Introducing Arthroscopic Biologic Total Shoulder Resurfacing

An innovative procedure for younger patients with advanced glenohumeral osteoarthritis

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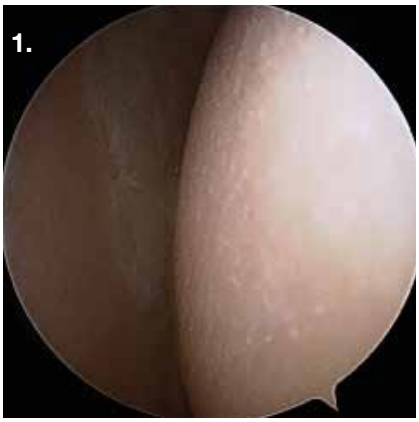

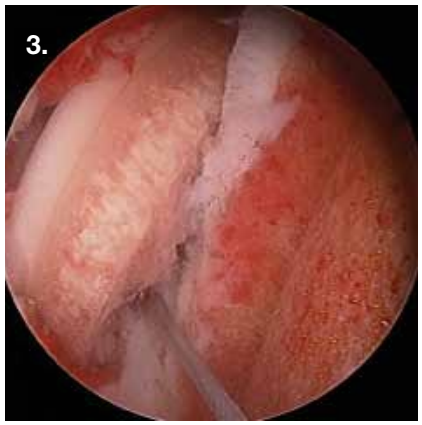

Total shoulder arthroplasty is an effective and durable treatment for advanced arthritis in the older patient. Better treatment modalities, however, are needed for younger, more active individuals. "The data in the literature is clear. If you're under 50 or in your early 50s and active, total shoulder arthroplasty with metal and plastic parts wear out much faster and these patients tend to do less well than their older counterparts who are less active," says **Reuben Gobezie, MD**, Chief, Division of Shoulder and Elbow Surgery, Department of Orthopaedic Surgery, University Hospitals Case Medical Center, and Assistant Professor of Orthopaedics, Case Western Reserve University School of Medicine.

"The traditional approach to treating an active young patient with end-stage osteoarthritis is hemiarthroplasty. However, the results of conversion for these patients to total shoulder arthroplasty is humbling. Alternative bearing surfaces such as patch grafts don't seem to be 'the answer' either," says Dr. Gobezie, who specializes in arthroscopic and open surgical techniques to manage a wide spectrum of shoulder disorders. He also notes that the outcomes for alternative surgical interventions to arthroplasty, such as arthroscopic debridement with or without chondroplasty and capsular release, are unpredictable, often offering little or no, or short-lived, pain relief and functional improvement.

Addressing Loss of Cartilage

Recognizing the clinical need for a treatment tailored to younger patients with advanced glenohumeral osteoarthritis, Dr. Gobezie, in partnership with Arthrex Inc., has developed an innovative procedure that focuses on the root of the problem – loss of cartilage – and is performed arthroscopically through the rotator interval, without violating or injuring the rotator cuff muscles.

Arthroscopic biologic total shoulder resurfacing uses a fresh osteochondral allograft of the humeral head and medial tibial condyle or distal tibial plafond to resurface the glenohumeral joint, enabling both sides of the joint to be replaced with a cartilage transplant. Designed for younger, active patients who have relatively flexible arthritic shoulders, it is performed as an outpatient procedure. Dr. Gobezie is a paid consultant for Arthrex Inc., which develops products for arthroscopic surgery.

He performed the first arthroscopic biologic total shoulder resurfacing in the world at University Hospitals Case Medical Center in December 2010. He based his development of the procedure on cartilage transplantation operations for the knee and the glenohumeral joint, for which good outcomes have been reported. It is the first shoulder cartilage transplant procedure to be performed arthroscopically and the first to include the glenoid in the transplant procedure.

The Most Anatomic Method

Arthroscopic biologic total shoulder resurfacing has several advantages over arthroplasty of the shoulder. Using an osteochondral allograft rather than metal and/or plastic implants enables Dr. Gobezie to reproduce normal anatomy and function. "Putting in a cartilage graft the exact same size as you took out is the most anatomic you can possibly make it," he says. Performing the procedure through the rotator interval prevents injury to the rotator cuff muscles, a cause of complications, including catastrophic failure, in up to 40 percent of shoulder arthroplasties. The arthroscopic procedure is significantly less painful than total shoulder arthroplasty, allows for early rehabilitation and offers the potential to significantly decrease the rehabilitation required after surgery compared with total shoulder arthroplasty.

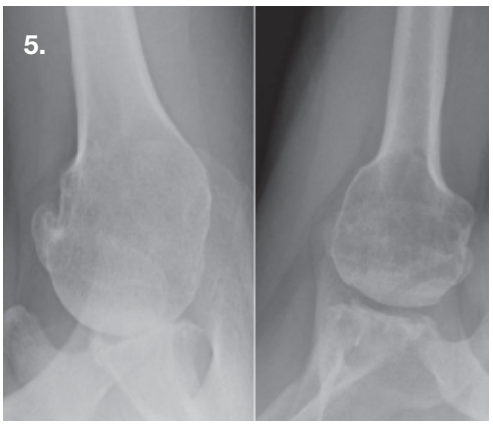

Figure 1: Arthroscopic view of the right shoulder, beach chair position, posterior portal. Bipolar osteochondral defects of the humeral head and glenoid were found on initial arthroscopic examination in a patient who underwent arthroscopic biologic shoulder resurfacing. Such large defects have historically been difficult to treat in younger patients.

Figure 2: Arthroscopic view of the right shoulder, beach chair position, posterior portal. Placement of glenoid and humeral allografts may be performed arthroscopically with novel instrumentation. A glenoid defect has been reamed arthroscopically with instrumentation passed through the humeral head, creating a site for placement of a tibial condyle allograft.

Figure 3: Arthroscopic view of the right shoulder, beach chair position, posterior portal. Humeral resurfacing is accomplished after reverse-reaming arthroscopically over a transhumeral guidepin. The allograft humeral head is moved into position with a traction suture, creating a humeral head articular surface that is free of defects.

Figure 4: Arthroscopic view of the right shoulder, beach chair position, anterior portal. A defect-free articular surface has been created by resurfacing the humerus and glenoid. Chondral darts have been used to secure the tibial condyle graft within the native glenoid.

Figure 5: Axillary radiographs taken preoperatively and postoperatively in a 53-year-old patient demonstrate the re-creation of glenohumeral joint space and a smooth articular surface. The grafts are beginning to incorporate into the surrounding host bone.

Since arthroscopic biologic total shoulder resurfacing preserves bone stock, revision to conventional shoulder arthroplasty or arthroscopic revision with another allograft can be performed if necessary.

Building the Evidence

Arthroscopic biologic total shoulder resurfacing is currently available only at University Hospitals Case Medical Center. Dr. Gobezie also performed this procedure in June 2011 at the largest live surgery course in the world, the Annecy Live Surgery Course, in France, hosted by Laurent Lafosse, a renowned shoulder surgeon. “If this procedure works,” Dr. Gobezie says, “it could be a paradigm change for the treatment of shoulder arthritis in young patients. There is significant interest in this procedure within the shoulder community and I am hopeful that it provides a new treatment option for young patients that relieves their pain and improves their function.”

To study the long-term efficacy of arthroscopic biologic total shoulder resurfacing, Dr. Gobezie is conducting a prospective clinical study using standardized and validated preoperative and postoperative outcome measures of patients who undergo the procedure. The main risk is that the osteochondral graft may not incorporate in a given patient’s shoulder. If this occurs, the patient may require total shoulder arthroplasty or another procedure. Dr. Gobezie has also developed a prospective shoulder and elbow database comprising pre- and postsurgery data on all of his patients.

In 2010, Dr. Gobezie was elected to American Shoulder and Elbow Surgeons, the most prestigious specialty society in the United States for shoulder and elbow surgeons. He also received the Patients’ Choice Award in 2009 and 2010, given to “physicians who have received near perfect scores as voted by patients.”

Insights from Radiostereometric Analysis

Through the largest shoulder radiostereometric analysis research program in the United States, **Reuben Gobezie, MD**, and colleagues are contributing to knowledge about glenoid component wear rates, translation and rotation, and humeral component migration in total shoulder arthroplasty. Results to date cover 29 patients who underwent total shoulder arthroplasty between 2007 and 2009, as part of a five-year clinical study now in its fourth year.

Dr. Gobezie’s research team is the first to analyze polyethylene wear rates in primary total shoulder arthroplasty using radiostereometric analysis, and has found that wear of a conventional, high-molecular-weight polyethylene glenoid component at two years is minimal. The team is also the first to evaluate component stability of uncemented humeral stems, and has shown that these prostheses remain stable without subsidence two years after surgery. Radiolucent lines appeared early for the glenoid and humeral components, but do not necessarily indicate instability.

The shoulder radiostereometric analysis research program is funded through grants from industry and the Orthopaedic Department’s Research endowment. Continued follow-up of the patient cohort will provide information on midterm wear and stability.

Contact Our Expert

For more information about arthroscopic biologic total shoulder resurfacing, please call **216-844-7093** or e-mail **OrthoInnovations@UHhospitals.org**.