The Knee Society

and the

American Association of Hip and Knee Surgeons

Combined Specialty Day Meeting

Saturday, February 17, 2007

San Diego Marriott Hotel and Marina
Marriot Hall 4-6
San Diego, CA

Scientific Program

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Future Combined Specialty Day Meetings

San Francisco, CA	March 8, 2008
Las Vegas, NV	February 21, 2009
New Orleans, LA	February 27, 2010

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Abstracts for the 2007 Knee Society Interim Meeting and the 2008 Specialty Day Meeting Award consideration can be submitted on the Knee Society Website (www.kneesociety.org)

Abstracts for the 2007 AAHKS Annual Meeting (papers and posters) can be submitted on the AAHKS website (www.aahks.org).

The deadline for receipt of Abstracts is April 15, 2007

2007 Combined Specialty Day Scientific Program
The Knee Society
and
The American Association of Hip and Knee Surgeons (AAHKS)
Saturday, February 17, 2007
San Diego Marriott Hotel & Marina, Marriot Hall 4-6
San Diego, CA

ACCREDITATION
This activity has been planned and implemented in accordance with the Essential Areas and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint sponsorship of the American Academy of Orthopaedic Surgeons and The Knee Society. The American Academy of Orthopaedic Surgeons is accredited by the ACCME to sponsor continuing medical education for physicians.

CREDIT HOURS
The American Academy of Orthopaedic Surgeons designates this educational activity for a maximum of 8 *AMA PRA Category 1 Credits*™. Physicians should only claim credit commensurate with the extent of their participation in the activity.

OBJECTIVES
The Knee Society/AAHKS Specialty Day program is designed to provide practicing orthopaedic surgeons with current information regarding surgical techniques, emerging technology and symposia discussions on managing total knee arthroplasty, and to enhance the care of patients with arthritis and degenerative diseases of the knee joint.

Please complete and return your Evaluation Form to the Knee Society Registration table at the conclusion of the Meeting. Thank you!

Please turn off cell phone ringers while inside the Scientific Session rooms. Thank you.

The Knee Society/AAHKS
Combined Specialty Day Meeting
Saturday, February 17, 2007

8:00-8:05 AM	**OPENING COMMENTS** Gerard A. Engh, MD,* Knee Society President Daniel J. Berry, MD,* Knee Society Education Committee Chair
8:05-8:52 AM	**SYMPOSIUM I:** **UPDATE ON NAVIGATION AND COMPUTER-ASSISTED SURGERY: ADVANCES AND LIMITATIONS** Moderator: Thomas P. Vail, MD,* Durham, NC
8:05-8:13 AM	**Computer Navigation the Easy Way** Aaron A. Hofmann, MD,* Salt Lake City, UT
8:13-8:21 AM	**Computer-Assisted TKR: Uses to Help Manage Deformities** Kenneth A. Krackow, MD,* Buffalo, NY
8:21-8:29 AM	**Is it Time to Revisit the Robot Idea with Smart Instruments?** Johan Bellemans, MD, PhD,* Leuven, Belgium
8:29-8:37 AM	**Preoperative Planning with Computer: Everyone will need to do it. What have we learned?** William L. Healy, MD,* Burlington, MA
8:37-8:52 AM	**DISCUSSION**
8:52-9:39 AM	**SYMPOSIUM II:** **NEW EXPOSURES FOR TOTAL KNEE ARTHROPLASTY: THE LATEST DATA ON PROS, CONS AND OUTCOMES—WHAT IS BEST FOR MY PATIENT?** Moderator: W. Norman Scott, MD,* New York, NY
8:52-9:00 AM	**Routine use of Minimally Invasive TKA: Benefits, Complications, Outcomes** Aaron G. Rosenberg, MD, FACS,* Chicago, IL
9:00-9:08 AM	**A Cautionary Experience: I tried MIS but have gone back to a Short Conventional Incision in a High Volume Practice** David F. Dalury, MD, Baltimore, MD
9:08-9:16 AM	**Minimally Invasive Total Knee Replacement Five Year's Experience: Lessons Learned** Richard S. Laskin, MD,* New York, NY

* indicates something of value has been received from a commercial company or institution

9:16-9:24 AM **A Middle Ground: Shorter but Not Tiny Incisions: Satisfying the Patient and the Surgeon**
Giles R. Scuderi, MD,* New York, NY

9:24-9:39 AM **DISCUSSION**

9:39-9:50 AM **Scientific Highlights of the Closed Knee Society and AAHKS Meetings: An update on the Latest Studies**
Daniel J. Berry, MD,* Rochester, MN

9:50-10:05 AM **PRESIDENTIAL GUEST SPEAKER**
What will TKA look like in 2020?
The Impact of Technology, Economics and Demographic Changes
Jan M. K. Victor, MD, Brugge, Belgium

10:05-10:20 AM **BREAK**

10:20-11:20 AM **SYMPOSIUM III:**
NEW TOTAL KNEE ARTHROPLASTY IMPLANT DESIGNS AND MATERIALS: A CRITICAL ASSESSMENT OF NEW TECHNOLOGY
Moderator: Cecil H. Rorabeck, MD, London, ON, Canada

10:20-10:28 AM **High Flexion in Real Life:**
How Much Knee Flexion do Western Patients Actually Use?
Harry E. Rubash, MD,* Boston, MA

10:28-10:36 AM **Optimizing TKA Function in High Flexion**
Douglas A. Dennis, MD,* Denver, CO

10:36-10:44 AM **Crosslinked Polyethylene for TKA: Ready for Prime Time?**
Timothy M. Wright, PhD, New York, NY

10:44-10:52 AM **Gender Differences: The Knee Anatomy of Male and Female Patients**
Robert E. Booth, Jr., MD,* Philadelphia, PA

10:52-11:00 AM **Mobile Bearings: Do They Provide a Benefit?**
Thomas K. Fehring, MD, Charlotte, NC

11:00-11:08 AM **Uncemented TKA: Time to Consider It Again?**
Leo A. Whiteside, MD,* St. Louis, MO

11:08-11:20 AM **DISCUSSION**

11:20 AM-12:00 PM **THE KNEE SOCIETY AWARD PRESENTATIONS**
Moderator: Thomas P. Sculco, MD, New York, NY

11:20-11:28 AM ***Mark Coventry Award Paper***
Polyethylene Sterilization and Wear-Related Failures with PFC Total Knees
William L. Griffin, MD,* Charlotte, NC

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11:28-11:33 AM **DISCUSSION**

11:33-11:41 AM ***Chitranjan Ranawat Award Paper***
Comparison of Intramedullary Nailing and External Fixation Knee Arthrodesis for the Infected Knee Replacement
Tad M. Mabry, MD, Rochester, MN

11:41-11:46 AM **DISCUSSION**

11:46-11:54 AM ***John Insall Award Paper***
Pain and Depression Influence Outcome Five Years After Knee Replacement Surgery
Victoria Brander, MD, Chicago, IL

11:54 AM-12:00 PM **DISCUSSION**

12:00-12:15 PM **PRESIDENTIAL ADDRESS**
Tissue-Guided Surgery: Can We Radically Improve the Kinematics of TKA?
Gerard A. Engh, MD,* Alexandria, VA

12:15-1:05 PM **LUNCH BREAK**
(Knee Society Business Meeting – Members Only)

1:05-1:12 PM **JOHN INSALL TRAVELING FELLOWSHIP REPORT**
Presenter: TBD

1:12-2:07 PM **SYMPOSIUM IV:**
PERIOPERATIVE MANAGEMENT AFTER KNEE SURGERY: TAKING ADVANTAGE OF THE REVOLUTION IN PERIOPERATIVE PAIN MANAGEMENT AND REHABILITATION
Moderator: Russell E. Windsor, MD, New York, NY

1:12-1:20 PM **Blood Management and Bleeding Reduction in TKA:**
What Should We Do in 2007?
E. Michael Keating, MD,* Mooresville, IN

1:20-1:28 PM **Antibiotic-Impregnated Cement:**
What should I know? When should I use it?
Steven J. MacDonald, MD,* London, Ontario, Canada

1:28-1:36 PM **Pain Management: Efficacy of Local Tissue Infiltration and a Comprehensive Pre-emptive Analgesic Program**
Chitranjan S. Ranawat, MD,* New York, NY

1:36-1:44 PM **Epidural blocks or regional nerve blocks: Do they add something? Which is best?**
Mark W. Pagnano, MD, Rochester, MN

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1:44-1:52 PM	**DVT Prophylaxis: The Gap between ACCP Guidelines and Orthopedic Surgeons: What is acceptable in 2007?** Paul F. Lachiewicz, MD,* Chapel Hill, NC
1:52-2:07 PM	**DISCUSSION**
2:07-2:20 PM	**BREAK**
2:20-3:05 PM	**SYMPOSIUM V:** **UNICOMPARTMENTAL (INCLUDING PATELLOFEMORAL) ARTHRITIS: WHAT IS THE BEST TREATMENT IN 2007?** Moderator: Thomas S. Thornhill, MD, Boston, MA
2:20-2:28 PM	**Patellofemoral Joint Replacement: Does it have a Role in 2007?** Jess H. Lonner, MD,* Philadelphia, PA
2:28-2:36 PM	**Unicompartmental Replacement: What do we know after 30 years?** Richard D. Scott, MD,* Boston, MA
2:36-2:44 PM	**Osteotomy: Who should get it? Opening or Closing Wedge?** Thomas Minas, MD, MS, Chestnut Hill, MA
2:44-2:52 PM	**Just do it: The full TKA is better than Compartmental Replacement** John B. Meding, MD,* Mooresville, IN
2:52-3:05 PM	**DISCUSSION**
3:05-4:00 PM	**SYMPOSIUM VI:** **COMPLICATIONS OF TOTAL KNEE ARTHROPLASTY: OPTIMIZING MANAGEMENT WITH NEW TECHNOLOGY AND TECHNIQUES: INSTABILITY, STIFFNESS, OSTEOLYSIS, INFECTION** Moderator: Richard Iorio, MD,* Burlington, MA
3:05-3:13 PM	**Imaging the Painful TKA: What can New Imaging Modalities Show Us?** Hollis Potter, MD,* New York, NY
3:13-3:21 PM	**Stiffness: Who should get a Reoperation? What are the Results?** William J. Maloney, III, MD, Stanford, CA
3:21-3:29 PM	**Technique and Timing of Two Stage Exchange for Infection** Robert L. Barrack, MD, St. Louis, MO
3:29-3:37 PM	**Osteolysis around TKA: Treatment Options** John J. Callaghan, MD,* Iowa City, IA
3:37-3:45 PM	**Instability after TKA: Optimal Management** Arlen D. Hanssen, MD,* Rochester, MN

* indicates something of value has been received from a commercial company or institution

3:45-4:00 PM	**DISCUSSION**
4:00-5:00 PM	**SYMPOSIUM VII:** **NEW TECHNIQUES IN TKA: VIDEO DEMONSTRATIONS OF "CUTTING EDGE" TECHNIQUES IN PRIMARY AND REVISION TOTAL KNEE ARTHROPLASTY** Moderator: Michael A. Kelly, MD, New York, NY
4:00-4:08 PM	**Unicompartmental Arthroplasty: Technique through a Mini Incision** Jean-Noël Argenson, MD,* Marseille, France
4:08-4:16 PM	**Mini Arthrotomy for Primary TKA** Adolph Lombardi, MD,* FACS, New Albany, OH
4:16-4:24 PM	**Locking Periarticular Plates for Supracondylar Fracture Treatment around TKA** Robert T. Trousdale, MD, Rochester, MN
4:24-4:32 PM	**Modular Porous Metal Metaphyseal Cones for Bone Defects in Revision TKA** David G. Lewallen, MD,* Rochester, MN
4:32-4:40 PM	**Extensor Mechanism Reconstruction: Options/Techniques** Michael D. Ries, MD, San Francisco, CA
4:40-4:48 PM	**Wound Problems in Total Knee Arthroplasty** Kelly G. Vince, MD,* Hermosa Beach, CA
4:48-5:00 PM	**DISCUSSION**
5:00 PM	**ADJOURN**

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Scientific Presentation Abstracts

Symposium I: Update on Navigation and Computer-Assisted Surgery: Advances and Limitations

Computer Navigation the Easy Way

Aaron A. Hofmann, MD, *Salt Lake City, UT*

Computer navigation has been introduced as an adjunct to total knee arthroplasty (TKA) to assure precision positioning, accurate bone resection and optimal component alignment. It is well accepted that alignment errors can be associated with poorer outcomes and more rapid failure.

Multiple studies have proven the improved accuracy of computer navigation. Our own retrospective study[1] compared component alignment between TKA's performed using an imageless computer navigation system and standard instrumentation by the same surgeon. Fifty TKA's were performed using the computer system and fifty TKA's using standard instrumentation. The computer system consisted of a workstation, an optical tracking system, and two custom instruments. Tracking devices were attached to the femur and tibia. The center of the femoral head was computed based on a motion analysis of the femur. The computer system displayed traditional alignment axes. The bone cuts and component positioning were performed using a posterior referencing TKA system (Natural Knee™). When the navigation system was used, 98% (49/50) of all femoral components were placed within +/- 3 degrees of the radiographic and clinical goal position (90 degrees to mechanical axis of femur) and 100% (50/50) of all tibial components were placed within +/- 3 degrees of the goal position relative to the tibial anatomic axis. The standard group dropped to 90% (45/50) and 92% (46/50), respectively when traditional instrumentation without navigation was used.

Simplified computer guided TKA demonstrates improved accuracy compared to standard instrumentation alone. This simple universal navigation system affords the surgeon the potential to eliminate or significantly reduce outliers with regard to component position. In addition, violation of the intramedullary canal with associated fat emboli is avoided using this instrumentation. I predict this improved accuracy will translate into improved component survivorship in the long term and is ready for widespread use.

Reference:

1. Bolognesi, M. and A. Hofmann, Computer navigation versus standard instrumentation for TKA: a single-surgeon experience. *Clin Orthop Relat Res*, 2005. 440: p. 162-9.

Financial Disclosure: e-Zimmer, Orthosoft

Symposium I: Update on Navigation and Computer-Assisted Surgery: Advances and Limitations

Computer-Assisted TKR: Uses to Help Manage Deformities

Kenneth A. Krackow, MD, *Buffalo, NY*

Computer navigation at TKR offers essential information from the start to the finish of any procedure. The point of maximal passive extension is one very simple and important example. Knowing whether and how much flexion contracture or recurvatum is present at the start, plus knowing at the end of the case that things are correct, without navigation are very crude estimates at best.

Varus and valgus deformity management involves adjusting the soft tissue sleeves so that they are balanced. Balancing means releasing the tight side until the respective bones are properly aligned during a tension maneuver that holds the collateral and cruciate ligaments out to length. Axial alignment viewed on a long standing film does not necessarily or typically show this "sleeve alignment". The x-ray is likely to overstate the deformity, almost never understate it. Passive apparent correctability may not be very helpful. What is apparently corrected certainly may not be fully corrected, and the corrected, forced position does not imply balance at all. In fact, it is likely to be the "least" balanced position.

The proper information about these positions and what represents proper balance can all be obtained with navigation. For the first time we can assess accurately the soft-tissue "sleeve asymmetry" and plan the release process more intelligently and efficiently. Knowing that one has a less severe deformity allows selection of the proper technique and discarding the notion of needing a higher order of varus-valgus constraint. Determining, for example, that the 12 degree apparent deformity is indeed rigid may lead to a more aggressive release technique or even rare consideration of ligament tightening that requires different handling right from the start. This too is information that is only accurately and reliably available with navigation.

This presentation also illustrates a new technique of varus management using over-resection of the medial and posterior-medial aspects of the tibial surface that has proven invaluable for many quite severe cases.

Financial Disclosure: a,b,c,e-Stryker

Symposium I: Update on Navigation and Computer-Assisted Surgery: Advances and Limitations

Is it time to revisit the robot idea with smart instruments?

Johan Bellemans, MD, *Leuven, Belgium*

The use of robotic technology could theoretically further increase the accuracy of conventional computer assisted surgery, by using navigation in combination with ultimate mechanical precision, thereby eliminating or reducing the inevitable margin of error during mechanical preparation of the bony cuts by the surgeon.

Despite this potential advantage, robots have not met up with the expectations, and so far they have only been used in a very limited number of centres. Attempts to improve their working speed, cost, and impractical size have not been very successful. Additionally, no clear benefit in objective outcome compared to standard or navigated TKA has been demonstrated. Recent advances in surface matching technology and semi-active mechanorobotics have however opened new opportunities towards smaller and smarter robots, allowing the surgeon precise implant positioning by simple pre-operative planning, intra-operative surface matching and semi-active milling or sawing. This in combination with attractive working size designs may revitalize this technology in the next years.

Financial Disclosure: e-Smith & Nephew

Symposium I: Update on Navigation and Computer-Assisted Surgery: Advances and Limitations

Preoperative Planning with Computer: Everyone will need to do it. What have we learned?

William L. Healy, MD, *Burlington, MA*

In 2007, digital radiology has been implemented in approximately 75% of hospitals in this country. Digital images enhance diagnostic accuracy, reproducibility, portability, and convenience for patients and physicians. During the next decade all hospitals and medical practices will use digital radiology.

However, full implementation of digital radiology to create a "film less" imaging environment requires digital templating programs to perform pre-operative planning on digital images, and only 10% of U.S. hospitals have digital templating programs at this time. Digital templating was prospectively evaluated on 50 TKA patients and compared with acetate overlay templating. Digital and acetate templating accurately predicted knee implant utilization to within one size (93% digital; 91% acetate).

As the prevalence of digital radiology becomes universal, reconstructive knee surgeons who choose to perform pre-operative planning will need to select, implement, and learn to use digital templating programs.

Financial Disclosure: e- DePuy

Symposium II: The Exposures for Total Knee Arthroplasty: The Latest Data on Pros and Cons and Outcomes— What is the Best for My Patient?

Routine use of Minimally Invasive TKA: Benefits, Complications, Outcomes

Aaron G. Rosenberg, MD, FACS, *Chicago, IL*

Minimally invasive is a convenient catchphrase not well defined in our literature or practice. Minimizing surgical exposure results in decreased visualization, loss of classic feedback and increased tension on jigs and must be accompanied by increased vigilance in bone preparation, soft tissue balancing, cement removal, etc.. Failure to maintain standards of alignment, balance, fixation and asepsis negates any advantage of decreased incision length or early functional recovery.

The concept of minimally invasive as a philosophy rather than a specific technique is encouraged, and includes the peri-operative features of modern TKA. Routine implies regular use of techniques (approach and instrumentation) which decrease soft tissue trauma while maintaining the standards established as providing both a high quality and long lasting result. This requires both greater judgement by the surgeon as well as toleration in the occasional compromised result.

There is no free lunch. Prolonged increase in skin tension leads to wound healing problems, wound margins violation during implantation may increase sepsis, and lack of surgical skill in the management of surgical tools is magnified by a less invasive approach. Attempts to provide the shortest possible incision in both the superficial and deeper tissues will not come without some price. There is a natural variation in the elasticity of soft tissues and in their tolerance for blunt trauma. Understanding this variability and using all of the traditional standards of surgical judgment are needed to make less invasive techniques a routine part of practice.

Financial Disclosure: a,b,c,d- Zimmer

Symposium II: The Exposures for Total Knee Arthroplasty: The Latest Data on Pros and Cons and Outcomes—What is the Best for My Patient?

A Cautionary Experience: I tried MIS but have gone back to a Short Conventional Incision in a High Volume Practice

David F. Dalury, MD, *Baltimore, MD*

Over the last several years there has been a great deal on interest in MIS TKR. Several authors have found that patients undergoing MIS had less pain, better range of motion and an easier recovery. Some of these findings persisted at the one-year mark. On the other hand, this author found an unacceptably high incidence of malalignment (13% of tibias placed in less than 87 degrees of alignment) in a matched group of MIS and conventional knees along with more frequent wound healing problems in the shorter incision group.

A comparison between two matched groups of 30 patients undergoing TKR via either a 4 or 6 inch incision was therefore undertaken. There was no difference between the 2 groups in terms of return to function, patient satisfaction and KSS at 6 or 12 weeks follow-up and amount of pain medication used perioperatively was not significantly different. There was a 10% longer tourniquet time, more wound healing problems, more instances of retained cement and more instances of tibial and femoral component malalignment in the smaller incision group.

The inability to demonstrate any real advantages with true MIS approaches combined with an increase in postoperative complications has led this author to favor a short conventional incision as the standard incision in his practice.

Financial Disclosure: None

Symposium II: The Exposures for Total Knee Arthroplasty: The Latest Data on Pros and Cons and Outcomes — What is the Best for My Patient?

Minimally Invasive Total Knee Replacement Five Year's Experience: Lessons Learned

Richard S. Laskin, MD, *New York, NY*

1. The size of the skin incision is unrelated to the functional outcome. Likewise the name Minimally Invasive is improper. The term Lesser Invasive is more descriptive.

2. The patient's perception of the skin incision was partially related to its length but more towards it's extend above the patella, its width, and its color

3. The mini mid vastus, the subvastus, and the mini quad split capsular incisions all resulted in equivalent results.
    a). Decreased pain post operatively
    b). More rapid return of flexion
    c). More rapid return of walking and stair climbing ability

4. Resecting the tibial spines increased the visualization when the knee was initially flexed.

5. The patella need not be everted. Non eversion (displacement) leads to a statistical decrease in the incidence of patella baja after the TKR.

6. Resecting the distal femoral surface first allowed visualization of all three anatomical rotatory reference points (the mid trochlear line of Whiteside, the posterior condyles, and the trans epicondylar line)

7. Exposure of the anterior femur is facilitated by extending the knee to move the soft tissue window proximally.

8. Exposure of the posterior femoral condyles is facilitated by flexing the knee to move the soft tissue window distally.

9. Avoidance of cement extrusion posteriorly is facilitated by
    a). Use of higher viscosity cement
    b). Partially subluxing the tibia forward during tibial component insertion

10. Lesser invasive exposure which did not permit adequate visualization resulted in higher incidence of complications (fractured femoral condyles, lacerations of the patellar tendon, malposition of the components).

11. Lesser invasive exposures which permitted adequate visualization (author used a mini mid vastus exposure) resulted in components which were positioned equally as well as those placed through larger exposures, and permitted proper balancing of the soft tissues.

12. The salutary results of lesser invasive knee replacement procedures occur within the first 12 months after surgery. Subsequently the longer term results are equivalent with those of total knee replacement performed through longer incisions.

13. Patients who are usually are not candidates for lesser invasive knee replacement procedures include:
    a). Morbidly obese
    b). Heavily muscled legs
    c). Pre-Op flexion < 75 degrees
    d). Prior open surgical procedures on the knee

14. Lesser invasive procedures do not preclude, but are part of a general comprehensive program which includes proper pain control, physical therapy, and patient choice.

Financial Disclosure: b,c,e-Smith & Nephew

Symposium II: The Exposures for Total Knee Arthroplasty: The Latest Data on Pros and Cons and Outcomes— What is the Best for My Patient?

A Middle Ground:
Shorter but not Tiny Incisions Satisfying the Patient and the Surgeon

Giles R. Scuderi, MD, *New York, NY*

Total knee arthroplasty has been the standard of treatment for debilitating knee arthritis for over three decades. While there have been steady improvements in implant design, the surgical technique has centered on adequate exposure and soft tissue releases in order to correctly position the components.

The MIS approaches are less invasive and can be converted to a standard approach if necessary. Critical to exposure is patient selection. The ideal patient should have a fixed angular deformity of < 10 degrees of varus or < 25 degrees of valgus; < 10 degree flexion contracture; and > 90 degrees arc of motion. Clinical observations relating to the length of the incision and arthrotomy include the size of the femur, length of the patellar tendon and body habitus. The wider the femur and lower the patella, the longer the incision. Realizing that the goal is to obtain adequate exposure, the case can be started with a carefully placed short incision, which is extended gradually as needed. A limited medial parapatellar arthrotomy can be utilized and the patella subluxed laterally without eversion for joint exposure. A MIS subvastus or MIS midvastus approach can also be used. The MIS quad sparing approach is an alternative that requires experience. Adequate exposure should be obtained since the surgical technique should not compromise the surgical result. The functional outcome and rapid recovery is multi-factorial and greatly influenced by the pre-operative education, medical evaluation, anesthesia, post-op analgesia, physiotherapy and home care arrangements.

References:

Tenholder M, Clarke HD, Scuderi GR: Minimal Incision Total Knee Arthroplasty. The early clinical experience. *Clin Orthop* 440: 67 – 76, 2005

Scuderi GR, Tenholder M, Capeci C: Surgical Approaches in Mini-incision Total Knee Arthroplasty. *Clin Orthop* 428: 61 – 67, 2004

Scuderi GR: Preoperative Planning and Peri-operative Management for Minimally Invasive Total Knee Arthroplasty. *Am J Orthopedics Supplement* (July) 2006, 4-6, 2006

Financial Disclosure: c,d,e-Zimmer

Symposium II: The Exposures for Total Knee Arthroplasty: The Latest Data on Pros and Cons and Outcomes— What is the Best for My Patient?

Scientific Highlights of the Closed Knee Society and AAHKS Meetings: An Update on the Latest Studies

Daniel J. Berry, MD, *Rochester, MN*

In this session, key papers presented at the Closed Meeting of the Knee Society and of the American Association of Hip and Knee Surgeons will be reviewed and highlighted. The information will provide practicing orthopedic surgeons with the latest scientific information well before it is available in published form. Individual authors have kindly provided critical supporting audiovisual material and data from scientific papers given at the closed meetings and will be credited for their work.

Financial Disclosure: a- Stryker, Zimmer, DePuy; c- DePuy

Symposium II: The Exposures for Total Knee Arthroplasty: The Latest Data on Pros and Cons and Outcomes—What is the Best for My Patient?

What will TKA look like in 2020?
The impact of technology, economics and demographic changes

Jan M. K. Victor, MD, *Brugge, Belgium*

Predicting the future is a delicate exercise, mainly based on historical references that do not necessarily reflect future developments. Still, current trends and recent evolutions in health care and orthopaedic surgery allow us to define the goals and benchmarks for the near future. The main challenges include globalization, the demographic evolution in the western world and patient selection and demands. Globalization leads to outsourcing of several economic activities. Health care is no exception to this phenomenon. The aging population will cause a sharp rise in health care demands. In the next decades, the worldwide incidence of hip fractures is expected to triple. This could suffocate surgical programs and induce competition with elective procedures in a contained health care environment.

It is expected that far more patients will seek help for knee arthritis. This is related with age, the epidemic proportions of obesity, and the shrinking acceptance of physical incapacity. The functional requirements will exceed current expectations of today's patients. Government and insurance companies are likely to tighten regulations and request more predictability and longer lasting results. Results can be improved by better health care organization, the training of the 'comprehensive knee surgeon' and technological advances. This must lead to better patient selection and counselling, more reliable surgical procedures and better implants. It is yet unclear to what extent new genetic and biologic treatments will contribute in early intervention and prevention of arthritis.

References:

1. Friedman TL: The world is flat, *A brief history of the twenty-first century*, Farrar, Straus and Giroux, New York, 2005
2. Kurtz SM, Lau E, Zhao K, et al. The future burden of hip and knee revisions: U.S. projections from 2005 to 2030. *Proceedings of the American Academy of Orthopaedic Surgeons 73rd Annual Meeting* Chicago 2006 SE-53 p597
3. Kurtz S, Lau E, Halpern M, Ong K: Trend shows growing orthopedic surgery case load. Will surgeons be able to keep up? *Mater Manag Health Care*. 2006; 15: 61-62.
4. Lavernia C, Lee DJ, Hernandez VH: The increasing financial burden of knee revision surgery in the United States. *Clin Orthop* 2006; 446:221-226
5. National Intelligence Council: mapping the global future, 2004; http://www.foia.cia.gov/2020/2020.pdf
6. News feature 2020 Computing, *Nature* 2006; 440: 398-417
7. Sambrook P and Cooper C: Osteoporosis. *The Lancet* 2006; 367:2010-2018

Financial Disclosure: none

Symposium III: New Total Arthroplasty Implant Designs and Materials: A Critical Assessment of New Technology

High Flexion in Real Life: How much Knee Flexion do Western Patients Actually Use?

Harry E. Rubash, MD, *Boston, MA*

It is unknown how often TKA patients will use deep knee flexion during a routine day. Using a validated smart-activity monitor[1-4], we documented the prevalence of knee flexion $>90^0$ in 10 consecutive high-flexion TKA patients with osteoarthritis at a minimum of 2 years after their operation. Patients wore the device continuously for a mean of 47 hours and 9 minutes. Mean maximum postoperative passive knee flexion was 123^0. Six of 10 patients flexed their high-flexion TKA $>90^0$. These patients did so, on average, for 1.1% of their average total data collection time.

Activities performed while their TKA was flexed $>90^0$ included, on average, single limb stance (74.4%), sitting/moving from sitting to standing (19.1%), walking (4.9%), moving from standing to reclining (1.1%), and stepping (0.5%). Peak flexion used by the 10 patients at any time during testing was, on average, 82% +/- 10% of their maximum postoperative passive TKA flexion.

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Financial Disclosure: a,e - Zimmer

Symposium III: New Total Arthroplasty Implant Designs and Materials: A Critical Assessment of New Technology

Optimizing TKA Function in High Flexion

Douglas A. Dennis, MD, *Denver, CO*

Numerous factors affect postoperative range of motion following total knee arthroplasty (TKA) and can be categorized into patient factors, surgical technical errors, alterations in knee kinematics, postoperative complications, prosthesis design, and postoperative rehabilitations program and effort. Factors associated with increased postoperative flexion include increased preoperative and intraoperative flexion, restoration or posterior femoral condylar offset, increased posterior femoral rollback, and the use of posterior cruciate substituting TKA designs.

Factors related to reduced postoperative flexion include preoperative flexion contracture, obesity, complications (infection, heterotopic ossification, etc.), and reduced pain tolerance which can limit rehabilitation effort. Technical errors resulting in reduced flexion include errors in component malposition or sizing, ligamentous or gap imbalance, overstuffing of the patellofemoral joint, and retention of posterior femoral osteophytes.

The literature is unclear regarding the effect of high flexion TKA designs. Fluoroscopic kinematic and flexion evaluation of multiple high flexion TKA subjects has demonstrated variable results with some exhibiting no increase in flexion while others have demonstrated weight-bearing flexion magnitudes higher than that observed in standard TKA implants.

Financial Disclosure: a-DePuy, Zimmer; c,e-DePuy

Symposium III: New Total Arthroplasty Implant Designs and Materials: A Critical Assessment of New Technology

Crosslinked Polyethylene for TKA: Ready for Prime Time?

Timothy M. Wright, PhD, *New York, NY*

The most significant new fabrication technique for polyethylene joint replacement components has been to increase molecular cross-linking by exposing the components to electron-beam or gamma radiation. Clinical studies of elevated crosslinked polyethylenes in acetabular components in total hip arthroplasty show a marked improvement in wear behavior [1-7]. Reduced toughness and resistance to fatigue crack propagation in laboratory studies [8,9], however, suggest a greater susceptibility to the fatigue wear damage that can occur in tibial components for knee arthroplasty; indeed, early retrievals of highly crosslinked acetabular cups demonstrated cracks in the bearing surfaces [10].

Wear tests of knee-like geometries (with non-conforming bearing surfaces) and knee joint simulator studies show that elevated cross-linked materials perform quite well in comparison to conventional polyethylene with significantly reduced wear rates and increased resistance to pitting and delamination [11,12]. One explanation is the lowering of the elastic modulus that accompanies the thermal treatment used to quench free radicals. Free radicals created by the breaking of chains that accompanies irradiation are eliminated by heating the material after irradiation. Thermal treatment allows free radicals to recombine, improving the material's resistance to oxidative degradation. A recent laboratory experiment confirmed that a low dose of irradiation followed by heat treatment had the same improvement in wear performance in a knee-like cyclic wear test, but without the disadvantages of reduced fracture toughness found with higher doses [13]. The lower modulus that accompanies the thermal treatment creates larger contact areas, lower stresses, and better resistance to wear damage.

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Financial Disclosure: a- Zimmer

Symposium III: New Total Arthroplasty Implant Designs and Materials: A Critical Assessment of New Technology

Gender Differences: The Knee Anatomy of Male and Female Patients

Robert E. Booth, Jr., M.D, *Philadelphia, PA*

Anthropologists and forensic pathologists have for centuries been able to distinguish gender purely based on bony anatomy. John Insall was the first, over 15 years ago, to realize the impact of these variations on knee arthroplasty and to create a femoral component to accommodate them. Multiple recent articles have articulated and - to some degree - quantified the gender differences in three important areas: the AP/ML ("aspect") ratio, the quadriceps angle, and the anterior femoral/patellar composite thickness.

Knee arthroplasty registry data have confirmed the consequences of these gender variations in existing arthroplasty designs, showing that women to have not only the expected differences in component size but unexpected differences in postoperative motion, pain and functional outcomes, and the incidence of soft tissue releases. Developmental, disease state, and racial variations are also now apparent. These observations are driving a new generation of arthroplasty components shaped to fit the patient, rather than the reverse. A new era of increased sophistication in knee arthroplasty would appear to be imminent.

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Financial Disclosure: c-Zimmer

Symposium III: New Total Arthroplasty Implant Designs and Materials: A Critical Assessment of New Technology

Mobile Bearings: Do They Provide a Benefit?

Thomas K. Fehring, MD, *Charlotte, NC*

Polyethylene wear and osteolysis have emerged as significant problems in total knee arthroplasty. As the indications for total knee arthroplasty are extended to our younger, more active patients, the need for a bearing that minimizes wear is apparent. The increased contact area found in mobile bearing knees may have the ability to diminish the osteolysis burden by reducing the contact stress at the femorotibial articulation.

Mobile bearings also have the ability to turn the complex crossing motions seen in fixed bearing knees into linear motion through their ability to rotate. Cross-shear on the polyethylene surface caused by multidirectional wear patterns can accelerate polyethylene damage. The mobile bearing advantage of converting multi-directional wear patterns into unidirectional wear patterns may have long term benefits with regard to diminishing wear and osteolysis in our young patients. Whether these theoretical advantages will lead to improved long-term results in our young patients remains to be determined.

Financial Disclosure: None Reported

Symposium III: New Total Arthroplasty Implant Designs and Materials: A Critical Assessment of New Technology

Uncemented TKA: Time to Consider it Again?

Leo A. Whiteside, MD, *St. Louis, MO*

Cementless total knee arthroplasty was done consecutively in 1,320 patients (1,562 knees) from October 1993 to October 2000 using a system that was designed for porous ingrowth fixation and unresurfaced patella (Profix, Smith and Nephew). Clinical results were entered prospectively in a computerized database and were evaluated at intervals up to 10 years postoperatively. One hundred sixty seven knees in 125 patients who were young and heavy (<55 years, >90kg) were segregated to compare the results with those of a matching group of 167 knees in 122 patients who were older and lighter (>65 years, <80 kg).

The active, heavy patient group had a statistically significantly lower ($p<0.05$) pain score compared with that of the standard patient group at one, five, and 10 years postoperatively. The mean Knee Society scores were similar among the groups at 1, 5, and 10 years postoperatively. The young, heavy patient group score was 92±4 at 5 years, and 93±3 at 10 years postoperative, the older, lighter group was 90+5 at 5 years and 91+4 at 10 years postoperative, and the combined group score was 94±5 at 5 years, and 95±4 at 10 years postoperative. None of the knees in the young, heavy group or in the older, lighter groups loosened, but three patients in the combined group who had surgery in 1993 had early femoral component loosening because of inaccurate femoral cutting guides. No additional incidence of clinical or radiographic loosening has occurred since the instruments were corrected. One patient in the active, heavy group required polyethylene component revision for wear.

Cementless technique with this knee design has been effective in a variety of age and activity levels.

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Financial Disclosure: a,b,c- Smith & Nephew

The FDA has not cleared the pharmaceutical for the use prescribed in this presentation (Smith & Nephew: Profix use without cement)

The Knee Society Award Presentations

MARK COVENTRY AWARD for Best Basic Science Paper

The Effect of Polyethylene Sterilization on Wear-Related Failures with First- and Second-Generation PFC Total Knees

William L. Griffin, MD, *Charlotte NC,* Thomas K. Fehring, MD, Donald L. Pomeroy, MD, Thomas A. Gruen, MS, Jeffrey A. Murphy, MS

Introduction: This study compared the incidence of wear-related failures between two large multicenter cohorts of total knee arthroplasty patients implanted with identical modular tibial trays and polyethylene inserts sterilized by different methods.

Materials and Methods: Radiographs of 1183 2nd-generation PFC Sigma prostheses having polyethylene inserts packaged and sterilized in an oxygen free environment were assessed by an independent radiologist for signs of osteolysis at a minimum 5-year follow-up (mean 7.0 years). Wear-related failure was defined as 1) osteolysis greater than or equal to 100 mm^2, or 2) revision of the implant due to osteolysis, polyethylene wear, chronic synovitis, and/or effusion. Wear-related survivorship was calculated using Kaplan-Meier survival analysis. Results were compared with our previously published study on wear-related failures in 1287 1st-generation PFC modular total knees having polyethylene inserts sterilized by gamma irradiation in air at 5-year minimum follow-up (mean 7.8 years).

Results: The 2nd-generation PFC Sigma design had a wear-related failure rate of 1.1% compared to 8.3% with the 1st-first generation PFC ($p<0.0001$). Kaplan-Meier survivorship was 97.0% at 10 years in the current study compared to 87.7% at 10 years in the previous study ($p<0.0001$). For 2nd-generation PFC Sigma components, patient age was the only variable significantly correlated with wear-related failure. For 1st-generation components sterilized by gamma irradiation in air, several variables were correlated to wear-related failure, with shelf age of the polyethylene insert being the most significant factor.

Discussion: This study emphasizes the dramatic effect that improvements in polyethylene manufacturing, specifically sterilization methods, can have on implant survivorship.

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Financial Disclosure: a,b,c,e-DePuy; f-JAAOS, Journal of Arthoplasty

CHITRANJAN RANAWAT AWARD
for Best Work on a Surgical Technique

Comparison of Intramedullary Nailing and External Fixation Knee Arthrodesis for the Infected Knee Replacement

Tad M. Mabry, MD, *Rochester, MN,* David Jacofsky, MD, George Haidukewych, MD, Arlen D. Hanssen, MD

Purpose: Analysis of knee arthrodesis for the infected total knee replacement (TKR) using two different fixation techniques.

Methods: Patients undergoing knee arthrodesis for infected TKR were identified and rates of successful fusion and recurrence of infection were compared using Cox proportional hazard models.

Results: 85 consecutive patients who underwent knee arthrodesis were followed until union, nonunion, amputation, or death. External fixation had a 67% rate of successful fusion (41 of 61 patients) and was associated with a 4.9% rate of deep infection. Fusion was successful in 23 of 24 patients (96%) with intramedullary (IM) nailing and was associated with an 8.3% rate of deep infection. When comparing the two techniques, the difference in fusion rates ($p = 0.14$) and infection rates ($p = 0.32$) failed to reach statistical significance. Overall, 34 patients (40%) had complications.

Conclusion: Knee arthrodesis remains a viable salvage alternative for the difficult infected TKR. Complication rates are high irrespective of the technique, and one must consider the risks of both nonunion and infection when choosing the fixation method in this setting. IM nailing has a higher rate of successful union and a higher risk of recurrent infection when compared with external fixation knee arthrodesis.

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Financial Disclosure: None

JOHN INSALL AWARD
for Best Work on a Clinical Subject or Outcomes Report

Pain and Depression Influence Outcome 5 Years After Knee Replacement Surgery

Victoria Brander, MD, *Chicago, IL,* Emily Martin, MS, Steven Gondek, MS, S. David Stulberg, MD

In a previous publication, we reported preoperative depression, anxiety and pain were associated with worse outcome at one year after surgery. The present study sought to determine the eventual outcomes of these patients. In a five year, prospective, single-cohort observational study, 99 TKA (mean age 65.3 years, 68 women) were evaluated pre-operatively, and at 1, 3, 6 months, and 1 and 5 years postoperatively. Pre-operative pain and depression predicted lower Knee Society Score at 5 years (p = .0003, .0004) mostly by lowering functional subscores (p=.0004). Heightened pre-operative pain resulted in slightly increased pain at one and five years after surgery (p = .002, .1). At 5 years, nearly all the patients with unexplained pain one year after surgery had resolution of pain and were satisfied with their surgeries.

In summary, preoperative pain and depression are associated with worse outcome 5 years after TKA. Assuming good ROM and well-aligned implants, most patients with pain at one year after surgery can be reassured that pain ultimately resolves. Depression drives long-term outcomes and should be addressed. This study also suggests KSS is influenced by psychometric variables and therefore is not solely reflective of implant issues.

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Financial Disclosure: none

PRESIDENTIAL ADDRESS

Tissue-Guided Surgery:
Can We Radically Improve the Kinematics of TKA?

Gerard A. Engh, MD, *Alexandria, VA*

Since the inception of total knee arthroplasty in the 1970s, condylar implants have provided excellent pain relief but limited knee function because of altered knee kinematics. Outcome studies consistently document both lower patient satisfaction than with total hip arthroplasty and limited activities as compared to age-matched, non-arthroplasty individuals. The altered kinematics are documented in gait and video fluoroscopy studies.

The intimate relationship between the patient's hard tissue anatomy and the soft tissue structures that guide motion and provide stability, proprioception, and strength to the knee are routinely altered with a conventional knee replacement. Anatomy that is unique to each patient is adversely modified when we reconstruct all knees with a 6° distal femoral valgus and a 90° coronal tibial cut. Reestablishing femoral rotation remains problematic. Implant position relative to soft tissue structures only approximates a patient's unique kinematics.

Tissue guided surgery enlists the patients capsular and ligamentous structures to guide bone preparation. Instrumentation for bone milling is placed within the joint cavity and the knee articulated. The kinematic relationship between bone and soft tissues is restored because it is integral to bone preparation. Tension in the capsular and cruciate ligaments dictates the amount of bone and cartilage removed. The final implants are truly resurfacing. They replace only the thin layer of bone and cartilage that was removed under the guidance of the soft tissue structures.

Financial Disclosure: a-Inova Health Care Services, c-DePuy, d-Alexandria Research Technologies, e-Smith & Nephew

Symposium IV: Perioperative Management After Knee Surgery: Taking Advantage of the Revolution in Perioperative Pain Management and Rehabilitation

Blood Management and Bleeding Reduction in TKA: What Should We Do in 2007?

E. Michael Keating, MD, *Mooresville, IN*

The most important factor for blood management in total knee replacement in 2007 is to lower our transfusion threshold. Evidence bases guidelines have been proven effective and do decrease allogeneic blood usage and infections. Historically we have not changed the hemoglobin drop in total knee replacement surgery with the average drop being 3.8 grams. Patients with preoperative hemoglobin's above 13 receive very few transfusions, whereas those below 13 have a higher risk. Most surgeons will not think of operating on a patient with an abnormal heart or lung without further evaluation, and yet, we operate on patients with preop hemoglobin's of 11 or less without evaluating the cause, or considering possible treatment. An appropriate evaluation should be done in all cases of anemia. During surgery, the bipolar sealer has been shown to decrease the hemoglobin drop by .5 grams or 13%. . Irrigation of the wound with a diluted solution of Norepinephrine 1-200,000 can decrease hemoglobin drop by .5 grams, at least in one report.

Tranexamic acid can decrease hemoglobin drop by a gram to 2.5 grams if given 30ml/km just before the release of the tourniquet and again three hours later. To date there has been no increase in DVT's, but this is an off label use, as tranexamic acid is only approved for use in dental procedures. Re-infusion of drainage blood also decreases hemoglobin drop and transfusion risk. However, this is only if drains are used. If drains are not used, the hemoglobin drop is the same as if drains and re-infusion are used.

In Summary the most important things we can do in 2007 to decrease allogeneic risk is to lower our transfusion threshold and quit operating on anemic patients

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Financial Disclosure: a,b,c-Biomet

The FDA has not cleared the pharmaceutical for the use prescribed in this presentation (Pharmacia, Upjohn: tranexamic acid)

Symposium IV: Perioperative Management After Knee Surgery: Taking Advantage of the Revolution in Perioperative Pain Management and Rehabilitation

Antibiotic-Impregnated Cement: What should I know? When should I use it?

Steven J. MacDonald, MD, *London, ON, Canada*

Introduction: The infected total joint arthroplasty continues to be one of the most challenging complications facing the reconstructive surgeon today. This paper will discuss the role of antibiotic-impregnated cement in the prophylaxis and treatment of infection in total joint replacement.

Currently, the only approved indication in the US for commercially available low-dose antibiotic-impregnated cement is in the second stage of an infected revision. Clearly however, there are many other current clinician-directed applications in use, with variable levels of controversy associated with each.

Types of Ab Cement

There are two broad categories of Ab cement:

i) Prophylaxis - commercially available low-dose (<1g of antibiotic per 40g of cement)
ii) Treatment – high dose (>3.6g of antibiotic per 40g of cement)

These are distinctly different with low-dose Ab cement maintaining good mechanical properties and being useful for long-term prophylaxis applications, while high-dose Ab cement demonstrates prolonged elution of therapeutic antibiotic levels but altered mechanical properties therefore having short-term but not long-term applications.

Indications for Ab Cement:

I. Widely accepted:

a) The second stage of revision total joint arthroplasty for infection (low-dose)
b) The first stage of revision total joint arthroplasty for infection (high-dose)
c) Prophylaxis in high risk patients undergoing TJA

High-risk patients include: revision TJA, immunocompromised (ie, previous transplant), diabetics, rheumatoid arthritis, obesity, and hemophilia

II. Controversial

The routine use of Ab cement for all total joint patients has significant global variability. This does not have widespread acceptance in North America[1], however in many countries it is seen as the standard of care. Large registry based studies[2,3,4,5] have demonstrated reduced septic and aseptic loosening rates in hip replacements using Ab cement versus conventional cement.

Theoretical Disadvantages to Routine Ab Cement Use

I. Resistant organisms
II. Increased cost
III. Allergic reaction
IV. Toxicity
V. Mechanical properties

In summary, while there is much consensus regarding the use of antibiotic-impregnated bone cement in total joint arthroplasty applications, there remains controversy regarding its routine use in all cases. A properly powered clinical trial has not been performed to date to answer this question and would require the enrollment of between 8-10,000 patients.

Financial Disclosure: a-DePuy, Smith & Nephew; e-DePuy

Symposium IV: Perioperative Management After Knee Surgery: Taking Advantage of the Revolution in Perioperative Pain Management and Rehabilitation

Controlling pain after total hip and knee replacement using a multimodal protocol with local periarticular injections: A Prospective, Randomized Study

Chitranjan S. Ranawat, MD, *New York, NY*

Introduction: Minimally invasive surgery total hip and total knee replacement (MIS-THR and MIS-TKR) have claimed better cosmesis, less blood loss, and quicker recovery of function than conventional procedures. We believe that uncontrolled postoperative pain has a more deleterious effect on the recovery of function than the length of the incision. In an effort to improve postoperative pain control after total hip and knee replacement, we initiated an advanced peri-operative pain management protocol using a novel peri-articular injection.

Materials & Methods: An IRB-approved prospective randomized study was conducted to compare different perioperative pain management protocols. For total hip replacements, patients were randomized to either the PCA or the periarticular injection group and for total knee replacements, patients were randomized to the PCA plus femoral nerve block (FNB) or the periarticular injection group. Eighty three patients (45 hips and 38 knees) were enrolled. In addition, all patients were enrolled in a comprehensive protocol including perioperative analgesics, anti-inflammatories, patient education, and advanced rehabilitation.In the injection group, a local proprietary mixture of five medications with different mechanisms of action was injected into the periarticular sites.Patients were assessed for pain (visual analog scale) and recovery of functional milestones, (unassisted walking, stair-climbing, straight leg raise), and overall satisfaction at POD # 1, 2, 3, 14, 45 and 90.

Results: Patients in the hip injection group demonstrated significantly lower average pain scores on each day of admission (3.8 vs 5.77 on POD # 1; p=0.0067). Narcotic use and associated side effects were significantly lower in the injection group. Straight leg raise and overall satisfaction were significantly higher in the injection group (52% vs 15% and 9.2/10 vs 6.7/10 respectively). Average pain scores and overall patient satisfaction were comparable between the knee injection group and the PCA + FNB group. However, the knee injection group demonstrated lower narcotic usage and associated side effects. Additionally, 63% of the patients in the knee injection group were able to straight leg raise on POD #1 versus 21% in the PCA + FNB group.

Discussion: By controlling acute pain in the critical early postoperative period following total hip and total knee replacement, the RTTS pain management protocol promoted a faster recovery of function and improved patient satisfaction. The marketing claims made by MIS-THR and MIS-TKR proponents have given misguided perceptions to the public regarding the current standard of care. It appears that pain control plays a much larger role in functional recovery than incision length.

Financial Disclosure: c, e- DePuy

Symposium IV: Perioperative Management After Knee Surgery: Taking Advantage of the Revolution in Perioperative Pain Management and Rehabilitation

Epidural Blocks or Regional Nerve Blocks: Do they add something? Which is best?

Mark W. Pagnano, MD, *Rochester, MN*

Failure to provide adequate analgesia after total knee arthroplasty impedes physical therapy, slows the time to discharge from the hospital and lowers overall patient satisfaction with the experience of total joint replacement. For many years intravenous opiod patient-controlled anesthesia was the treatment of choice after TKA. However, even relatively large doses of intravenous opiods do not provide consistently adequate pain control and are often associated with excessive sedation, nausea or vomiting, disorientation, impaired bowel function and pruritus. Epidural infusions containing local anesthetics (with or without an additional opiod medication) have provided substantially better pain control but have been associated with hypotension, urinary retention, motor blockade involving both the operated and non-operated legs, and rare cases of spinal hematoma. More recently, single-shot and continuous/indwelling peripheral nerve block techniques have been used with TKA to block all or parts of the lumbar plexus and/or the sciatic nerve. Several studies suggest that unilateral peripheral nerve blocks provide consistently excellent analgesia, similar to that achieved with epidural anesthesia but with fewer side effects.

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Financial Disclosure: none

Symposium IV: Perioperative Management After Knee Surgery: Taking Advantage of the Revolution in Perioperative Pain Management and Rehabilitation

DVT Prophylaxis: The Gap between ACCP Guidelines and Orthopaedic Surgeons: What is acceptable in 2007?

Paul F. Lachiewicz, MD, *Chapel Hill, NC*

The American College of Chest Physicians (ACCP) Guidelines, recommendations for venous thromboembolism disease (VTED) prophylaxis, have met resistance from many orthopaedic surgeons, who evaluate risks and benefits of anticoagulation regimens from different clinical experiences.[1] Recently, some government and insurance agencies have proposed that these Guidelines define "quality of care" and may be used in "pay for performance" algorithms. It is well accepted by both the ACCP and orthopaedists that "total knee arthroplasty (TKA) differs from total hip arthroplasty in several important respects." TKA patients have lower rates of *symptomatic* proximal deep vein thrombosis (DVT) and symptomatic or fatal pulmonary embolism. However, the ACCP Guidelines focus on the reduction of venographic (usually asymptomatic calf) DVT, with recommendations, for the most part, derived from prospective, randomized, pharmaceutical company-funded studies comparing anticoagulation regimens. These studies generally did not include a "control arm" of mechanical plus aspirin or other "multimodal" regimens. In addition, many studies have shown a low but consistent rate of fatal pulmonary embolism (0.1%) despite a wide variety of prophylactic regimens. Orthopaedic surgeons have expressed greater concern about the overall outcomes of TKA patients given strong anticoagulants. These concerns are related to bleeding complications, wound healing problems and infection. The ACCP "Grade 1 A" recommendations for TKA are: low molecular weight heparin (LMWH), fondaparinux or warfarin (target INR 2-5) for at least 10 days. The ACCP "Grade 1 B" recommendation is: optimal use of intermittent pneumatic compression (IPC) is an alternative option to anticoagulation. However, no recent studies of IPC were reviewed for the Guidelines. The ACCP recommended against the use of aspirin alone, low-dose heparin alone, or venous foot pumps alone.[2]

The author and others have had a long interest in multimodal prophylaxis with IPC and aspirin for TKA patients. In our prospective, randomized study of two IPC devices and aspirin in 472 knees (with "high-risk" patients included), there was one symptomatic pulmonary embolus (0.2%) and no fatal pulmonary embolism.[3] The only death was due to myocardial infarction. The rapid inflation, asymmetric calf compression device plus aspirin group had no pulmonary embolism and a significantly lower rate of DVT. In another prospective, randomized study comparing this identical IPC device plus LMWH and IPC plus aspirin (in 275 unilateral TKA patients) reported no significant difference in DVT between groups using Duplex scans at 3-5 days and 4-6 weeks.[5] In a non-randomized study of over 3000 TKA patients who had multimodal prophylaxis: early mobilization - CPM, foot pumps and aspirin (325 mg twice daily for six weeks), overall mortality was nine (0.26%), including two (0.06%) from fatal PE and five (0.14%) from myocardial events.[4] The author has performed 1014 consecutive TKAs (682 patients), with aspirin prophylaxis only in 158 knees (108 patients) and calf IPC plus aspirin in 856 knees (600 patients). Ultrasonography was performed and only proximal thrombi were treated. Overall, there was one death from myocardial infarction (0.1%) and three symptomatic non-fatal pulmonary emboli (0.3%). There were no reoperations for bleeding. Based on these recent studies, this author concludes that multimodal prophylaxis with calf IPC and aspirin (325 mg twice daily) is an acceptable alternative in 2007 to the ACCP anticoagulation regimens. *(continued)*

DVT Prophylaxis: The Gap between ACCP Guidelines and Orthopaedic Surgeons: What is acceptable in 2007? *(continued)*

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Financial Disclosure: a- Zimmer, Aircast; e-Zimmer

Symposium V: Unicompartmental (Including Patellofemoral) Arthritis: What is the Best Treatment in 2007?

Patellofemoral Joint Replacement: Does it have a Role in 2007?

Jess H. Lonner, MD, *Philadelphia, PA*

Isolated patellofemoral arthritis can occur in as many as 9% of patients over the age of forty. This problem is particularly common in women, who often have subtle patellofemoral maltracking or malalignment. When considering the unsatisfactory results of a variety of surgical measures for refractory patellofemoral arthritis – arthroscopic lavage and debridement, cartilage grafting, patellectomy, tibial tubercle unloading procedures – it is clear that arthroplasty options must be entertained because of the predictable pain relief that they can provide. While total knee arthroplasty yields excellent results in over 90% of patients with isolated patellofemoral arthritis, it is not desirable in patients who are young and very active. Therefore, patellofemoral arthroplasty has a legitimate role in the treatment of isolated anterior compartment arthritis.

Early patellofemoral implants were plagued by a high incidence of patellar maltracking, catching and subluxation, due to design features of the trochlear components, inadequate soft tissue balancing, and component malposition. Improved contemporary designs, as well as refinement in surgical indications, improved surgical techniques and instrumentation, have and will continue to reduce the incidence of patellar maltracking and enhance the outcomes, leaving late tibiofemoral degeneration as the primary cause of "failure" of patellofemoral arthroplasties. Several long-term studies have shown a rate of tibiofemoral degeneration of approximately 20% at 15 years. Combining patellofemoral arthroplasty with biological resurfacing of full-thickness defects of the femoral condyles may expand the indications for the procedure and protect the tibiofemoral cartilage from degeneration. Finally, the results of TKA do not seem to be compromised by the presence of a prior patellofemoral arthroplasty.

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Financial Disclosure: a,c,e- Zimmer

Symposium V: Unicompartmental (Including Patellofemoral) Arthritis: What is the Best Treatment in 2007?

What Have We Learned After Three Decades of UKA

Richard D. Scott, MD, *Boston, MA*

After three decades of performing UKA, many lessons have been learned regarding patient selection, operative technique and prosthetic design.

Inflammatory arthritis is a contra-indication to UKA as is a valgus knee with MCL insufficiency. Femoral deficiency is rare at revision. Tibial deficiency is dependent on the initial level of tibial resection. A UKA should not be over-corrected. Degeneration of the opposite compartment is usually a late complication unless the knee alignment was over-corrected.

The wear pattern of the prosthetic components reproduces the pre-op wear pattern of the arthritic joint.

Smooth femoral lugs can allow loosening at the prosthesis cement interface. A fixed bearing UKA must be non-conforming. Conforming articulations must be mobile bearing. Multiple and peripheral tibial alignment pins can cause tibial stress fracture.

Second decade survivorship of UKA has been inferior to TKA, but is becoming competitive as patient selection, surgical technique and prosthetic designs and materials are improved.

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Financial Disclosure: c- DePuy

Symposium V: Unicompartmental (Including Patellofemoral) Arthritis: What is the Best Treatment in 2007?

Osteotomy: Who should get it? Opening or Closing Wedge?

Thomas Minas, MS, MS, *Chestnut Hill, MA*

Joint preservation surgery for early knee OA has taken on a renewed interest as aging weekend athletes wish to maintain active lifestyles well into their fifties and sixties. The promise of new technologies such as cartilage repair and technically accurate osteotomy jig systems have improved these chances.

Previous reports [*Coventry et al JBJS 93, Insall et al JBJS 1984*] reported on populations of patients considerably older (average age 65 years old), and with more advanced disease than would be considered for osteotomy today as the results of TKA in this population are so good.

Little is published in the osteotomy literature in patients in their early forties regarding the expected pain relief and resultant improvement in activity level expected from osteotomy surgery.

Closing wedge osteotomy has had many late complications associated with its use in the past including; patella infera, overcorrection, proximal tibial boney distortion, all leading to TKA difficulties and frequently inferior outcomes to primary TKA. Early problems include pain management, compartment syndrome, delayed and non-union to mention a few, all discouraging the surgeon from using osteotomy amongst his/her surgical choices.

Open wedge osteotomy has gained popularity in the US since the late 1990's. The development of several accurate osteotomy jig systems and bone graft substitutes has made the surgery technically easier and hence more popular. The correction of the deformity on the concave side restoring bone stock where it is deficient has also made it more appealing to the later possibility of conversion to TKA with expected fewer problems than closing wedge HTO. This hypothesis is yet to be borne out.

This presentation will focus on the Author's preferred indications for HTO in cartilage repair, OA and instability and the amount of correction for each, surgical indications and technique and tips for closing versus opening wedge HTO. The clinical outcomes of Tibial Valgus Osteotomy in our OA patients will be presented.

Financial Disclosure: none

Symposium V: Unicompartmental (Including Patellofemoral) Arthritis: What is the Best Treatment in 2007?

Just do it: The full TKA is better than Compartmental Replacement

John B. Meding, MD, *Mooresville, IN*

With proper patient selection, and in the hands of experienced surgeons, the long-term results of UKA have yielded ten-year survival rates between 70 and 98% and fifteen-year survival rates between 79% and 97%. Some of these results may be comparable to TKA. However, in general, they do not surpass or even approach the excellent long-term results of TKA with published ten-year survival rates between 95% to 100% and fifteen-year survival rates between 94% and 99%.

The major reason for revision of a UKA remains progression of arthritis in a previously uninvolved compartment. This has been reported to be as high as 51% at ten years in a community-based implant registry. Other common reasons for revision include aseptic loosening and PE wear. As the indications for UKA expand to include younger, heavier, and more active patients, revision rates may be expected to increase commensurate with improper patient selection. In contradistinction, excellent ten-year TKA survival rates between 91% and 99% have been reproduced by multiple authors in younger patients.

PFA has recently gained attention has a viable alternative to TKA in younger patients with isolated PF OA. Yet, thirty years of data, with follow-up between six months and 17 years, has demonstrated far inferior results to TKA with revision rates reported up to 51% and re-operation rates up to 63%. Newer designs may improve these, less than satisfactory, results.

Thirty-three TKAs were performed in twenty-seven patients less than sixty years of age (average age, 52 years) with isolated PF OA. All patients were followed for at least two years (average follow-up, 6.2 years). Over 85 % of knees were rated with minimal or no pain. There were no infections, revisions, re-operations, manipulations, patellar instability, or component loosening. These results are far superior to most results of PFA in younger patients at similar follow-up.

To become a viable treatment option for isolated PF, medial, or lateral compartment OA, the results of UKA and PFA should be at least as good as the results of TKA. The results of TKA, in younger and older patients, are generally superior to UKA and consistently superior to PFA at similar follow-up. These results emphasize the need for judicious patient selection when considering UKA and should question the use of PFA in any patient.

Financial Disclosure: a,c-Biomet

Symposium VI: Complications of Total Knee Arthroplasty: Optimizing Management with New Technology and Techniques: Instability, Stiffness, Osteolysis, Infection

Imaging the Painful TKA: What Can New Imaging Modalities Show Us?

Hollis G. Potter, MD, *New York, NY*

Due to multiplanar capabilities, lack of ionizing radiation and superior soft tissue contrast, magnetic resonance imaging (MRI) is an effective means of evaluating painful arthroplasty. MRI quantifies and more accurately localizes particle disease compared to conventional radiographs, detecting compromise of regional neurovascular bundles by extracapsular extension of disease[1]. MRI is more sensitive than optimized radiographs and computerized tomography (CT) in detecting osteolysis[2].

In addition, MRI allows for characterization of adjacent soft tissue masses and regional tendon insertions. Ongoing use in the serial evaluation of painful arthroplasty will enable evaluation of synovitis that is located at the origin of the adverse biologic reaction, allowing for longitudinal, quantitative assessment of intracapsular burden of particle disease and osteolysis, as well as qualitative assessment of differential patterns of bone resorption.

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Financial Disclosure: a-General Electric Health Care

Symposium VI: Complications of Total Knee Arthroplasty: Optimizing Management with New Technology and Techniques: Instability, Stiffness, Osteolysis, Infection

Stiffness: Who Should Get a Re-operation? What are the Results?

William J. Maloney, III, MD, *Stanford, CA*

Persistent stiffness following primary total knee replacement is an infrequent but significant complication limiting patient function. Closed manipulation can be successfully performed in the first several months following the index procedure provided the implants are well aligned and the knee balanced. Data exists that demonstrates that with both cruciate retaining and substituting designs, manipulation for persistent stiffness can lead to improvement and range-of-motion that is long lasting.

The results of a re-operation for stiffness are variable. Re-operation performing a soft tissue release with component retention has been reported to have only fair results. Component revision as opposed to retention has been somewhat more favorable historically but the literature is sparse.

In our series, we reviewed 25 knees in 23 patients at a mean of 36.7 months after re-operation. In 12 patients, a limited approach was performed and in the other 11 patients, a revision of both components was done. In those patients who had a limited approach, the arc of motion improved approximately 26 degrees, the mean clinical score 38 points and the mean functional score 21 points. For the patients who had complete revision, the arc improved approximately 18 degree with little change in the clinical and functional score.

Although the groups were similar with respect to demographics, the complete revision group had significantly less preoperative range-of-motion compared with the soft tissue release group. In addition, they had lower preoperative clinical scores.

It appears that soft tissue release and tibia insert exchange may be effective provided that the patients have well aligned implants and a polyethylene insert of adequate thickness to allow downsizing if necessary. Although there were patients who underwent complete revision improved arc of motion significantly, overall they did not improve their functional scores. The series is relatively small, therefore they may be other variables that play a role in the outcome.

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Financial Disclosure : none

Symposium VI: Complications of Total Knee Arthroplasty: Optimizing Management with New Technology and Techniques: Instability, Stiffness, Osteolysis, Infection

Technique and Timing of Two Stage Exchange for Infection

Robert L Barrack, MD, *St. Louis, MO*

Infection in TKA is a devastating complication. The 2-stage exchange procedure has evolved as an effective treatment option. The first stage involves implant removal, local irrigation/debridement, and a 6-week course of IV antibiotics. The use of antibiotic impregnated cement spacers may be considered at the 1st stage surgery. Spacers may be static or articulating, intramedullary dowels, preformed or constructed in the O.R., and provide single or multiple agent antibiotic (and antifungal) joint-space delivery. Proper technique and indications with these devices will avoid complications between stages.

The 2nd stage TKA reimplantation is performed once the clinical and laboratory (ESR, CRP) parameters have normalized. The use of a knee aspiration/synovial fluid cell count and culture may be a useful adjunctive test. Surgical exposure, assessment of bone and soft-tissue defects, the integrity of the extensor mechanism, and implant selection play an important role in the 2nd stage reimplantation revision TKA.

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Financial Disclosure: None Reported

Symposium VI: Complications of Total Knee Arthroplasty: Optimizing Management with New Technology and Techniques: Instability, Stiffness, Osteolysis, Infection

Osteolysis Around Total Knee Arthroplasty: Treatment Options

John J. Callaghan, MD, *Iowa City, Iowa*

Close to half of the total knee revisions performed today are related to wear particle induced osteolysis generated from modular fixed bearing cemented and cementless total knee arthroplasty designs and metal backed patellar components. The particle production has been generated from the polyethylene (front and back side), metal (trays, femoral components, patellas) and cement. Access channels to the surrounding bone have occurred through incomplete porous coatings, screw holes, and suboptimal cementing techniques.

Use of a classification system is helpful in determining which treatment option is optimal for the individual patient. Type I is a case with stable implants, good alignment, stable ligaments and adequate insert locking detail with predominantly metaphyseal osteolysis. Type II is a case with a stable implant but malalignment, unstable ligaments, poor locking mechanism, and extensive bone loss with risk for periprosthetic fracture. Type III is a case with a loose implant.

We have had extensive experience with grafting, realignment and use of a newer generation polyethylene in Type I cases. Some of these cases would have required extensive segmental allografts. Type II and Type III cases require revision with the use of a combination of metal augments and sleeves, bone graft, and component constraint.

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Financial Disclosure: a,c,e-DePuy

Symposium VI: Complications of Total Knee Arthroplasty: Optimizing Management with New Technology and Techniques: Instability, Stiffness, Osteolysis, Infection

Instability Following TKR: Optimal Management

Arlen D. Hanssen, MD, *Rochester, MN*

Tibio-femoral instability is an important and common cause of failure following total knee replacement (TKR). Poor operative technique is frequently the cause leading to instability which may be associated with component size or position, ligament imbalance or failure, bone loss, prosthetic loosening, wear, or component breakage.

Instability can be classified as: varus-valgus (extension), mid-flexion rotatory, antero-posterior (flexion), recurvatum, and global. The clinician needs to recognize that some patterns of instability are quite obvious whereas others are very subtle. Assessment of typical historical patterns, careful physical examination, dynamic radiographs, and synovial fluid analysis help make a proper diagnosis.

Of these instability patterns, mid-flexion and flexion instability are most often missed despite their typical presentation of a sense of instability without giving way, recurrent knee effusions, and multiple areas of soft tissue tenderness. The role of nonoperative treatment for these subtle instability patterns is limited. Femoral component malrotation is often present in midflexion-rotatory and AP flexion instability. There are many aspects of these subtle instability patterns that are poorly understood and currently available revision implants are generally poorly suited to address and correct the abnormal kinematics found in these knees.

Surgical options for treating instability are dependant upon the underlying cause which must be clearly understood prior to revision surgery. In general, isolated ligament reconstructions do not work. Isolated polyethylene insert exchanges are rarely successful unless the extension and flexion spaces are equal at the time of revision surgery. Revision surgery should minimize deforming forces as implants, no matter how well designed, are not substitutes for proper surgical technique.

Some aspect of revision with component change, correction of alignment, gap balancing, and prosthesis positioning or sizing is usually necessary. The prosthesis chosen should compensate for the specific ligamentous deficiency present and it is recommended that the minimum amount of constraint necessary to achieve stability should be used. Most revisions include the use of at least a posterior stabilized or ultra-congruent insert. The use of these inserts does not obviate the need for careful gap balancing.

Advancement to increased prosthetic constraint, such as a varus-valgus constrained or constrained-condylar knee implant may be required when symmetric flexion and extension spaces cannot be achieved. The use of increased constraint should be undertaken with caution as increasing constraint may reduce instability, but will increase forces transmitted to implant fixation interfaces, which may contribute to premature loosening. Rotating-hinge knee implants are usually recommended for patients with severe deformity or instability that cannot be managed with a varus-valgus constrained implant, particularly in patients with an absent and non-reconstructable medial collateral ligament. Extensor mechanism redundancy must often be addressed in these complex cases requiring hinged knee replacement.

Financial Disclosure: a,c,- Stryker

Symposium VII: New Techniques in TKA: Video Demonstrations of "Cutting Edge" Techniques in Primary and Revision Total Knee Arthroplasty

Unicompartmental Knee Arthroplasty: Technique through a Mini-Incision

Jean-Noël Argenson, MD, *Marseille, France*

Unicompartmental knee arthroplasty (UKA) is a logic procedure when osteoarthritis or avascular necrosis is limited to one femorotibial compartment. The so-called minimally invasive surgery (MIS) procedure is able to provide quicker recovery since the extensor mechanism disruption is eliminated,[1-2] with the patella moved to the middle of the joint and the specific MIS instrumentation facing only the replaced compartment. Instrumentation improvements have provided the possibility to perform the procedure using both an intra- or extra-medullary femoral technique, with the aims of optimal femorotibial component alignment and slight undercorrection of the deformity.[3]

More importantly the radiological evaluation has shown that precise implantation of the components is possible with an MIS approach which is important for the long term results of the arthroplasty.[4] The in vivo kinematic evaluation of patients implanted with MIS UKA has shown that kinematics similar to the normal knee can be obtained, enhancing the importance of a functional anterior cruciate ligament.

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Financial Disclosure: a,c-Zimmer

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Mini Arthrotomy for Primary TKA

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The success of total knee arthroplasty (TKA) is measured by the parameters of relieving pain, restoring function, and providing durability. Performing a TKA requires iatrogenic trauma. A structured perioperative approach to TKA which includes but is not limited to minimization of surgical exposure and resultant trauma will facilitate the goals of TKA. The minimally invasive movement with respect to total joint arthroplasty has fostered a greater understanding of the entire perioperative process. Patients clearly desire little interruption in their routine activities and wish to return to a normal lifestyle as quickly as possible. Accomplishment of this goal is multifactorial and commences with the initial surgeon/patient encounter.

Establishment of a timeline for recovery, alignment of expectations and motivation of the patient are the prerequisites of this encounter. Preoperative education and supportive materials along with preoperative physical therapy and rehabilitation will delay anxiety and accelerate the return to function. An effective pre-emptive multimodal preoperative pain protocol allows the patient to make steady process. The surgical technique itself must be accurate and efficient. Standard incisions can be minimized gradually with increasing familiarity with newer and smaller instruments. An understanding of the mobile window concept with concomitant retractor choreography will allow the surgeon to effectively minimize trauma. Aggressive clinical pathways focused on early discharge promote a sense of well-being.

The purpose of this video vignette is to demonstrate an algorithmic approach to TKA with emphasis on minimization of surgical trauma via understanding the concepts of a mobile window and retractor choreography.

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Financial Disclosure: c,d,e-Biomet

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Locking Periarticular Plates for Supracondylar Fracture Treatment around TKA

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The use of locked plating techniques for fracture fixation has enjoyed widespread popularity. Anatomically pre-contoured locked plates that allow fixation in various anatomic regions are currently widely available. Additionally, new technologies have become available that utilize subchondral support locking pegs, polyaxial bushings, and locking washers, to improve intraoperative versatility, however, limited data is available on the efficacy of these new implants, especially when used around TKA.

Although the clinical performance of locked plates has generally been good, several unique complications have been noted such as malalignment, fracture distraction, and loss of diaphyseal fixation, especially when percutaneous techniques and unicortical screws were used. Additionally, the expense of locked plate constructs is a concern, as this technology typically costs three times more than similar nonlocked constructs. This presentation will discuss indications, surgical technique, and outcomes of periprosthetic femur fractures treated with locking plates.

Financial Disclosure: None Reported

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Modular Porous Metal Metaphyseal Cones for Bone Defects in Revision TKA

David G. Lewallen, MD, *Rochester, MN*

Major bone defects are an increasingly common challenge seen during revision TKA, and are related both to an increasing population at risk and dramatic increases in periprosthetic osteolysis from the patterns of wear and loosening of many prior TKA implants.

Prior bone defect treatment options include structural bone allograft, cancellous bone grafting, specialized implants with metaphyseal buildups, and custom prostheses. A novel reconstruction method developed at our institution makes use of porous tantalum metaphyseal augments with a modified conical configuration that are placed independently within the damaged end of the bone. Structural mechanical support is re-established prior to insertion of a standard revision implant, which may incorporate traditional wedges or blocks and cemented or cementless stems as needed to optimize implant position and fixation. The metaphyseal augments are designed to be impacted into the host bone first in uncemented fashion to allow bone ingrowth from the damaged host metaphysis, with cement used between the augment and knee components to unitize the final construct, provide fixation, and prevent motion between the TKA implant and metaphyseal cone. This method facilitates independent positioning and rotation of the metaphyseal augment (within the bone defect), and the knee components (relative to anatomic reference points). Both femoral and tibial metaphyseal augments are currently available in a range of sizes and configurations.

Initial clinical results from our institution with the tibial metaphyseal augments were recently reported for fifteen patients all with Type 2-B or Type 3 (AORI Classification) tibial defects. Despite multiple prior surgeries (average 3.5), and large bone defects, no cases of tibial loosening occurred at minimum 2 year followup, with apparent radiographic incorporation of the augments in all cases to the host bone. (Meneghini et al, AAOS Annual Meeting, 2006)

Similar encouraging early results have been seen with the more recently introduced femoral metaphyseal augments, despite their use in many cases of massive bone deficiency which would have precluded the use of standard implant systems. These implants have helped expedite and simplify the reconstruction of major metaphyseal defects that in our practice would otherwise have required massive structural allograft or a custom implant.

The potential for tendon and ligament reattachment and ingrowth into a porous tantalum prosthetic surface has been suggested by recent experimental animal studies, and if validated clinically could provide additional reconstructive options for the most massive of bone loss challenges.

Further followup and experience is needed to understand the limitations of the current implants and methods, determine long term durability, and help optimize ongoing design efforts.

Financial Disclosure: a,b,c,e-Zimmer

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Extensor Mechanism Reconstruction: Options/Techniques

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Extensor mechanism disruption may occur at the patellar ligament, quadriceps tendon, or as a result of patellar fracture. Primary repair without allograft or autogenous tissue augmentation is associated with a relatively high rate of failure. Patellar allograft is most appropriate for reconstruction with an absent patella while Achilles tendon allograft with an attached calcaneus bone block is more useful to reconstruct extensor mechanism soft tissue discontinuity with an intact patella. Successful results have been reported with allograft reconstruction although the allograft tissue may stretch out over time so the repair should be performed with maximal soft tissue tension. Autogenous semitendinosis tendon or fascia lata have been used to augment primary extensor mechanism repair. The distal tendon attachment is maintained and proximal tendon detached and repaired to the quadriceps mechanism.

For treatment of extensor mechanism disruption associated with infection or soft tissue defects, medial gastrocnemius transposition is a useful salvage procedure.

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Financial Disclosure: none

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Wound Problems in Total Knee Arthroplasty

Kelly G. Vince, MD, *Hermosa Beach, CA*

Wound problems can often be prevented with careful planning. Years before a knee arthroplasty is required, transverse incisions for patellar surgery and high tibial osteotomy are fine. A standard knee arthroplasty incision will always be appreciated at a later date. When lateral incisions are necessary (following previous lateral tibial plateau fracture) they should be re-used for the arthroplasty, perhaps with a tibial tubercle osteotomy. The arthroplasty surgeon confronted with multiple previous incisions should choose either the one that has healed most recently or the most lateral. When too many incisions are present, when skin and scar are adherent to underlying tissue or when wound healing appears questionable, soft tissue reconstruction with expanders or gastrocnemius flap is preferred.

Deep infection must be ruled out by aspiration, and if present, mandates an entirely different course of action including irrigation, debridement and polyethylene exchange if acute, and resection arthroplasty in the chronic situation.

Poor wound healing in the face of total knee arthroplasty is a potentially devastating complication that may result in multiple reconstructive procedures and even loss of limb. Early recognition followed by expeditious debridement and soft-tissue reconstruction is the mainstay of management of wound complications in total knee arthroplasty.

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Financial Disclosure: e-Zimmer

CME Accreditation Statement
This activity has been planned and implemented in accordance with the Essential Areas and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint sponsorship of the American Academy of Orthopaedic Surgeons and the Knee Society/AAHKS. The American Academy of Orthopaedic Surgeons is accredited by the ACCME to sponsor continuing medical education for physicians. The American Academy of Orthopaedic Surgeons designates this continuing medical education activity for a maximum of 8 AMA PRA Category 1 Credits™. Physicians should only claim credit commensurate with the extent of their participation in the activity.

Goals and Objectives:
The Knee Society/AAHKS 2007 Combined Specialty Day Meeting is designed to provide practicing orthopaedic surgeons with state-of-the-art information about the surgical applications and treatment protocols for the diagnosis and management of total knee replacement, and to enhance the care of patients with arthritis and degenerative diseases. Interactive presentations will be utilized.

Upon completion of this program, participants should be able to:

- Update clinical skills and basic knowledge through research findings and biomechanical studies.
- Discuss the various surgical and non-surgical treatments and management of conditions related to the knee joint.
- Determine indications and complications in total knee arthroplasty.
- Critique presentations of surgical techniques and demonstrations of treatment options.
- Evaluate the efficacy of new treatment options through evidence-based data.

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