

SL-Plus/EP Fit-Plus (Smith & Nephew, n = 2028); Taperloc/Exceed (Biomet, n = 1668); and Taperloc/Mallory-Head (Biomet, n = 1240). Overall, there was a lower all-cause revision rate associated with HA stems (hazard ratio (HR) 0.83). The VerSys/Trilogy, Mallory-Head/Mallory-Head, Taperloc/Exceed, and Taperloc/Mallory-Head did not have a lower risk of any-cause revision with HA-coated stems compared with non-HA-coated stems. Only the SL-Plus/EP Fit-Plus subgroup showed a lower risk of revision for loosening (HR 0.17); however, this observation was coupled with a much higher risk of early revision. Overall, these authors concluded that HA coating of femoral stems was found to be associated with a 17% lower risk of revision for any reason. Sadly, the authors were not able to tease out the contribution of the HA itself, partly due to the relatively low numbers of

components with both a HA and non-HA option. For the moment, then, the benefit of HA remains. However, whether this benefit is due to the coating itself, or because the sensible stem designs are HA-coated, is still an unanswered question.

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## Knee

**X-ref** For other Roundups in this issue that cross-reference with *Knee* see: *Hip & Pelvis Roundup 4; Sports Roundups 2 & 3; Research Roundups 3 & 5.*

### Kinematic knees at a decade

■ Total knee arthroplasty (TKA) innovations undergo years of scrutiny before becoming standard of care for patients. Given the success rates of large joint arthroplasty, it is usually at least ten years before we are happy to report a technique or implant as a ‘success’. In the case of kinematic knee alignment (KA), we were delighted, here at 360, to read this ten-year follow-up from the team in **Davis, California (USA)**.<sup>1</sup> The principle behind KA is that the postoperative knee is orientated as closely to the patient’s native alignment as possible. Randomized trials for kinematic KA have previously shown a normal-feeling knee and better pain relief, function, and flexion compared with those treated with a mechanically aligned (MA) knee. However, these trials do all have some weaknesses. The long-term effects of using KA are still unknown and are of concern, given the alignment being outside the design parameters for the prostheses. Advocates of MA believe that alignment outside of those set values poses a higher risk of implant failure than those in range. This study focuses on the long-term results of the KA TKA by noting implant

survival, yearly revision rate, and patient-reported outcomes, including the Oxford Knee Score (OKS) and Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scores. In this single-centre cohort series, 207 TKAs performed in 2007 were retrospectively reviewed; the mean age for the cohort was 77 years (SD 10 years; 49 to 97) and 38% of patients were male. The yearly revision rate was 0.3%, with an implant survival of 97.4% for all-cause revision. Five patients were revised for aseptic failure and two were revised for postoperative infection. Tibial component loosening occurred in one revision patient; the component subsided posteriorly associated with a reverse tibial slope of 8°. Patellar complications were found in four knees: one underwent a full revision, two were treated with arthroscopic lateral releases for lateral patellofemoral instability, and one had a patellar revision for a loose patellar implant. Ten-year function scores were available for 144 knees. OKS had a mean score of 43 (0 to 48, with 48 being the best) and the mean score for WOMAC was found to be 7 (0 to 96, 0 being the best). There was no significant difference between the in-range and outlier aligned knees. Patients who are kinematically aligned at the time of TKA do well at a long-term follow-up of ten years, suggesting it to be an appropriate surgical technique for surgeons to use.

### Predicting satisfaction after total knee arthroplasty

■ Bundled payments have become more popular as the payment method for a total knee arthroplasty (TKA). As the United States population grows older, the number of TKAs performed annually is expected to rise, with the revision and readmission rates increasing proportionally with it. The current rate of dissatisfaction after TKA remains surprisingly high, with percentages ranging from 17% to 41%. The need for additional postoperative care for unsatisfied patients will ultimately put a strain on the healthcare system’s economy, because of the financial burden incurred from bundled payments. The payers hope this will drive efficiency, although this is not always the case. Identifying factors that are indicative of TKA dissatisfaction may be helpful in potentially improving postoperative outcomes, in order to offset the financial burden of revisions and rehospitalizations. This study analyzed the answers given by patients on an 11-item TKA questionnaire to identify potential indicators of complications and dissatisfaction following surgery. The knee survey took into account modifiable risk factors (body mass index (BMI), diabetes, opioid use, comorbidities, smoking status), and the patient’s medical history (drug allergies, osteophyte score, patellar thickness to soft-tissue

shadow skin thickness, flexion contracture, previous knee surgery, and surgical indication). Patients were also given functional outcome evaluations (patient-reported health state (PRHS), Knee Society Score (KSS), and KSS functional outcome (KSS-F)) both preoperatively and at a minimum of one year following the operation. Overall, 484 patients undergoing TKA were included in the analysis; 69.0% of the patient population was female and the mean age was 66.3 years old. The mean BMI was just under 35 kg/m<sup>2</sup>. It turned out that all components of the 11-item questionnaire were significantly and positively correlated with the total knee survey score. Risk tiers were found to be significantly associated with postoperative satisfaction. Four tiers in the questionnaire score were identified according to the risk of postoperative dissatisfaction: low (survey score of 96.5 to 110), mild (score of 75 to 96.4), medium (score of 60 to 74.9), and high (score of 59.9 and below), with the high-risk cohort most likely to be unsatisfied. Regardless of postoperative satisfaction, all patients improved their functional outcomes according to the KSS, KSS-F, and PRHS scores. Knee flexion increased from 109.5° (SD 15.1°) to 113.3° (SD 11.1°). Overall, this research from **Chicago, Illinois (USA)** demonstrated that the 11-item TKA questionnaire is a significant predictor of functional outcomes following TKA when age, BMI, and sex were controlled.<sup>2</sup> Patients that scored higher on the knee survey score had a greater chance of achieving postoperative satisfaction compared with others. The survey had a 97.5% sensitivity and 95.7% negative predictive value in patients at risk for postoperative dissatisfaction. Perhaps this survey can be useful to surgeons when optimizing patients postoperatively to decrease their readmission and revision rate.

### SMS and total joint arthroplasty

■ Patient-physician communication after total joint arthroplasty (TJA) has become an increasingly important aspect of the overall patient experience. Unfortunately, constant communication with the surgeon is not always feasible and often leaves patients feeling frustrated. An automated physician may potentially improve patient morale and education, and may increase compliance with home exercises after surgery. This innovative team from **Chicago, Illinois (USA)** evaluated the usefulness of an automated text message system for patients undergoing primary total knee or hip arthroplasty through a randomized trial of either the control or intervention group.<sup>3</sup> Controls received the traditional perioperative care including perioperative education, a postoperative

follow-up appointment, and a bundle of perioperative instructions. The intervention group received the traditional care and were additionally enrolled in the surgeon's short message system (SMS) bot to receive automated text and video messages over a six-week period consisting of perioperative instruction reminders, motivating statements, and personalized video messages from the surgeon. Patients in the intervention group also had the opportunity to respond to the bot with keywords such as "pain" or "shower" to receive additional information and instruction. All participants in the study kept a calendar recording their daily home exercise, visual analogue scale (VAS) mood score, and narcotic use. Preoperative, three-week, and six-week postoperative range of movement was recorded as well. Overall, 159 patients in total were included in the study: 76 in the intervention group and 83 in the control. Intervention group patients exercised for a mean of 8.6 more minutes per day (46.4 vs 37.7) and reported higher VAS mood scores (7.5 vs 6.5). Patients in the intervention group discontinued narcotics at a mean of ten days earlier than the control group and placed an average of two fewer calls to the surgeon's office. At six weeks' follow-up, the range of movement for both groups were not statistically significant. Overall, the intervention group reported clearer instructions and a higher level of motivation and encouragement compared with the patients who received the traditional postoperative care. Because TJA is becoming more high-volume at many institutions in the United States, the time available for prolonged patient contact with the treatment team is also inevitably decreasing. The results of this study suggest that automated SMS bots can help to fill the communication void that patients may feel postoperatively, and can also help to boost patient morale and motivate them throughout their recovery process.

### Could pedalling be the answer for physiotherapy following total knee arthroplasty?

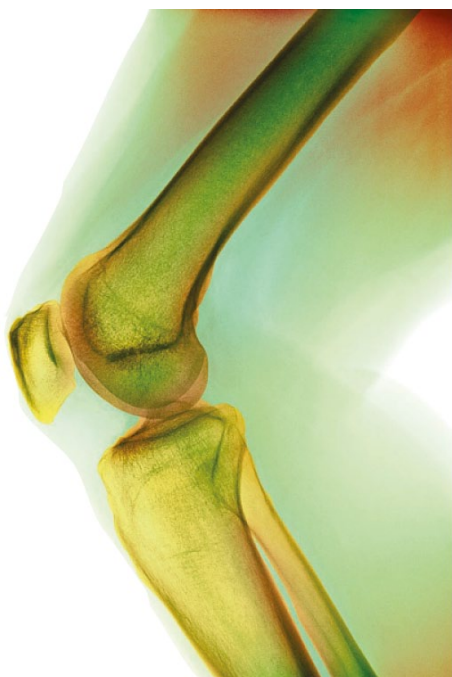
■ Obtaining range of movement after a total knee arthroplasty (TKA) is of utmost importance to both patients and surgeons. In some cultures, deep flexion is required to allow sitting on the haunches for social purposes. However, in every culture, at least 100° of flexion is needed to allow the patient to sit in a chair without their leg sticking out. However, few studies have demonstrated that any particular rehabilitation regime is superior to any other. Some surgeons recommend using an exercise bike to improve range of movement, while others recommend swimming. Despite the reliance we place

on physiotherapy and rehabilitation to improve the outcomes for our patients, there are precious few randomized studies evaluating rehabilitation interventions. We were therefore delighted, here at 360, to read the report of this randomized trial from **Robina (Australia)**.<sup>4</sup> The authors undertook a 60-patient prospective parallel group study, where patients were allocated to receive either a standard ten-exercise physiotherapy regime or a three-exercise pedalling (pedalling-based) exercise regime. Outcomes were assessed using the six-minute walk test, along with secondary outcomes of a ten-minute walk test, a 'timed up and go' test (TUG), Oxford Knee Score, and the EuroQol (EQ)-5D. The primary outcome measure and the vast majority of secondary outcome measures favoured the three-exercise pedalling-based regime. The bottom line is that this prospective randomized controlled trial demonstrated that using a bike was preferable to a regimen not based on pedalling. Perhaps we need to rethink our traditional methods of postoperative physical therapy and engage in bicycle riding as the main source of physical therapy after TKA. The evidence presented here is certainly compelling, despite the small numbers in each group.

### Just how much do knee arthroplasties vary?

■ There have been a small glut of National Joint Registry (NJR) papers recently reported from the group in **Bristol (UK)**, including a publication in *BMJ Open* that sets out to benchmark and establish noninferiority margins for the vast array of total knee arthroplasties (TKA) and unicompartmental knee arthroplasties (UKA) currently in use in England and Wales.<sup>5</sup> The authors included all primary TKAs and UKAs performed and entered onto the registry over a 13-year period. The authors utilized Kaplan-Meier analysis to compare the performance of each construct against the best performing components and thereby undertake a noninferiority analysis. The authors identified that, although there are 449 different knee arthroplasty constructs recorded on the NJR, only 27 had more than 500 knees at risk after ten years of follow-up. The authors used a benchmark of 20% excess risk of revision as their noninferiority benchmark. This placed 18 constructs as inferior to the benchmark, of which two were UKAs with at least 100% increased relative risk. The risk of inferior performance was highest in men aged 55 to 75 years, where 44% of constructs were inferior to the 20% benchmark used by the authors. This is an interesting study and places some real and useful figures on the various options available to surgeons when choosing knee joint arthroplasties. The authors point out that, almost

universally, UKA carries with it an excess revision burden, which in this very large analysis looks to be approximately 200%.



### Where are we with cementless knees?

■ Joint registries around the world are demonstrating a consistent increase in the number of total knee arthroplasties (TKAs). The fixation of the implants is with bone cement in most cases, but some surgeons are utilizing hybrid methods where only one of the components is cemented, while others are using cementless implants. The potential benefits of cementless implants include avoidance of the failure due to the cement-bone interface, greater stability due to osseointegration of the cementless implant, no third-body wear due to cement debris, and better preservation of bone stock. However, cementless implants have historically performed poorly from a survival perspective. The authors of this study from **Christchurch (New Zealand)** argued that the manufacturing of cementless implants has improved dramatically, and that there is increasing evidence that outcomes have significantly improved.<sup>6</sup> The aim of this study was to review the survivorship, rates of revision, and patient-reported outcome scores (PROMs) for cemented, hybrid, and cementless TKA for the last 18 years from the New Zealand

Joint Registry. Of the 96 519 primary TKAs identified from the registry, 88 303 (91.5%) were fully cemented TKAs, 4659 (4.8%) were hybrids, and 3559 (3.7%) were cementless. The majority of cemented implants used were fixed-bearing, while the majority of hybrids and cementless TKAs were mobile-bearing. Cruciate-retaining implants were used in the majority of all TKAs. The ten-year survival rates were 97% for cemented, 94.5% for cementless, and 95.8% for hybrid TKAs. There was a statistically significant difference between the implants, with the cementless group performing significantly poorer than the cemented and hybrid groups. The greatest difference in the survival curves between cemented and cementless implants was in the first two to three years, especially in those under 55 years of age. The cemented TKAs had the highest revision rate of all components, at 25% compared with 17.5% in the cementless group. In addition, the cementless group had the highest number of either polyethylene liner exchange (43.8%) or a patellar revision (7.2%). In terms of functional outcomes, the cemented group had superior outcome scores at six months compared with the cementless group, but there was no subsequent difference when scores were compared at five or ten years. One important observation that the authors made from their data was that surgeons appeared to be selecting younger patients for the cementless TKA, as more were performed in patients aged under 55 years, which is the group in which cementless TKAs performed most poorly. While there are those who would argue that better fixation of cementless TKAs may lead to better survivorship, this large study does not demonstrate any benefit to using cementless implants. Therefore, as the title of this paper suggests, cemented TKA remains the benchmark and there appears to be little justification for using cementless TKAs for the time being.

### How do total femoral replacements fail?

■ The total femoral replacement (TFR) will never be considered a 'workhorse' operation; however, it does have application in tumour, periprosthetic fracture, and some revision scenarios. It seems likely that the use of the procedure will steadily increase in line with the revision and fracture burden. Given the rare nature of the procedure, we were delighted to see this report from **Bogotá (Colombia)** and **Birmingham (UK)**,

which retrospectively reports the outcomes of 81 patients treated with TFR from 1976 to 2017.<sup>7</sup> The aim of the paper was to establish how and why the TFR fails. This series had a mean follow-up time of 10.3 years and a roughly even male:female split. The authors report a remarkably high headline survival rate of 71% at five years and 63% at ten years of follow-up. Despite the long survival, the complications profile was significant. Exactly 10% of patients suffered a dislocation, while rates of 18% and 6% were reported for infection and structural failure, respectively. One of the more interesting findings in this study is that the use of a silver coating did not reduce infection rates. As would be expected, rotating hinge prostheses had lower revision rates than the fixed-hinge group, and those who had had previous surgery did poorer. The overall conversion to amputation rate was 11 patients of the initial 81 (13%). It does seem that the TFR is maturing. Clearly, however, there is more work to do on the follow-up, as it is likely that more of these implants will be used in the future.

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