

Orthopaedic Update

By Liz Meszaros

The future holds many twists and turns for those in the orthopaedic community. The aging of America, the controversy of less invasive surgical procedures, new devices and technologies, and the potential for reimbursement reductions will all contribute to the changing face of orthopaedic medicine in the decade to come.

The future need for joint replacement surgery, due primarily to the exponential increases in the elderly population fueled by the aging of the baby boomer generation, seems to be staggering. For example, the number of total knee replacements performed in this country will increase by 673 percent by the year 2030, to reach a total of 3.48 million, according to data from the American Academy of Orthopaedic Surgery. The number of hip replacements will increase as well. Predictions from the AAOS hold that by 2030, these will rise by 174 percent, to 572,000. These findings are based on historical procedure rates from 1990 to 2003, as well as population projections from the U.S. Census Bureau.

In addition, controversy surrounds the trend for less invasive orthopaedic procedures. In the past five years, less invasive or minimally invasive surgeries (MIS) have changed the way surgeons approach and perform orthopedic joint replacement surgery and the way patients recuperate. Reports of high complication rates and higher short-term

failure rates with MIS, however, led the way to a more moderate approach by many orthopedists to use smaller, but not extremely small, incisions.

A less invasive approach to traditional knee replacement surgery was the topic of discussion at a panel briefing of the American Academy of Orthopaedic Surgeons' 73rd Annual Meeting earlier this spring. The new approach involves an incision of 3 to 4 inches, compared with the 8- to 10-inch incision traditionally used. Navigation to the knee is done without compromising the surrounding tendons, muscles and tissues; when visibility is compromised, computer-assisted navigation systems are used.

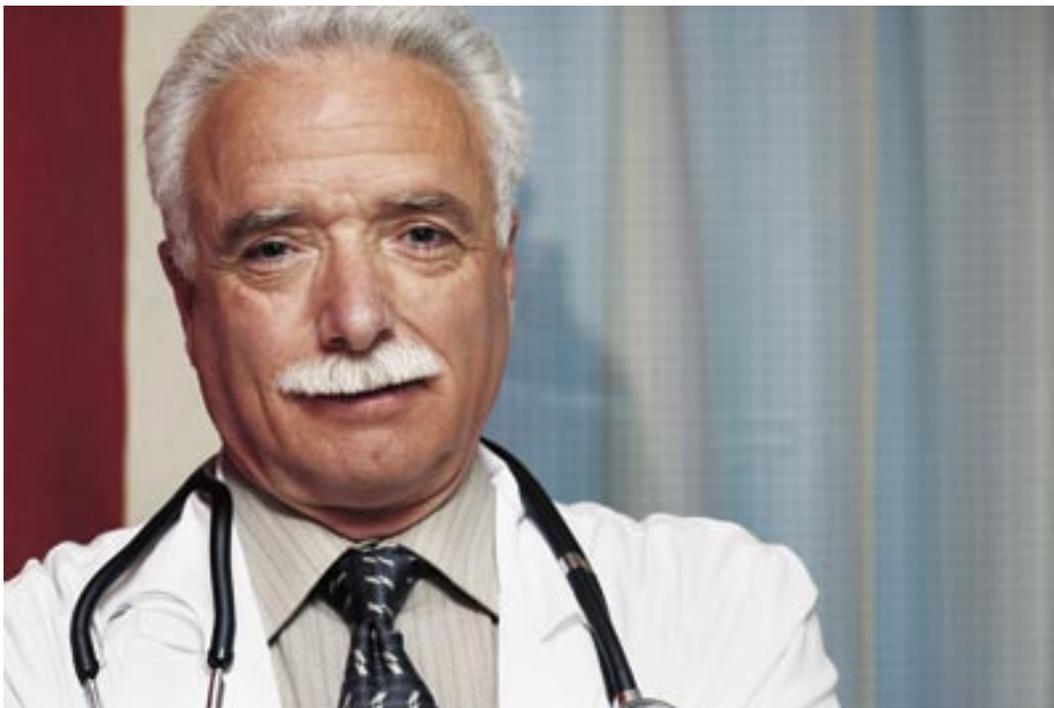
Minimal patient pain and disability is the goal of surgery, and patients are given anti-inflammatories and local anesthesia prior to surgery and pain medications after surgery, as well as counseling on what to expect during their recovery.

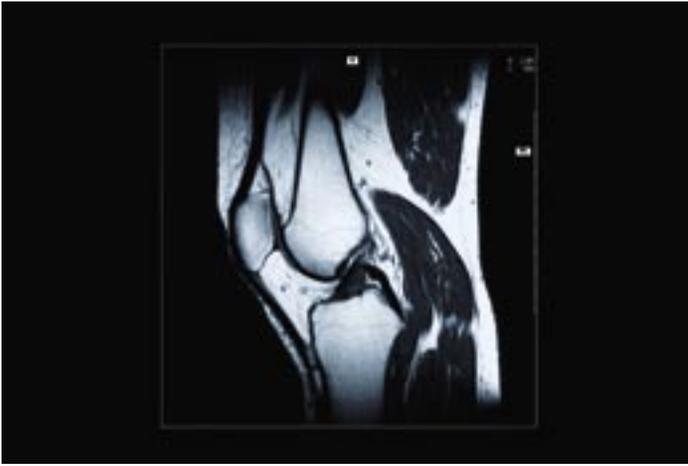
"Minimally invasive surgery is no longer just about making smaller incisions," said Robert E. Booth, Jr., M.D. "The procedure now includes a range of precise techniques to control pain, get people back on their feet and back to work more quickly." Dr. Booth is Chief of Orthopaedic Surgery, Pennsylvania Hospital, Philadelphia, PA.

Yet this new type of surgery carries with it some risks. Smaller incisions, by their nature, require more force to be exerted on the tissues. This, in turn, may inhibit wound healing. In addition, less invasive surgeries can take up to two to three times longer to perform than traditional surgery because these smaller incisions decrease the surgeon's field of vision. The increased length of surgical time also increases risks of infection, embolism and other complications.

"Any time surgery is performed with a smaller incision, the surgeon has fewer visual clues to guide them on techniques, such as the appropriate placement of the implant," noted AAOS panelist Mark W. Pagnano, M.D., associate

The future holds many changes for orthopaedic practitioners.





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professor of orthopedics at the Mayo Clinic College of Medicine, Rochester, MN. “Particular care must be taken during surgery not to damage tissue around the knee.”

In addition, certain patients are not ideal candidates for MIS of the knee, including those who are obese and those with a high degree of knee damage. Certainly, more evidence-based data on the long-term benefits of less-invasive surgery are needed. Dr. Booth, however, noted that the additional risk factors involved with MIS “have not been a problem.”

The AAOS panel concluded that while the less-invasive approach has certain advantages to the traditional approach to knee replacement, it may never completely replace it.

“Certainly not in the foreseeable future, as long as you have people who are overweight or who have already undergone multiple operations on their knee,” said Dr. Pagnano. “But as techniques improve and evolve, we hope to make this type of surgery available to a wider range of patients.”

“Regardless of whether you call it less invasive or minimally invasive, almost every surgeon these days is making smaller incisions,” concluded Dr. Booth. “The art of knee surgery has been significantly advanced because MIS is out there.”

He predicted that within the next decade, “...about half of all patients will be getting MIS operations on their knees.”

THE INNOVATIONS CONTINUE

In orthopaedic surgery, techniques, equipment and approaches are constantly being improved upon. One recent innovation, the Hip Tool, created by James K. Brannon, M.D., was designed as an alternative radical hip replacement surgery for patients suffering from osteonecrosis/avascular necrosis. Dr. Brannon is assistant professor with the Department of Orthopaedic Surgery at the University of Missouri School of Medicine; Director of the Joint Preservation Center; and founder, President and CEO of Orthopedic Sciences, Inc. (OSI).

Dr. Brannon developed the Hip Tool Bone Graft Stabilization System. This innovative product was designed by Dr. Brannon to assist

surgeons who have chosen thorough debridement and nonvascularized bone grafting in patients with osteonecrosis/avascular necrosis. With an endoscopic approach, the surgeon can better identify and debride necrotic bone within the femoral head using a minimally invasive surgical technique, avoiding the large soft-tissue dissections necessary in other procedures, explained Dr. Brannon.

The Hip Tool plate and reverse compression screw then work to stabilize the bone graft and prevent micromotion. This helps incorporate it into the surrounding host bone, and the healthy bone then heals as a simple fracture. Dr. Brannon has developed similar procedures for the knee, shoulder and ankle.

Dr. Brannon thoroughly debrides the femoral head, doing so through a 2.5-cm incision, and then stabilizes the bone graft with a small plate and screw. The Hip Tool works like an internal splint or an internal cast. “The fracture that I create does not extend through the cortex of the femoral neck. It is primarily contained within the femoral head and neck and the plate and screw hold the bone in place until it heals,” he told *M.D. News*. “Some patients call the procedure a root canal of the hip.”

The goal of this new technology is to extend the debridement of dead bone until healthy bone is reached, preparing the host bed for a bone graft through a narrow core tract within the femoral neck. Patients who would benefit most from this approach are those who are in their third through fifth decades of life. Dr. Brannon was quick to note, however, that he has treated a wide range of patients. “I have treated patients who are 8 years old and those who were 68 years old,” he added.

OSI originated in 1999 with the Bone Graft Tool. Dr. Brannon has also developed the Bone Tool for large volume bone and bone marrow collection and the Outologous Trepine-Aspirator (OT-A) for large volume percutaneous bone marrow aspiration, as well as the Bone Tool Vacuum Assisted Bone and Bone Marrow Harvesting System, which is designed to harvest cancellous bone and bone marrow from the iliac crest with a minimally invasive technique. The Bone Tool incorporates smaller incisions and simultaneous harvesting of bone and marrow elements to leave the iliac crest substantially intact. The cancellous bone and bone marrow are then easily placed in a fusion cage or other surgical site, and patients have less postoperative pain and blood loss.

“Our primary objectives at the center are relief of pain while preserving the natural joint, maintaining and improving motion of the joint, and completing the surgical procedure through a 3” or smaller incision,” noted Dr. Brannon.

FUTURE DEVELOPMENTS

What the future holds for orthopedists is largely a mixed bag, noted Dr. Brannon. Financially, further reductions in reimbursements for joint replacement seem to have arrived. But, advances in technology will bring better patient care and more options for joint preservation, he added.

“From a growth opportunity perspective, we can look forward

Obesity and Orthopaedics

Orthopedic surgeons are also faced with resolving the practical problems of surgical care that the nation's growing problem with obesity has raised. Indeed, obesity is one of the primary considerations in a surgeon's approach to total joint replacement, and one of the primary factors that influence patient outcome.

"Orthopedic surgeries like total knee or joint replacements can be difficult — even for the most skilled and experienced orthopedic surgeon," according to Timothy Bhattacharyya, M.D., instructor of orthopedic surgery, Harvard University Medical School and orthopedic surgeon with Partners Orthopedic Trauma Service at Massachusetts General Hospital and Brigham and Women's Hospital in Boston. "Add an obese patient into the equation, and there's a higher risk of complications — sometimes five times as high," he noted.

Indeed, according to Dr. Bhattacharyya, obese patients use approximately 40 percent more cardiovascular energy than patients of average weight. In addition, extra equipment is necessary for obese patients, including bigger beds and different surgical techniques to minimize complications.

In the treatment and management of obese patients, surgeons should:

1. Perform preoperative assessment of cardiopulmonary status and other comorbid conditions, such as diabetes.
2. Plan for intraoperative needs for special equipment, patient positions, IV line placement, central monitoring lines and anesthesia specifically geared toward the obese patient.
3. Plan for postoperative needs of obese patients, including supplemental oxygen requirements and medication dosing, and remember that these differ greatly from those of patients of average weight.

Keep in mind that obese patients have higher rates of deep vein thrombosis and wound sepsis than non-obese patients, as well as higher rates of prosthetic failure, infection, hardware failure and fracture malunion.

Source: Guss D, Bhattacharyya T. Perioperative Management of the obese orthopedic patients. J Am Acad Orthop Surg 2006 Jul;14(7):425-32.

to more biologic therapies and increasing technologies that focus on joint preservation. How do we restore cartilage? How do we allow the patient's bone or hip joint to last another 20 to 30 years? The answers to these questions are well on their way," Dr. Brannon told *M.D. News*.

He used the following example to illustrate his point: Now, when patients present hip pain and the diagnosis is minor arthritis, they are prescribed an NSAID ranging from Advil or Motrin to the COX-2 selective inhibitors, depending on the severity of their pain.

"All these medications do is buy time and allow the patient to tolerate the eventual demise of the hip joint," said Dr. Brannon.

When a patient is first prescribed these medications, the joint is not badly off enough to warrant total joint replacement. But as time goes on, the joint wears out until eventually, total hip replacement is necessary, he explained.

"Providing our patients with biologic solutions to their hip or joint



The topic of less invasive surgeries is a controversial one, and orthopaedic surgeons must carefully weigh the pros and cons of such procedures.

disease or musculoskeletal disease at the time that it is diagnosed as opposed to waiting until it's time to simply replace the joint is what the future holds," said Dr. Brannon. "I am currently studying these aspects, spending time with orthopedic scientists and patients, trying to understand the causes of abnormal X-rays and deciding whether I can decelerate the process or even eliminate it as opposed to prescribing medication for pain and asking the patient to come back and see me when it's time to 'change their tire.'"

Endoscopic evaluation of bone is also an area that Dr. Brannon looks to for future developments.

"We will be seeing opportunities to evaluate bone endoscopically. If we started evaluating bone endoscopically, in situ, then we could understand the relationship that the diseased bone has with its surrounding host bone. From that, we could better assess the disease and its pathophysiology," said Dr. Brannon, adding that he is currently studying this area. "When I look inside that femoral head endoscopically, I can tell you exactly where the necrotic bone is, whether there is blood surrounding it, and whether it is bleeding. This is all very important information," he concluded. ■