to see if the use of a single-dose of antibiotics is equally efficacious to the multiple-dose regimens previously used in prevention of implant associated infection.[5] This is a retrospective study of 20 682 procedures undertaken over an 11-year period. There were 4523 who received a single dose of prophylactic antibiotics and 16 159 who received multiple doses. The overall PJI rate was 0.60% in the single dose group compared with 0.88% in the multiple dose group. The authors went on to develop a propensity score matched analysis, which again did not show a difference between regimes (odds ratio (OR) = 0.746). An analysis of multiple doses did not demonstrate any additional benefit for patients with a high preoperative risk of PJI. This retrospective study seems to confirm the CDC's guidelines that one dose of antibiotic prophylaxis may be enough in all patients, regards of comorbidities. An ongoing prospective randomized study may further demonstrate this or refute these findings.

Hepatitis C and the outcomes of total joint arthroplasty?

There are certain diseases that will always be under the spotlight due their chronic long-term health risks and the ability to contract them via the blood borne route. One of these conditions is hepatitis C, which carries significant medical comorbidity and long-term disability. In some parts of the world, up to 8% of those undergoing joint arthroplasty are hepatitis C positive. Yet, despite this, there is little known about the potential impact of hepatitis C on the outcomes of joint arthroplasty. This meta-analysis from **Tianjin (China)** aims to draw together the various publications referring to outcomes following joint arthroplasty in the hepatitis C population.[6] Their initial search identified 28 articles potentially identifying outcomes following joint arthroplasty for those patients with hepatitis C. Once the final reviews had taken place, six articles reporting ten studies were felt suitable for inclusion in this review. In this analysis, there was a higher rate of complications in the hepatitis group (hazard ratio (HR) 1.55). The current evidence base also suggests a higher revision rate for total hips (HR 2.21) and infection rate across all joint arthroplasties (HR 1.29). While this is perhaps an intuitive result, putting numbers to risks such as these does help with counselling of patients and risk stratification for surgeons.

International Hip Outcome Tool 12: reliability, validity, and responsiveness in Japanese

While only of interest to our international colleagues in Japan, we are including this paper from various centres around **Japan**.[7] Little work has been done on outcome measures and, in particular, the conversion of validated tools into international native language versions. Although International Hip Outcome Tool 12 (iHOT 12) is a useful evaluation method for young active hip joint disease patients, it is not available for Japanese centres. The authors of this study were able, with just 51 patients, to undertake reliability measures and validation of the iHOT 12 Japanese Language version.

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Knee

X-ref ***For other Roundups in this issue that cross-reference with Knee see: Hip Roundup 5; Sports Roundups 1 & 2; Research Roundups 1 & 5.***

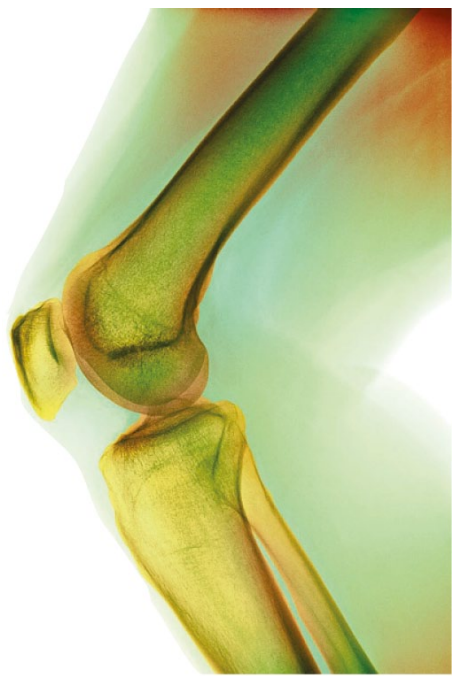
Is the robot helpful in early rehab following unicondylar knee arthroplasty?

Unicondylar knee arthroplasty (UKA) for medial compartment osteoarthritis has recently been widely publicized, both in the medical literature and the national press. The advantages have been well documented, including the ability to preserve the patients' own kinematics leading to better functional outcomes. However, this is balanced against the increased risk of implant failure and reduced survivorship compared with total knee arthroplasty. Some of these failures are due to poor surgical technique, which is often associated with lower-volume surgeons. While robotic-assisted surgery should never be seen as a replacement for surgical experience and training, it can help reduce intraoperative surgical errors. As such, robotic-assisted surgery is being used in specialist low-volume arthroplasty procedures such as unicompartmental knee arthroplasty. In addition to the potential benefits from a component alignment perspective, the authors of this paper from **London (UK)** proposed that robotic technology may also help preserve the periarticular soft-tissue envelope, and therefore aid a more rapid period of early postoperative rehabilitation.[1] This series reports the outcomes of patients undergoing either conventional jig-based UKA or robotic-arm assisted UKA. A total of 146 patients (146 knees) were included, with 73 consecutive patients undergoing the conventional UKA followed by 73 consecutive patients undergoing the robotic-assisted technique. All patients received a standardized postoperative care programme including patient-controlled analgesia (PCA) with additional oral paracetamol and ibuprofen was prescribed as required. The PCA was then stopped 24 hours after surgery and converted to oral medication. Patients undergoing the robotic-assisted surgery had significantly less pain than the conventional group with opiate usage also significantly lower in this group. Form a functional perspective, the robotic group were able to achieve a straight leg raise significantly quicker than the conventional group, and achieved greater knee flexion at discharge, requiring fewer physiotherapy sessions. Mean time to discharge was also statistically quicker in the robotic group. The results from this study were somewhat surprising. A reduction in surgical errors in implant

positioning could be reasonably expected with this technology, but not intuitively less pain and easier rehabilitation. It has been postulated that a more conservative bone resection is associated with reduced bone oedema and, therefore, reduced pain and faster rehabilitation. In addition, with robotic assistance there could be better preservation of the supporting soft tissues as the burr used to remove the bone automatically shuts off should the surgeon stray away from the articular surface. With conventional surgery, inadvertent injury to the periarticular soft tissues could occur from the oscillating saw, which may go unnoticed. The authors suggest that with fewer iatrogenic injuries from an oscillating saw to the periarticular soft tissues, robotic-assisted surgery results in less pain and, therefore, faster rehabilitation. This is one of the first papers to suggest a clinical advantage with robotic-arm technology. The benefit observed in this study may only be in the early postoperative phase but this would still be a significant advantage. Most patients find the first few weeks after a UKA very painful, so anything that reduces patient perception of pain and enables quicker rehabilitation needs to be seriously considered. We look forward to a formal randomized study here.

Usually, selectively, or rarely resurfacing the patella during primary total knee arthroplasty: determining the best strategy

The debate about resurfacing the patella continues, with most practices performing resurfacing on a geographic or unit basis. The problem with a preference approach like this is that it has not been made readily apparent which preference is best. The authors of this study from **Auckland (New Zealand)** utilized an interesting methodology to try to establish which approach is best.[2] The authors categorized surgeons into three groups based on their preferences for patella resurfacing and on New Zealand Joint Registry (NZJR) data: 'usually resurface', 'rarely resurface', or 'selectively resurface'. The study focuses on the results of the 203 surgeons performing 57 766 primary total knee arthroplasties (TKAs) between 1999 to 2015 with outcomes recorded on the NZJR. The authors arbitrarily defined < 10% as 'rarely resurfacing' and > 90% as 'usually resurfacing', with the remainder in the selective cohort. The outcomes were assessed using both likelihood of revision and Oxford Knee Scores (OKS) at six months and five years. Overall, the majority (57%) were categorized as 'selective resurface', and 37% 'rarely resurface'. This left 14 surgeons (7%) in the 'usually resurface' group. With such a small subgroup of surgeons in this group, very little can be inferred from the findings of this study for that group, as there are so many other factors (such as implant choice, surgical skill, etc.) that have an impact on both knee survival and clinical outcome measures. Despite the limitations of sample size, the authors report that those in the 'usually resurface' group achieved the highest mean OKS at both timepoints, followed by the 'selective resurface' group. This was not associated with any apparent differences in revision rate per 100 observed component years ('rarely' (0.46), 'selectively' (0.52), or 'usually' (0.46)). There was a difference, however, in the success of posterior-stabilized implants with 'selective' resurfacers having a significantly lower revision rate. This is, of course, again subject to the limitations of the small group sizes. As this study demonstrates, the geographic preference in New Zealand leans heavily on selectively resurfacing, yet the usual resurfacing patients had higher OKS. The revision rate was similar between groups, leading to the conclusion that orthopaedic surgeons will not be faulted if they do or do not resurface the patella.



Injection prior to total knee arthroplasty and infection

Intra-articular corticosteroid injection or hyaluronic acid injection is routinely performed as conservative therapy for knee osteoarthritis. On many care pathways, patients are encouraged to exhaust a package of conservative care including lifestyle and risk factor modification, physiotherapy, and injection (usually of steroid). There is both professional opinion and case-controlled series evidence that there is an increased risk of implant associated infection in those undergoing total knee arthroplasty (TKA) after local injection into the knee. What is not known is an accurate assessment of the risk and exposure time. This paper from **New York, New York (USA)** aims to establish what the relative risks of infection are with either steroid or hyaluronic acid injections prior to TKA.[3] This study builds on work that demonstrates that recent injections (within three months) into the knee are associated with a higher infection rate when a subsequent arthroplasty is performed. This is an insurer-based database study from the USA and sets out to establish what the effects of recent injection of either corticosteroid or hyaluronic acid are on subsequent TKA infection rates through activity and billing code data. The authors utilized episode data on a total of 58 337 patients, all of whom underwent a TKA. Of these, 3249 patients (5.6%) received hyaluronic acid and 16 656 patients (28.6%) received corticosteroid less than or equal to one year before TKA. The authors estimated the incidence of infection as 2.7% in the whole group. However, a multivariable regression model demonstrated independent prosthetic joint infection for both corticosteroid (odds ratio (OR), 1.21; p = 0.014) and hyaluronic acid (OR, 1.55; p = 0.029) given less than or equal to three months before TKA. However, they also established that there was no increased risk for those who underwent injections over 12 weeks prior to undergoing their TKA. This is a large data set that essentially establishes that patients should not be offered a TKA within three months of an injection into the joint. While the injection itself does not bar undergoing a joint arthroplasty, there are clear indications here that whatever the type of injection, a three-month cooling off period prior to undertaking a TKA is required.

Does the institution matter in prosthetic joint infection? X-ref

We all have our own views on centralization and specialization. Those in specialist units tend to argue that outcomes are better, care is cheaper, and it makes sense to centralize services for those patients with specialist problems from a health economic perspective. Those who do not work in large specialist centres usually feel its about having the right surgeon do the case, rather than having a specialist standalone unit. So, these authors from **Berlin (Germany)** ask the question what effect does organization have?[4] The authors of this study have attempted to tease out what effect the centralized care pathway has on outcomes. The basis for this study is two cohorts of patients, those treated

with the standardized protocol (study group) consisting of 95 patients with either a hip or knee prosthetic joint infection (PJI) treated over a four-year period, and a comparison group of 86 patients treated in the same institution prior to the introduction of the standardized care pathway. Outcomes were followed up to two years and successful treatment of the joint infection reached by consensus. The study group patients were slightly more medically complex, with higher Charlson Comorbidity Index, were older (69 *vs* 66), and had multiple revisions (52.6% *vs* 36%). The headline results here are that, despite this increase in complexity, the rate of recurrent infection fell (from 10.4% to 3.1%) and the interval between the two stages fell from 80 days to 66 days. Overall, this study demonstrates that outcomes of treating PJI improve when medical teams work in an organized way within an agreed protocol. There is no data presented here to support specialized units, only standardized care pathways. We would endorse the authors conclusions that standardized care protocols improve outcomes, as does consistent treatment by the same team. The results of this study would probably be reflected in any complex care situation.

Amputation after total knee arthroplasty: not a great option

■ When situations are unsalvageable, the only option can be an above-knee amputation. Modern advances in military injuries have demonstrated how well patients can get on after amputations. The results of these young men, usually at the peak of fitness with superb medical care and great amounts of resolve and commitment to their rehabilitation, is often applied to other populations. There is rising awareness that an 80-year-old with several years of immobility and diabetes cannot expect to do anything like as well with an amputation as the young combat veteran. The route of final resolution for the untreatable revision knee (usually for infection) is, of course, amputation. This in itself is a last-resort operation with the only other option a knee fusion. However, little is known about the outcomes in this group, and the suspicion has been for a number of years that they may not do as well as those veterans with the same operation. A multicentre group from across the **United States** conducted an important study detailing the outcomes of precisely these patients.[5] In their retrospective multicentre review, the authors of this paper drew together 111 patients, all of whom had an above knee amputation following a failed total knee arthroplasty. Patients were from a representative age range (42 to 88 years old) and had, on average, 3.7 operations to the knee prior to the amputation. The authors report demographic and comorbidity information along with postoperative mortality and functional data. Just shy of 90% of patients underwent amputation for chronic infection, and the overall five-year survival rate for the patients was 52%, which was reflective of the frailty of the group as a whole. For the survivors, this study frankly reports what really happens to arthroplasty patients who undergo an above-knee amputation. Only 53% were satisfied. Only 55% use a prosthesis, 55% were primarily reliant on a wheelchair for mobility, and 80% reported phantom limb pain. This stark and realistic picture of patients following an above-knee amputation in older life is definitely food for thought for the arthroplasty surgeons among us.

Synovial fluid alpha-defensin as a diagnostic adjunct X-ref

■ An accurate diagnosis of prosthetic joint infection (PJI) is imperative, as treatment is often much longer and very different when compared with aseptic failure. Technology for the diagnosis of PJI has improved over the years and now includes multiple competing diagnostic tests, including synovial fluid alpha-defensin. This relies on the detection of alpha-defensin, which is naturally released by neutrophils in the presence of pathogens. The biomarker has caused some consternation of late with conflicting reports. However, some report the highest diagnostic odds ratio among all of those currently used for testing, which can be useful in equivocal cases of PJI. Investigators in **Chicago, Illinois (USA)** studied the overall utility of alpha-defensin in cases where the diagnosis of PJI is unclear.[6] In their series, 39 aspirations (32 patients) with uncertain results were retrospectively reviewed, with 33 samples from the knee (85%) and six from the hip (15%). Overall, 23 primary arthroplasties and 16 revision arthroplasties were included in the study. Alpha-defensin matched the Musculoskeletal Infection Society (MSIS) diagnosis in 32 of 39 patients (82%), with five false-negative and two false-negative results. One patient with a false-negative result was on long-term antibiotic suppression for chronic methicillin-susceptible *Staphylococcus aureus* PJI. Two of the false-positive patients had a known diagnosis of inflammatory arthritis and responded well to anti-inflammatory treatment. In borderline cell count samples, alpha-defensin diagnosis was concurrent with the MSIS diagnosis in 91% of samples. The biomarker yielded an overall specificity and sensitivity of 82%, a negative predictive value of 92%, and a positive predictive value of 64%. In the 23 samples with recent antibiotic exposure, the authors undertook a further review of the results. In these cases, alpha-defensin confirmed the correct diagnosis (six MSIS positive and 17 negative) in 19 samples (83%). These study results certainly support those who advocate the use of alpha-defensin in equivocal cases of PJI diagnosis, especially in those patients with borderline lab findings, suspected false positive/negative, and those with recent antibiotic use.

Implant survival and function ten years after kinematically aligned total knee arthroplasty

■ Total knee arthroplasty (TKA) innovations undergo years of scrutiny before becoming part of general clinical practice, including kinematic knee alignment (KA), which is a relatively new approach to total knee arthroplasty alignment. In KA, the surgeon orients the replacement knee as close to the native alignment as possible, the rationale being that this maintains the best soft tissue balance and that this in itself will result in superior outcomes. Randomized trials evaluating kinematic KA have shown better pain relief, function, flexion, and a normal feeling knee compared with those treated with a mechanically aligned (MA) knee. The long-term effects of using KA are still unknown, and are of concern since the prosthetic components are set in orientations outside the suggested values for MA knees. Advocates of MA believe that alignment outside of those set values poses a higher risk of implant failure than those in range, due to uneven loading of the components and the potential for macroscopic failure. 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. The authors of this study from **Davis, California (USA)** focus on the results of a cohort of 207 TKAs performed in 2007; the mean age for the cohort was 77 years (SD 10, 49 to 97) and 38% were male.[7] The yearly revision rate was 0.3%, with an implant survival of 97.4% for all-cause revision at ten years. There were five patients who were revised for aseptic failure and two 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 and two were treated with arthroscopic lateral releases for lateral patellofemoral instability, while the last patient had a revision of the patella for a loose patellar implant. At ten years, functional scores were available for 144 knees: OKS

had an average score of 43 (0 to 48, with 48 being the best), and the average score for WOMAC was found to be 7 (0 best, 96 worst). 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.

A predictive model for satisfaction after primary total knee arthroplasty

Bundled payments have become more popular as the payment method for a total knee arthroplasty (TKA). As the US 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 reported 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. Identifying factors that are indicative of TKA dissatisfaction may be helpful in potentially improving postoperative outcomes to offset the financial burden of revisions and re-hospitalizations. 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 both modifiable risk factors (body mass index (BMI), diabetes, opioid use, comorbidities, smoking status) as well as the patient's own 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 postoperatively. Responses were available from 484 patients undergoing TKA and 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 34.2 kg/m^2. All components of the 11-item questionnaire were significantly and positively correlated with the total knee survey score ($p < 0.0001$). 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 and knee flexion increased from 109.5° ± 15.1° to 113.3° ± 11.1°. Overall, this study team in **Chicago, Illinois (USA)** found that the 11-item TKA questionnaire is a significant predictor of functional outcomes following TKA when age, BMI, and sex were controlled.[8] 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/revision rate.

Text-messaging follow-up is effective in patients undergoing TJA X-ref

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, in the age of instant information, this often leaves patients feeling frustrated. An automated, physician-specific text messaging system could potentially improve patient morale and education and increase compliance with home exercises after surgery. A group from **Chicago, Illinois (USA)** evaluated the overall usefulness of an automated text message communication system for patients undergoing primary total knee or hip arthroplasty.[9] Their study design was a randomized trial. The control group received standardized 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 opioid use. Preoperative, three-week, and six-week postoperative range of movement was also recorded. In all, 159 patients were included in the study: 76 in the intervention group, and 83 in the control. Intervention group patients exercised for an average 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-week 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 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 help boost patient morale and motivate them throughout their recovery process.

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