Penn Medicine

CLINICAL BRIEFING™

Department of Orthopaedic Surgery • Shoulder and Elbow Program

2019 Update: Reverse Shoulder Replacement Surgery for Rotator Cuff Deficiency, Failed Arthroplasty, Arthritis, Humeral Fractures and Bone Loss

Surgeons with the Penn Orthopaedics Shoulder and Elbow Program are performing reverse shoulder replacement surgery to resolve intractable pain and dysfunction in patients with severe rotator cuff deficiency, failed anatomic arthroplasty, proximal humerus fractures, and arthritis with significant bone loss at the glenoid (socket.)

In traditional arthroplasty, an implanted device replicates the anatomy of the shoulder; a cup replaces the socket at the shoulder and a ball is attached to the humerus. Unfortunately, because the rotator cuff muscles contribute substantially to the movement and stability of the shoulder, standard prostheses are not ideal for patients with rotator cuff tears. In the absence of these instrumental muscles/tendons, conventional arthroplasty often results in instability and failure in patients with rotator cuff tears.

Reverse shoulder replacement surgery employs a prosthesis to switch the anatomy of the normal shoulder, placing the cup at the humerus and the ball at the shoulder socket, and shifting the burden of movement in the joint from the rotator cuff muscles to the deltoid muscles. This simple arrangement avoids the displacement, instability and limitation of motion associated with conventional arthroplasty in the indicated patient populations.

Patients who receive the reverse prosthesis typically report significant reductions in pain and improved function, flexibility and range of movement within three months of surgery. In addition, the post-operative pain management protocol instituted at Penn Orthopaedics has shortened length of stay, and substantially diminished pain and the need for opioid medications in the post-operative period.

CASE STUDY

Mr. M, a 66-year-old man with a year-long history of right shoulder dysfunction, was referred to the Penn Shoulder and Elbow Service for evaluation of progressive weakness, chronic pain and limitation of movement in his right shoulder. At Penn, an X-ray and subsequent MRI of the shoulder demonstrated advanced deterioration of the glenohumeral joint, a retracted rotator cuff tear, and superior migration of the humeral head. After a discussion of his options, Mr. M chose to have reverse shoulder surgery.

Prior to initiation of surgery, anteroposterior and lateral radiographs were taken to determine optimum implant position of both the glenosphere and the humeral component. A percutaneous catheter was then inserted under ultrasound guidance to anesthetize the nerves about the shoulder during surgery. The glenohumeral joint was opened and the subscapularis dissected to allow removal of inflamed tissue from his arthritis and chronic rotator cuff injury.

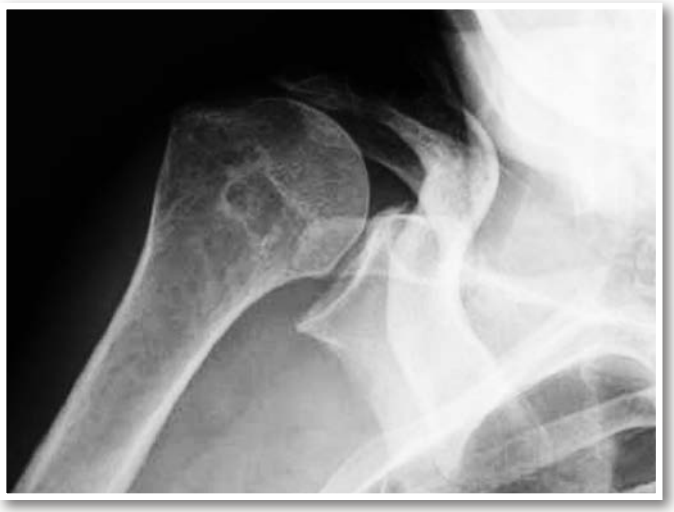

Figure 1: View of the glenohumeral joint demonstrating superior migration of the humeral head and mild reduction of the acromiohumeral space subsequent to a retracted rotator cuff tear.

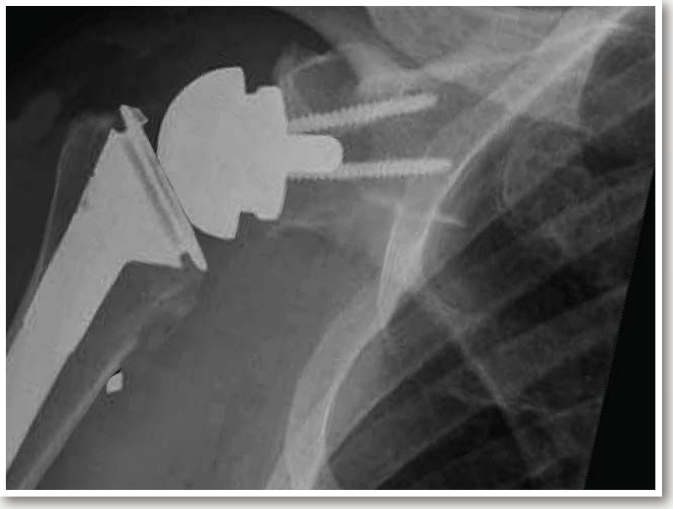

Figure 2: The Reverse Shoulder System attaches a component representing the ball of the humerus directly to the scapula and places a socket at the humeral epiphysis to "reverse" the normal shoulder anatomy and restore the normal shoulder center of rotation in patients with large rotator cuff deficiencies, shoulder arthritis and bone loss at the glenoid/humeral joint.

After removal of the deformed humeral head, the humeral medullary canal was then prepared, and the stem support for the socket inserted and press fit into the humerus for subsequent bony ingrowth. Next, the glenoid was prepared for placement of a baseplate into which bone grows and the glenosphere was locked into this.

Trials were then performed to ensure proper range of motion, soft tissue balance and implant stability, after which the final polyethylene socket

(Continued on back)

CASE STUDY *(Continued from cover)*

was attached to the humerus. The subscapularis tendon was then reattached and the skin closed in layers.

Mr. M's post-operative recovery was uneventful. Prior to discharge from the hospital, an infusion pump was attached at the existing catheter to provide a continuous infusion of anesthetic for several days to treat pain during the post-operative period.

At his two-week follow-up visit, Mr. M reported a substantial reduction in pain and discomfort. He is now more than three months out from surgery, reports no pain, and uses his arm for functions of daily living. He is presently preparing for replacement of his left shoulder.

FACULTY TEAM

The Penn Shoulder and Elbow Service is comprised of a team of orthopaedic surgeons, rehabilitation and family practice physicians, nurses and physical therapists dedicated to patient care. To enhance the mobility, independence, and quality of life of orthopaedic patients, Penn Shoulder and Elbow Service physicians create and use the latest advances in shoulder and elbow diagnosis, treatment and rehabilitation.

Performing Reverse Shoulder Replacement Surgery at Penn Medicine

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CLINICAL RESEARCH

The Penn Orthopaedics Shoulder and Elbow Program is currently involved in a clinical study to evaluate long-term outcomes with the Titan Reverse Shoulder System [NCT02204228]. The trial population includes subjects with gross rotator cuff deficiency and severe arthropathy and patients with or without failed joint replacement.

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