ROUNDUP360

Knee

x-ref *For other roundups in this issue that cross-reference with Knee see: Hip roundup 6; Children's Orthopaedics roundup 2; Research roundup 6.*

Re-admission following total knee replacement

There are a number of reasons other than infection that might cause a re-admission to a medical facility following total joint replacement. It is not uncommon after a total knee replacement for patients to experience wound complications that are not infective. The incidence of haematoma formation, delayed wound healing, and ongoing discharge is appreciable in most centres, and following the implementation of accelerated discharge pathways these are usually seen as re-admissions. Although the long-term sequaelae of infected wounds are well described, those of patients re-admitted with non-infected long-term wound complications are not known. Researchers in **Saint Louis (USA)** set out in an intriguing study to evaluate the two-year clinical outcome of this patient group.[1] Their study population consists of just 15 patients re-admitted to the hospital within 90 days of their index total knee replacement (TKR) for non-infectious wound complications. These were matched using 2:1 matching to 30 patients who were demographically similar but did not have wound complications. While age and body mass index (BMI) were similar between the two groups, the authors found that those re-admitted for non-infectious wound complications had a significantly poorer outcome at two years of follow-up. The authors established outcomes to be poorer in the re-admission group when assessed using both the Knee Society function score (46 vs 66 points) as well as the incidence of pain (73% vs 33%). This study highlights the importance of avoiding early complications, particularly wound complications, as they may have adverse outcomes for patients in regards to both function and pain.

Out with the old and in with the new? Computer navigation revisited

Despite huge impetus from industry quarters and the appeal of a new technology one might expect to improve outcomes in joint replacement surgery, there has been a complete failure to demonstrate any improved long-term outcomes with modern knee navigation systems. Despite this failure to demonstrate superior outcomes, computer-assisted surgery (CAS), navigation, and patient-specific instrumentation continue to be popular amongst practising orthopaedic surgeons, perhaps relying on the 'new toy' effect despite the lack of long-term survivorship and functional data. Surgeons in **Haugesund (Norway)** have revisited this well investigated topic with yet another randomised clinical trial.[2] Their study recruited nearly 200 patients and randomised patients to either a CAS strategy or conventional surgery. Outcomes were assessed with functional measures (Knee Society Score (KSS), Knee Injury and Osteoarthritis Outcome Score (KOOS)) and radiological alignment measures. Patients were recruited from four Norwegian hospitals and outcomes were assessed at three months after surgery. The authors found only a mild improvement in the Knee Society function score, in addition to the pain, sports, and quality of life subscores of the KOOS for patients who had a total knee replacement (TKR) with CAS. Improvements in the KOOS sports and symptoms subscores were also noted at one year for patients who had a TKR completed with CAS. Moreover, overall frontal alignment and tibial component alignment were improved with CAS. However, the surgical intervention was 20 minutes longer with the use of CAS. As with other studies on CAS TKR, the reasons for the differences in functional outcome remain elusive, as do the long-term benefits of such technology. In this particular study (like many other large randomised controlled trials), although there is a consistent difference in mean score measured at multiple time points, it is unclear if this is clinically relevant; in this case the reported differences in overall scores are below the minimally clinically important change, although the importance of the differences in the subscores is unclear. Certainly for the present time there is not enough data presented here to support the added cost of a CAS-based system. Time, as they say, may well tell in this case and we look forward to the five-year report of this study.

Approach less important in knee replacement

Reasoning that surgical techniques resulting in less pain and dysfunction in the knee extensor mechanism may result in reduced pain and allow faster recovery of the knee, researchers in **Dartmouth (USA)** designed an attractive randomised controlled trial to establish the benefit or otherwise of a quadriceps-sparing subvastus approach to total knee replacement (TKR).[3] The researchers used a randomised clinical trial design to compare the subvastus and medial parapatellar arthrotomy techniques during primary TKR. This particular study is unique from other studies comparing the two surgical approaches in that the authors utilised contemporary minimally invasive surgery principles and standardised the rest of their pathway including implants, anaesthesia, and post-operative rehabilitation in both groups. In this well designed, well controlled RCT of 129 patients, outcomes were assessed at both baseline and at three months follow-up. Outcomes were assessed using clinical outcome measures (Knee Society Score, UCLA Activity Score) and structured weekly telephone interviews. The authors were unable to find any differences in any of the reported outcome measures between the subvastus and medial parapatellar approach with regard to early functional outcomes or opioid use after TKR. This study once again highlights to us here at 360 the importance of a multimodal

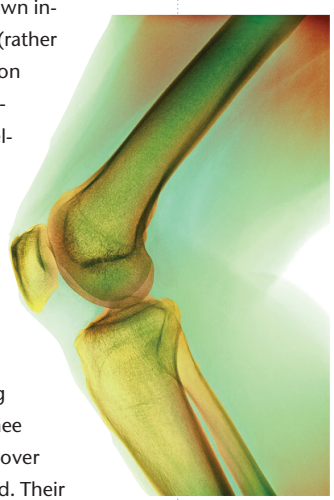
and contemporary pathway, as opposed to one minor adjustment in surgical technique.

Is obesity driving a rise in knee replacements?

Over the past five years, studies with large numbers from a range of now readily accessible datasets have become commonplace in the worldwide orthopaedic literature. These studies have for the first time facilitated the large scale study of epidemiological orthopaedics. Within North America the Nationwide Inpatient Sample (NIS), a database sponsored by the Agency for Healthcare Research and Quality (AHRQ) as part of the Healthcare Cost and Utilization Project (HCUP), has become a very popular resource and has demonstrated changes in the use of total knee and total hip replacements with a relative rise in the demand for knee arthroplasty. Researchers in **New York (USA)**, noting that the topic of obesity and total knee replacement (TKR) has gained significant attention, set out to establish, using the NIS, if obesity is contributing to the relative rise in TKR.[4] While the authors found that growth in TKR volume has far outpaced that of total hip replacement among those with a body mass index of ≥ 25 kg/m2, it highlights two worrying trends in lower extremity arthroplasty research and clinical care. Foremost, many studies are using these large databases with relatively little known about the quality of the data entering the databases. As such, caution should be enforced when interpreting such data. Second, it is becoming increasingly obvious that obesity leads to significant peri-operative morbidity when considering a TKR.

Knee replacement isn't cheap in the obese

Perhaps only with the exception of bariatric surgeons, orthopaedic surgeons have most keenly felt the effect of the wave of obesity on their workloads and patient populations. The intuitive link between obesity and arthritis has been the topic of much debate, as have the outcomes of joint replacements and complication rates in obese patients. Much literature on the topic exists, however, as the number and complexity (both from a comorbidity and technical surgical side) of joint replacements continue to grow it is important to understand the health economic impact of this problem. Using a similar methodology to the previous paper, researchers in **Rochester (USA)** used their own institutional registry (rather than lower resolution national data) to increase the data fidelity.[5] Impressively, the authors were able to report the results of a cohort of 8129 patients (6475 primary and 1654 revisions) all having undergone total knee replacement (TKR) over an eight-year period. Their retrospective review included collation of clinical, demographic, surgical and health economic data (which was inflation adjusted for direct healthcare costs). Patients were stratified by body mass index (BMI) and the outcomes assessed were length of stay in hospital and direct medical costs. BMI ranged between 15 and 73 kg/m^2, and in both outcomes patients with lower BMI had significantly shorter stays and lower hospital admission costs. The research team adjusted for confounders and undertook a multivariant analysis which suggested that every 5-unit increase in BMI beyond 30 kg/m^2 was associated with approximately $250 to $300 higher hospitalisation costs in primary TKR and $600 to $650 higher hospitalisation costs in revision TKR even after adjustment for confounders and complication rates. This paper, when taken in the context of the previous one, presents a worrying clinical and health economic picture of a spiralling burden of obesity-related knee replacement surgery associated with higher hospital costs and resource utilisation.



Cruciate substitution doesn't increase knee flexion

The range of flexion in total knee replacement (TKR) is one of the most significant limitations of knee replacement for many patients. In some parts of the world, sitting on haunches is important for social (mostly Japan and the Far East) and religious reasons (prayer on a prayer mat requires deep flexion). While most Western populations don't have these high flexion requirements, even getting in and out of a car or sitting on a low seat can require more flexion than many joint replacements are able to achieve. There has been a renewed interest in cruciate substituting designs where a central post or cam can be used to guide roll back in the knee, potentially increasing the flexion arc, a strategy being employed by implant manufacturers to help increase the flexion achievable in their joint replacements. A detailed randomised controlled trial has recently been reported by a study team in **Leiden (The Netherlands)**, designed to establish the flexion range of patients randomised to either a bicruciate substituting or conventional posterior stabilised knee replacement.[6] Outcomes were assessed at one year and the primary outcome measure was flexion angle, with secondary outcomes of active flexion (lying and standing), the Knee Society Score, the Patella Scoring System score, the University of California Los Angeles score, adverse events and a satisfaction scale also collected. Despite the use of a 'cutting edge' knee system there were no differences in active or passive flexion between the two groups. Nor were there any differences in clinical outcome measures seen between the two groups. However, there was a significant difference in the number of adverse device events with the bicruciate substituting group experiencing 41 adverse events in 26 patients, resulting in three total knee system revisions (as compared with 16 in the posterior stabilised group). Given the increased rates of complication and no signs of any clinical improvement (including in flexion arc) we would tend to agree with the authors that there does not appear to be a tangible clinical benefit associated with use of this type of prosthesis.

Sonication useful diagnostic aid in two-stage revision x-ref

The treatment of deep prosthetic infection can be frustrating and difficult for surgeon and patient alike. Two-stage revision strategies are often employed when there is established infection or resistant organisms. Two-stage revision, although gold standard, does not always eradicate infection, with quoted success rates of up to 90%. Establishing bacterial clearance and sensitivities at removal of spacer is essential if two-stage revision is not successful. Sonication is one potential strategy that can be employed to increase the diagnostic accuracy of intra-operative cultures at the second stage of revision, and investigators in **Philadelphia (USA)** sought to establish if sonication results were predictive of late re-infection at two-year follow-up and if sonication improves sensitivity of intra-operative cultures.[7] Their study design of 36 consecutive two-stage revision operations undertaken with both intra-operative samples and sonicated antibiotic spacers was performed in a single institution with follow-up to around 20 months. The authors report that positive sonication results were predictive of failure as defined by re-infection at two-year follow-up. Their cohort consisted of 18 patients with positive sonication results and

16 with negative results. Re-infection was seen in 50% of patients with a positive sonication (compared with 11% without), giving an odds ratio of 8.0. This, when combined with an increase in sensitivity of intra-operative cultures from 36% to 82% when sonication was also used, does suggest that this is likely to be a useful long-term adjunct to the traditional microbiology techniques in these challenging revision operations.

REFERENCES

1. **Adelani MA, Johnson SR, Keeney JA, Nunley RM, Barrack RL.** Clinical outcomes following re-admission for non-infectious wound complications after primary total knee replacement. *Bone Joint J* 2014;96-B:619-621.
2. **Gøthesen O, Espehaug B, Havelin LI, et al.** Functional outcome and alignment in computer-assisted and conventionally operated total knee replacements: a multicentre parallel-group randomised controlled trial. *Bone Joint J* 2014;96-B:609-618.
3. **Tomek IM, Kantor SR, Cori LA, et al.** Early patient outcomes after primary total knee arthroplasty with quadriceps-sparing subvastus and medial parapatellar techniques: a randomized, double-blind clinical trial. *J Bone Joint Surg [Am]* 2014;96-A:907-915.
4. **Derman PB, Fabricant PD, David G.** The role of overweight and obesity in relation to the more rapid growth of total knee arthroplasty volume compared with total hip arthroplasty volume. *J Bone Joint Surg [Am]* 2014;96-A:922-928.
5. **Kremers HM, Visscher SL, Kremers WK, Naessens JM, Lewallen DG.** The effect of obesity on direct medical costs in total knee arthroplasty. *J Bone Joint Surg [Am]* 2014;96-A:718-724.
6. **Schimmel JJ, Defoort KC, Heesterbeek PJ, et al.** Bicruciate substituting design does not improve maximal flexion in total knee arthroplasty: a randomized controlled trial. *J Bone Joint Surg [Am]* 2014;96-A:e81.
7. **Nelson CL, Jones RB, Wingert NC, Foltzer M, Bowen TR.** Sonication of antibiotic spacers predicts failure during two-stage revision for prosthetic knee and hip infections. *Clin Orthop Relat Res* 2014 Mar 22. [Epub ahead of print] PMID: 24658903.