Excellent Long-Term Survivorship of Unicompartmental Knee Arthroplasty Implants

Michael A. Mont, MD
Rubin Institute for Advanced Orthopedics, Sinai Hospital of Baltimore

SUMMARY
Unicompartmental knee arthroplasties (UKAs) are increasingly being performed, nearly tripling between 1998 and 2005 (J Arthroplasty. 2008 Apr;23[3]:408-12). Recent studies have demonstrated high survivorship at ten years in excess of 90% (J Bone Joint Surg Am. 2005 May;87[5]:999-1006, J Arthroplasty. 1996 Oct;11[7]:782-8, and J Bone Joint Surg Br. 1998 Nov;80[6]:983-9). In their report, Foran and coauthors described their experience with UKAs at a minimum follow-up of fifteen years.

The patient cohort consisted of sixty-two knees in fifty-one patients who had a mean age of fifty-eight years and were treated for osteoarthritis in fifty-three knees and osteonecrosis in nine knees. The authors used strict criteria as their indications: unicompartmental osteoarthritis or osteonecrosis with radiographic evidence of only mild deterioration of the other two compartments, a range of motion of at least 90° with a flexion contracture of <15°, a weight of <275 lb (125 kg), and an age of greater than fifty years. They used one cemented fixed-bearing UKA design for all of the knees, which involved the medial compartment in 95% of the knees and the lateral compartment in 5% of the knees.

They found, on Kaplan-Meier analysis with revision for any reason as the end point, that survivorship was 93% at fifteen years and 90% at twenty years. Four of the sixty-two knees were revised at a mean of 144 months (range, eighty-seven to 204 months). None of the knees was revised for aseptic loosening or osteolysis. There was radiographic evidence of progression in the other compartments; however, they typically did not become symptomatic.

DISCUSSION
These authors obtained excellent rates of survivorship for the UKA implants in a quite strictly indicated group as described. Certainly, the three prime factors for a high success rate, which include appropriate indications for these implants, surgical technique used, and prosthetic design, may have all contributed to these results. It is interesting to note that all patients had progression of the arthritis in the nonresurfaced compartments in the radiographic follow-up, but in only two knees did this require revision.
How Do You Perform a Leukocyte Esterase Analysis from Bloody Synovial Fluid?

Michael A. Mont, MD
Rubin Institute for Advanced Orthopedics, Sinai Hospital of Baltimore

SUMMARY

Recently, a study by Parvizi et al. described the use of a leukocyte esterase strip to test synovial fluid aspirates for the diagnosis of periprosthetic joint infections (J Bone Joint Surg Am. 2011 Dec 21;93[24]:2242-8). This straightforward test allows for the simple detection of an infection using a colorimetric strip. With a positive two-strip reading, one can obtain high sensitivity (80.6%) and specificity (100%) for the presence of a periprosthetic infection. Unfortunately, the joint aspirates may often be bloody, which makes the colorimetric strip testing impractical. Aggarwal and coauthors described a simple protocol for using centrifugation to allow for leukocyte esterase testing after obtaining a bloody joint aspiration.

First, a minimum aspirate of 1.5 mL of synovial fluid was transferred to a microcentrifuge tube. Samples were spun for two to three minutes, by which time the fluid had separated into a packed red-blood-cell pellet and a synovial fluid supernatant. They then easily performed a needle aspiration of the supernatant, which allowed for colorimetric strip testing by placing a drop of fluid on the leukocyte test pack (Chemstrip 7 urine test strip; Roche Diagnostics, Indianapolis, Indiana). Results were then read after one to two minutes. The authors confirmed that there was 100% concordance in leukocyte esterase enzyme test results when known specimens were mixed with bloody samples and then spun down as described.

DISCUSSION

The authors described a straightforward mini-centrifuge method to deal with bloody joint aspirates when performing leukocyte esterase enzyme tests for the diagnosis of periprosthetic joint infections. They did some tests to validate this technique, although further
A Potential Genetic Link to Surgical Site Infection?

Craig J. Della Valle, MD
Rush University Medical Center

SUMMARY
Using a unique database in Utah that contains genealogical information on more than two million people descended from the pioneers of the region, the authors sought to determine whether there was a genetic predisposition to surgical site infection (SSI). They selected from the database individuals with both parents, all four grandparents, and at least six of their eight great-grandparents in the database to adequately match cases and controls. They then cross-referenced this database with medical records from the University of Utah Health Science Center to identify patients with an ICD-9 (International Classification of Diseases, Ninth Revision) code in their medical record that suggested an SSI; this included all codes related to wound healing or an infection of a postoperative wound; infection at the site of a total joint arthroplasty or other orthopaedic hardware; and infection involving a catheter, the mediastinum, or Caesarean section wounds. A control was then selected for each case.

When they examined the 651 cases that included a nonhealing wound or a prosthesis or hardware-related infection, they found significant “excess relatedness” among cases compared with controls and a significantly higher relative risk for development of infection among second and third-degree relatives. Both relationships were strengthened as the definition of an SSI was broadened to increase their sample size.

DISCUSSION
Although many of us have suspected a genetic susceptibility to the development of infection, this is the first study that I am aware of that supported a genetic link. While numerous studies have correlated infection with patient-related factors, some patients do seem more likely to develop an SSI and others seem more resistant to standard treatment modalities. The authors of this study hypothesized that a number of potential factors could be at play, such as genes related to inflammation (e.g., interleukin-1 or tumor necrosis factor) or those that control phagosomal oxidase, which plays an integral role in host defense.

One of the main weaknesses of this report was that it did not examine comorbidities, such as diabetes and obesity, or case complexity; however, this work nonetheless suggested that further study in this area was warranted. It would be fascinating to specifically identify which genes are responsible, with the potential for a much greater understanding of SSI and periprosthetic joint infection, including improved methods for prevention and treatment. Further, preoperative screening might identify those with a predisposition to acquiring an infection for whom the risks associated with surgery may outweigh the benefits.

Increased Complication Rates with General Anesthesia for Primary Total Knee Arthroplasty

Michael A. Mont, MD
Rubin Institute for Advanced Orthopedics, Sinai Hospital of Baltimore

SUMMARY
Some reports have described an increased rate of complications when total knee arthroplasty (TKA) was performed with general anesthesia versus spinal anesthesia. Others have suggested that the increased risk of complications associated with general anesthesia is due to the effects of the surgical procedure on the surgical site. The authors of this study examined the effect of general anesthesia on the risk of complications in primary total knee arthroplasty (TKA) and found that the use of general anesthesia was associated with an increased risk of complications.
anesthesia versus neuraxial anesthesia (J Bone Joint Surg Br. 1989 Mar;71[2]:181-5, Can J Surg. 2006 Dec;49[6]:391-6, J Bone Joint Surg Br. 2009 Jul;91[7]:935-42, and Am J Orthop. 2007 Jul;36[7]:E101-6). Spinal anesthesia, as one type of neuraxial anesthesia, has been less studied and in some reports has demonstrated no significant differences compared with general anesthesia in terms of the rate of complications (J Bone Joint Surg Br. 1991 May;73[3]:418-22 and Anesthesiology. 1990 Dec;73[6]:1103-9). Because there have been no multicenter, prospective studies comparing complications between patients managed with spinal anesthesia and those managed with general anesthesia during TKA, Pugely and coauthors studied thirty-day perioperative morbidity and mortality in patients who had a TKA.

All patients who underwent a primary TKA between 2005 and 2010 and were identified by the American College of Surgeons National Surgical Quality Improvement Program Participant Use Data Files were evaluated (J Gastrointest Surg. 2011 Feb;15[2]:250-9). This database contained patient data from 250 hospitals across the United States. The authors identified patients who underwent general anesthesia (8022 patients) or spinal anesthesia (6030 patients) during a TKA. They then analyzed complications and correlated this to various demographic characteristics, preoperative comorbidities, preoperative laboratory values, and operative values. They found that the rates of overall complications, superficial wound infections, and need for blood transfusions were lower, and the duration of the surgical procedure and the duration of the hospital stay were shorter, in the spinal anesthesia group compared with the general anesthesia group. This was despite the fact that various demographic characteristics, preoperative health and comorbidity factors, and operative variables were no different in these two groups of patients. Even after adjustment for potential confounders, the overall likelihood of complications was significantly higher for the group that had general anesthesia. Interestingly, the authors found that age, female sex, black race, elevated creatinine, American Society of Anesthesiologists class, operative time, and anesthesia choice were all independent risk factors for short-term complications.

DISCUSSION
This topic has been addressed in quite a robust manner by these authors. One often assumes that the risks of spinal anesthesia are lower than those for general anesthesia, but this study addressed this quite well and gave us answers that I believe we can rely on. I have often challenged the results of studies that are obtained from databases such as this one. However, the authors did an excellent job of making sure that they answered their fundamental question, the rates of complications for spinal versus general anesthesia, while trying to reduce any biases found with their conclusion. For example, one might question whether the spinal anesthesia patients had more comorbid or other factors than did the general anesthesia patients, which then led to their lower rate of complications. These authors did not find that there were differences in the groups, and their analysis of preoperative factors utilized more than thirty demographic aspects and other preoperative considerations, as well as operative variables; they even evaluated the extent of teaching residents’ involvement in the cases. I certainly commend the authors, and this can be a model for other studies.

In summary, I think that this is useful information for surgeons, anesthesiologists, and especially patients for deciding on the type of anesthesia to use during TKA, especially when either modality could be used.

Excellent Restoration of Alignment Using Computer-Assisted Total Knee Arthroplasty for Tibial Deformities

Michael A. Mont, MD
Rubin Institute for Advanced Orthopedics, Sinai Hospital of Baltimore

SUMMARY
It has been shown that computer-assisted total knee arthroplasty (TKA) can provide reproducible mechanical alignment within a few degrees of the neutral mechanical axis (J Bone Joint Surg Br. 2004 Jul;86[5]:682-7, J Bone Joint Surg Br. 2004 Apr;86[3]:372-7, and J Arthroplasty. 2005 Aug;20[5]:618-26). However, there have been few studies in which this technology has been applied to knees with more severe deformities, most notably when there are proximal tibial deficiencies. Instead of
Far Cortical Locking: A Growing Trend in Fracture Management

The Problem

Three recent studies examining supracondylar femur fractures show concern for the high degree of stiffness of locked plating constructs and report nonunion rates as high as 23%.\(^1\)\(^2\)\(^3\) A plating construct needs to be strong enough to support the damaged bone while the fracture heals, but too much stiffness forces the body to heal through osteonal or primary/direct healing. Primary healing requires nearly-perfect anatomic reduction and rigid compression for absolute stability, and has proven to be a very complex and unforgiving procedure.\(^4\)

What is Far Cortical Locking (FCL)?

When used with a locked plating construct in animals, FCL is a screw technology designed to provide stable fracture fixation while promoting natural healing.\(^5\) FCL has been shown to provide controlled axial flexibility and to promote fracture healing, by stressing the bone through micromotion.\(^7\) This is possible because FCL screws have a flexible shaft that elastically deflects as it is loaded, allowing the bone to be stressed separately from the plate and dynamize at the fracture site. The screw is prevented from over-deflecting by the shaft contacting the bone edge within the proximal cortex.\(^7\)

Comparison of fracture healing between standard locked plate and far cortical locking constructs in an ovine tibia gap osteotomy model.

SUGGESTED READING


Note: FCL™ is a trademark of Apex Biomedical Company LLC.
Zimmer MotionLoc Screw Technology

The idea of Far Cortical Locking Technology motivated Zimmer to create Zimmer® MotionLoc™ Screws. MotionLoc Screws look different than most cortical screws. The diagram below explains the design.

A. Spherical Head

This part of the screw interfaces with the plate. Since the MotionLoc Screw was designed to work with the NCB® Polyaxial Locking Plate and NCB Periprosthetic Polyaxial Plating Systems, a spherical head is locked to the plate with a locking cap that threads into the plate holes.

B. Working Length of the Screw

This is the portion of the MotionLoc Screw that makes it unique. The diameter of this portion has been reduced in comparison to the distal end of the screw. This allows the screw within the drilled hole to flex through elastic deformation without deforming the screw.8 It is important to maximize the working length of the screw, so centering the screw in the bone is key.

C. Reverse Cutting Flutes

The reverse cutting threads on the working length of the screw are necessary for screw removal. The reverse cutting threads are designed to engage with the near cortex before the threads on the top of the screw disengage from the far cortex, so the screw can be back out.

D. Cortical Screw Threads

This is what makes the MotionLoc Screw a standard screw with a standard surgical procedure. As this screw advances through the drilled hole, it carves out a flexibility envelope for the reduced shaft portion of the screw.

SUGGESTED READING

Early Clinical Evidence

Early clinical experience with *MotionLoc* Screws is showing promising results. A prospective, multi-center observational study documented early clinical results with *MotionLoc* Screws to assess their durability and potential complications. The conclusions gathered from the study are as follows:

Radiographic evaluation documented that none of the 125 *MotionLoc* Screws used for diaphyseal fixation broke or lost fixation. There was no diaphyseal fixation failure. Thirty of 31 fractures healed within 15.6±6.2 weeks. In 23 fractures (74%), periosteal callus formed circumferentially, extending to the lateral cortex under the plate. At an average follow-up of 16±5 months, two of 31 fractures exhibited complications requiring revision. One revision was performed at 5 days post surgery to correct a mal-rotation. The second revision was performed at 6 months post surgery to treat a non-union. Absence of hardware and fixation failure suggests that dynamic plating of distal femur fractures with FCL screws provides safe and effective fixation. Moreover, the amount and distribution of periosteal callus suggests that dynamic fixation with *MotionLoc* Screws may promote increased fracture healing over standard locked plating. However, this hypothesis on the stimulatory effect of dynamic fixation on fracture healing requires investigation in a future randomized controlled trial.

Seventeen-year-old female with poor fracture reduction leading to extensive screw/plate loading.
Periprosthetic Fractures on the Rise!

Just recently, Lisa Cannada, MD published an article in the OTW monthly newsletter about the growing periprosthetic fracture trend. In the article, she discussed three take-home points necessary for periprosthetic fixation for any surgeon treating patients presenting with these difficult fracture patterns.9

1. Variable screw trajectories with up to 30 degrees.
2. Liberal use of non-locking screws in the diaphysis.
3. Every screw in a locking plate does not have to be locking.

The NCB Periprosthetic (NCB-PP) System, now indicated for use with MotionLoc screws, meets all of the above criteria. NCB-PP is a complete periprosthetic system that allows you to angle your screw trajectory, lock in the screws that need to be locked, and leave the rest conventionally placed in the plate. To reduce construct stiffness, MotionLoc screws can be utilized in the shaft of bone.

The NCB-PP system includes a full femur periprosthetic family of plates, including a greater trochanter plate* attachment.

*Note: Trochanter plates are not indicated for use with MotionLoc Screws
performing preoperative templating to decide on the level of osseous resection or whether an augmentation of tibial osseous defects needs to be performed, computer-assisted TKA may potentially make it easier to make these decisions. Therefore, Shah and coauthors used computer navigation to quantify the amount of bone loss on the tibial plateau and to assess the need for augmentation with metallic tibial wedges in order to preserve the host bone in TKA.

The authors evaluated 439 consecutive computer-assisted TKAs performed by one surgeon between July 2006 and October 2009. The tibial deformity was quantified intraoperatively using computer navigation software. This was done by quantifying the lowest point on the deformed tibial plateau and the midpoint on the nondeformed plateau. When tibial deformities were >13 mm and involved greater than one-third of the tibial plateau, augmentation was used. The authors found that thirteen knees (3%) in twelve patients required metallic wedge augmentation in the medial tibial plateau. The range of tibial plateau discrepancy was between 15 mm and 23 mm (mean, 18 mm). The authors achieved a mean postoperative alignment of 0.08° of valgus, with a range of 2° of valgus to 4° of varus. At a minimum of two years of follow-up, patients had Knee Society objective and functional scores of 91 and 88 points, respectively.

DISCUSSION

There are currently four general options available for the augmentation of tibial bone defects in TKA: cement, metallic wedges, allografts, and autografts. In this study, the authors evaluated the use of metallic wedges with successful results. The limitations of the study were that it still represented a small group (twelve patients) and they were evaluated at a short duration of follow-up. Nevertheless, these were quite difficult patients to treat, and the authors’ results are commendable in that they represent for the surgeon a potential new method and technique for dealing with these marked tibial defects. Certainly, these types of defects can be treated using methods other than computer-assisted TKA. Nevertheless, it is nice to see that the use of this technique led to excellent early results in this difficult-to-treat patient population.

Washing Your Way to a Lower Transfusion Rate?

Craig J. Della Valle, MD
Rush University Medical Center


SUMMARY

The authors of this study performed a prospective randomized trial to determine the efficacy of an autologous retransfusion system in primary total knee arthroplasty (TKA). Specifically, they randomized 151 consecutive primary TKAs being performed for osteoarthritis using primary components to either the use of a perioperative autotransfusion system (OrthoPAT; Haemonetics, Braintree, Massachusetts) that was used for approximately six hours or a standard drain without suction. Patients had a transfusion when the hemoglobin value was <8 g/dL or if they were symptomatic. The surgical procedures were performed without a tourniquet and all components were cemented. Postoperative anticoagulation was performed with low-molecular-weight heparin.

The authors found no difference in the requirement for allogeneic blood postoperatively; 33% of patients in each group required a mean of 2.1 units of blood. The study appears to have been appropriately powered. Demographics between the two groups were equivalent, as were factors such as the mean hemoglobin values at the time of the allogenic transfusion and on postoperative days 2, 3, and 5.

DISCUSSION

The authors of this study are to be congratulated for a well-done Level-I study. These studies are quite difficult to accomplish, which is reflected in the fact that fifty-three patients eligible for the study declined participation. Not only is it difficult to enroll patients in prospective randomized trials but such studies are also time and resource-intensive; however, the highest level of evidence is achieved. There are multiple options available to us as physicians to attempt to decrease the need for transfusions (which I think we all agree is in our patients’ best interests), and work such as this is critical for assisting us in making intelligent choices.

As health care changes rapidly and we as physicians come under increased scrutiny for how we direct health-care dollars to be spent, it is important for us to critically evaluate each intervention we choose for our patients. Adding value and quality of care is
more important than ever. Tackling these difficult questions in a systematic fashion is imperative to determine both what works and what is cost-effective. If we as a profession do not continue to perform such high-level studies, I fear such decisions will be made by forces outside the medical profession.

One-Stage Exchange Is Successful for a Chronically Infected Knee After Total Knee Arthroplasty

SUMMARY OF: Jenny JY, Barbe B, Gaudias J, Boeri C, Argenson JN. High Infection Control Rate and Function After Routine One-Stage Exchange for Chronically Infected TKA.

Michael A. Mont, MD
Rubin Institute for Advanced Orthopedics, Sinai Hospital of Baltimore

SUMMARY
Despite the fact that one may expect a low prevalence of periprosthetic infection after total knee arthroplasty (TKA), this still remains a devastating complication. Even if the infection rate of approximately 1% to 2% occurs, because of the increasing number of TKAs performed, there would be an increasing number of these infections (J Bone Joint Surg Br. 2006 Jul;88[7]:943-8). Most surgeons consider that prosthetic removal is mandatory for any chronic deep infection at the site of a TKA. Typically, the prosthesis is removed, and after a variable period of time using a two-stage protocol, it may be implanted. Unfortunately, performing these procedures in two stages can be quite inconvenient for the patient and family and obviously requires greater cost and all the morbidity associated with a second procedure. One-stage reimplantation of a total hip replacement was proposed by Wroblewski and has been used more commonly for hip arthroplasty (Clin Orthop Relat Res. 1986 Oct;[211]:103-7). There has been little study concerning whether there can be infection control when one performs a one-stage procedure for a periprosthetic infection after TKA. Therefore, Jenny and coauthors assessed whether a one-stage exchange protocol would lead to a rate of infection control similar to those reported for two-stage exchange and what effect this would have on knee function.

The authors retrospectively identified all forty-nine patients at their institution who had chronic infection after a TKA treated between 2004 and 2007. The authors indicated one-stage exchange when there was a suspicion, or diagnosis, of a chronic infection, with fungal infections and repeat failures of previous infection treatments as contraindications. The authors performed their procedure via a skin incision using the previous scar, with a tibial tubercle osteotomy if necessary. Fistulas were excised if present, and there was careful soft-tissue debridement, complete prosthesis removal, and complete osseous debridement, including intramedullary reaming. The tibial tubercle osteotomy was necessary in twenty-four patients. Once irrigation was completed, draping, gloves, and instruments were changed. A new prosthesis was then implanted with commercially available gentamicin-impregnated cement. The authors needed a pedicled musculocutaneous flap in five patients. With this treatment, one patient required an above-the-knee amputation for end-stage arterial occlusion after three months without evidence of any infection. One patient died at six weeks because of other medical conditions without any infection. The remaining forty-seven patients were followed for a minimum of three years. Overall, forty-one (87%) of forty-seven patients were free of any knee infection. Of the forty-seven patients followed, twenty-five (53%) had Knee Society scores of >150 points. Of note, six patients required repeat debridement, with retention of the prosthesis, within two postoperative weeks because of persistent drainage (five patients) or skin necrosis (one patient). At the time of the final follow-up of the forty-one patients without a repeat revision, the median Knee Society score was 85 points, with a flexion angle of 100°.

DISCUSSION
This was certainly quite a thought-provoking report. To me, a one-stage exchange protocol was not something that, until reading about their results, I would have ever considered. Aside from the fact that this was a retrospective and small study, the results were still impressive. The results appeared to be comparable to those of other reports that have described two-stage exchange arthroplasties, and in fact the results were superior to those of a number of reports. I think it behooves others to try to repeat this type of study, because this paper may have reflected the results of one specific surgical team during a period of time and may not be useful for other surgeons. In addition, I would like to see some of the work further refined, such as trying to decide where this approach would be best used. Certainly, when taking into consideration certain subgroups of patients, different time periods, soft-tissue factors, and index organisms, this might not be an effective approach; for other more “benign” knee infections, this might be the most appropriate. In summary, I commend the authors for bringing to the forefront this type of approach. I hope this study encourages further work in this field. As a point of comparison, this report can be a standard for other surgeons who use this treatment protocol. If the protocol turns out to be successful in a defined population, it certainly would be advantageous to reduce the number of procedures and potentially reduce the morbidity for these patients.
No Difference in Surface Damage Found with Rotating-Platform Versus Fixed-Bearing Total Knee Arthroplasties

Michael A. Mont, MD
Rubin Institute for Advanced Orthopedics, Sinai Hospital of Baltimore

SUMMARY
The designs of the implants used in total knee arthroplasties (TKAs) are balanced by the desire to reduce contact stresses, and thus wear, and to try to have less conforming surfaces that will reduce the load transfer to the fixation interfaces and thus lower the risk of loosening (J Bone Joint Surg Am. 1986 Sep;68[7]:1041-51, Clin Orthop Relat Res. 2000 Jun;[375]:302-12, and J Bone Joint Surg Br. 1977 May;59[2]:222-8). Mobile-bearing knee arthroplasty was developed in an attempt to meet both objectives. Several randomized clinical trials and meta-analyses have failed to demonstrate any advantages with the use of these mobile-bearing designs over those of fixed-bearing designs (J Bone Joint Surg Am. 2010 Sep;92[Suppl 1 Pt 2]:240-9, Clin Orthop Relat Res. 2004 Nov;[428]:221-7, Knee Surg Sports Traumatol Arthrosc. 2010 Mar;18[3]:325-40, and Arch Orthop Trauma Surg. 2011 Oct;131[10]:1341-50). Other studies have shown that wear patterns after retrieval are also similar to those seen in fixed-bearing implants (J Arthroplasty. 2009 Sep;24[6 Suppl]:28-32, J Biomed Mater Res. 1983 Sep;17[5]:829-42, and Clin Orthop Relat Res. 2011 Jan;469[1]:123-30). However, previous studies have included multiple designs as part of their analyses. In the study performed by Stoner and coauthors, one specific rotating-platform design and one fixed-bearing design were compared. They analyzed whether the severity of the damage and wear was the same on the tibiofemoral articular or inferior surface of each group, the location of damage on the two designs, and whether component thickness led to different combinations of wear and deformation.

The authors analyzed twenty-five rotating-platform and seventeen fixed-bearing polyethylene tibial inserts from their institution's retrieved implant program. Three of the rotating-platform inserts and four of the fixed-bearing inserts were cruciate-retaining; all of the others were posterior-stabilized. The authors analyzed various patient demographic factors and prerevision radiographs and found that the two groups were similar for most of the parameters that were analyzed. The authors found that the average total damage for the rotating platforms was greater than that for the fixed bearings (p < 0.001). Rotating platforms had an average total damage score of 77, which can be compared with the fixed bearings that had an average total damage score of 53. The scores on the inferior surface of the rotating platforms were greater and were often due to third-body debris scratching observed on both the damage mapping and the three-dimensional scans. In addition, the extensive damage as a function of surface area was greater for the rotating-platform knee, which might be expected because of the greater surface conformity. There were no differences found between the thicknesses of the two designs.

DISCUSSION
The authors found no advantage of using mobile-bearing TKA implants, and, in fact, there was an increased total damage score on the rotating-platform implants, with increased surface area damage and a tendency for third-body debris. I particularly liked this study because, unlike many others that I have read, the investigators looked at one specific design as opposed to the literature, which contains multiple studies of analyses with various implants (J Arthroplasty. 2009 Sep;24[6 Suppl]:28-32, J Biomed Mater Res. 1983 Sep;17[5]:829-42, J Arthroplasty. 2009 Jan;24[1]:131-8, J Bone Joint Surg Am. 1988 Oct;70[9]:1312-9, and Clin Orthop Relat Res. 1992 Mar;276:126-34). There are many limitations to this study, which the authors themselves acknowledged. In fact, I think this report is almost worth reading specifically because they describe these limitations and how they might be mitigated. For example, they used retrieved implants, which reflect in vivo use and should be a better reflection of performance than those obtained by in vitro knee simulation studies that may look at only one simplified condition. However, the authors acknowledged that the devices in this study were removed for mechanical failures and might not represent well-functioning implants. In addition, these had a short length of implantation and may not reflect longer periods of follow-up for these prostheses. Furthermore, some of the surgeries were performed at another institution and there was no information regarding patient activity, which could certainly influence wear. The authors also described many other limitations of their work, which, for the interest of the reader, are worth analyzing. Nevertheless, I think that this was an important study and really showed no benefit in the use of rotating-platform knee arthroplasty implants with regard to surface area damage. Finally, the more conforming surface and rotating-platform bearing did not necessarily decrease stress across the polyethylene to reduce damage at these short lengths of implantation.
SUBTITLE
A Systematic Review Has Shown That Computer-Assisted Total Knee Arthroplasty Has No Proven Clinical Benefit

SUMMARY

A number of studies have shown that, using conventional alignment guides for TKA, the achievement of a neutral mechanical axis (±3°) may occur in only 75% of the knees (Orthopedics. 2004 May;27[5]:476-80). Many studies have shown that computer-assisted TKA can reduce the number of outliers in the coronal mechanical axis (J Bone Joint Surg Br. 2004 Jul;86[5]:682-7, Int Orthop. 2007 Oct;31[5]:617-22, and Clin Orthop Relat Res. 2007 Apr;457:156-62). Only a few reports have shown any improvement in clinical outcome despite improvements in radiographic outliers. Therefore, Burnett and Barrack reviewed the literature with regard to computer-assisted TKA to try to understand alignment, long-term durability, and patient-specific instrumentation. They also evaluated operating-room time, costs, and complications unique to navigated TKA.

The authors analyzed publications within the past ten years in the English-language literature through an extensive search. As expected, they found that coronal plane alignment was improved with navigated TKA, with fewer radiographic outliers. In most of the studies, they found no improvements in any other clinical variable or in function by many outcome measures with navigated TKA. Many articles described increased costs with navigation. The only area in which costs might be contained would be in some reports of patient-specific instrumentation. The authors found a number of complications, including fractures around pin sites that occurred at a rate of approximately 1%, with the use of navigated TKA. Some authors have described a decrease in blood transfusion requirements or pulmonary emboli with navigation, but there have been contradictory findings and these have not been confirmed.

DISCUSSION
To me, this was a tremendous effort by the authors and should be must-reading for anyone interested in the field of computer-assisted TKA, or those wishing to evaluate patient-specific instrumentation. The authors provided quite a balanced view of this field. In addition, the report provided a nice framework that other authors may wish to emulate when performing systematic reviews of the literature that encompass not only one specific topic but an overall assessment of the many issues concerning radiographic results, clinical results, costs, complications, and newer technologies. I certainly commend the authors for their efforts.