACL reconstruction if needed. All patients received structured rehabilitation. As reported in the initial paper, only half ($n = 30$) of the patients in the optional delayed ACL reconstruction arm ended up requiring ACL reconstruction, of whom seven required this between two and five years following injury. There was a similar improvement in KOOS in both groups between injury and five years (42.9 acute reconstruction *versus* 44.9 for optional ACL). There were no significant differences in KOOS, its subscales, Tegner activity scale, re-intervention requirement or radiological OA of the knee.⁷ It does look to us here at 360 like the authors make a compelling argument for a trial of conservative therapy in those patients with acute ACL injuries. We are sure that the Lund group will continue to report their series out to the long-term follow-up required to establish the incidence rates of OA following injury, but currently it does look like, in some centres, 50% of patients with an ACL rupture are undergoing surgery they may be able to avoid. We are sure this paper will fuel an already heated debate.

Analgesia after TKR

■ Post-operative pain is the blight of all knee arthroplasty surgeons. Even in the best and most competent hands, up to 5% of patients complain of persistent anterior or other knee pain following TKR, in contrast with THR patients, the majority of whom are reported to be satisfied post-surgery. Unpicking the causes and incidence of pain is tricky and something that the joint replacement registries have not helped with. The tenacious folks in **Birmingham (USA)** have, however, come to the rescue, using data from

the Mayo arthroplasty register which unusually includes patient reported data including pain scores and medication use. The research team aimed to establish the incidence of persistent pain, use of medication and predictors for persistent pain after surgery, which is quite a tall order for a registry study. The team studied patients undergoing primary joint arthroplasty between 1993 and 2005. The cohort consisted of 10 957 of whom 7139 (65%) and 4234 (57%) were available at two- and five-year follow-up respectively. Patient factors screened as potential predictors of the incidence of post-operative pain included gender, age, body mass index, comorbidities, anxiety and depression. The team used a multi-variant analysis method to adjust for confounding variables, which in this case were operative diagnosis, ASA grade, implant fixation and distance from the treating centre. Female gender and younger age were associated with a higher use of NSAIDs and opioids after TKR. Depression was associated with higher NSAID use and anxiety with higher opioid use after TKR.⁸ This is an interesting article and shows the potential power of well conducted registry studies. The researchers have effectively established that women and younger patients are more likely to still be using painkillers five years after TKR. Interestingly, the study demonstrated that anxiety was associated with a higher incidence of NSAID use and depression with higher opioid use. We certainly think here at 360 that this is a very interesting area for further study. The question we would pose is: does living with pain for five years make you anxious and depressed? or is it that people who are anxious and depressed are more likely to end up with pain?

Degenerate meniscus: to scope or not?

■ The application of arthroscopic surgery to the degenerate atraumatic meniscal tear is a contentious issue. While the benefit of washing out degenerate arthritic knees has been seriously called into question with some powerful studies (including

sham surgery RCTs), the general consensus is that degenerate meniscal tears do benefit from arthroscopic debridement. Results according to clinicians and more importantly, patients, are often reported to be good. However, there is little in the way of specific evidence examining the role of arthroscopic debridement in non-traumatic meniscal tears. Authors from **Lidingo (Sweden)** set out to examine the benefit of surgery over physiotherapy in this particular group of patients. They designed a prospective randomised intervention study (Level I evidence) to evaluate the outcomes at two and five years' follow-up of combined arthroscopic surgery and exercise therapy *versus* the same exercise therapy alone. The research team had strict inclusion criteria of non-traumatic, degenerative, isolated medial meniscal tears. The authors excluded patients with radiological evidence of osteoarthritis, and assessed their outcomes with the KOOS, Lysholm and Tegner activity scales, in addition to a VAS for pain. In total, 96 patients with MRI-proven degenerative non-traumatic medial meniscal tears were enrolled. The team identified significant clinical improvements from baseline in both groups at 24 and 60 months' follow-up in all four scores. However, there were no differences in any score between the groups at either observation point. The exercise therapy alone group did, however, have a 30% cross-over rate to the arthroscopic group at which point their outcomes improved. There were no differences in progression of osteoarthritis in either group. While the authors conclude that arthroscopic surgery followed by exercise therapy was not superior to the same exercise therapy alone, this is not quite the whole picture. Based on the results presented, exercise therapy can only really be recommended as initial treatment with one third of the patients from the exercise group still experiencing disabling knee symptoms after two months of therapy. However, given that these patients improved to the same level as the rest of the patients

after delayed arthroscopic surgery with partial meniscectomy it can well be argued that all that is lost is time.⁹ While this paper may be misinterpreted by some, including health insurers, we believe that it contains some valuable data. It is important to interpret the headline results with a pinch of salt and remember that this study does not apply to traumatic or lateral meniscal tears, and one third of patients can be expected to fail the suggested exercise therapy regime.

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