Abstract

Reverse total shoulder arthroplasty was initially approved for use in rotator cuff arthropathy and as chronic pseudoparalysis without arthritis in patients who were not appropriate for tendon transfer reconstructions. Traditional surgical options for these patients were limited and functional results were sub-optimal and at times catastrophic. The use of reverse shoulder arthroplasty has been found to effectively restore these patients function and relieve symptoms associated with their disease. The procedure can be done through two approaches, the deltopectoral or the superolateral. Complication rates associated with the use of the prosthesis have ranged from 8-60% with more recent reports trending lower as experience is gained. Salvage options for a failed reverse shoulder prosthesis are limited and often have significant associated disability. Indications for the use of this prosthesis continue to be evaluated including its use for revision arthroplasty, proximal humeral fracture and tumor. Careful patient selection is essential because of the significant risks associated with the procedure.

Protocol

1. Introduction:

The glenohumeral joint is a complex articulation. It has minimal bony constraints and relies on a complex balance of tensions between supporting soft tissues for normal function. This essential relationship allows the shoulder to have a large functional range of motion. When this balance is uncoupled, varying degrees of dysfunction occur. A loss of function of the rotator cuff, such as a large tear, can cause superior translation of the humeral head on the glenoid. This changes the center of rotation of the glenohumeral joint and subsequently, the tension and moment arms of the remaining musculature, decreasing function. Additionally, the changes in position of the humeral head and subsequent changes in contact pressures can lead to progressive damage to the articular cartilage and resulting painful arthritis. The use of standard shoulder arthroplasty in these cases has provided sub-optimal and sometimes catastrophic results.

Reverse total shoulder arthroplasty (RTSA) provides a solution for these complex problems providing significant improvements in pain, range of motion and function. The RTSA design mediates the center of rotation and brings the humerus to a more inferior position. This change in biomechanics restores tension in the deltoid muscle belly and the functional lever arm, improving the deltoids ability to move the arm in space. Additionally, the painful articular cartilage is removed with the process, significantly improving the patient’s pain.

2. Case Presentation:

This patient is a 71 year-old, healthy female with a history of a "mini-open" rotator cuff fifteen years prior. Over the past year, she has experienced increased pain and weakness in her shoulder with an associated decrease in his range of motion. Her active abduction was 30°, active forward flexion was 40°, active external rotation was 10° and active internal rotation to her gluteus. Her modified bear-hug test demonstrated minimal weakness in the subscapularis tendon and she had a negative horn-blower’s sign and negative lag test. Her passive range of motion showed 75° of forward flexion with a positive drop arm test. The neurovascular exam was otherwise normal and there were no signs of infection associated with the previous rotator cuff repair.

3. Treatment/diagnostic Procedure:

Initial radiographic evaluation of this patient should include a scapular outlet view, a Grashey view, and an axillary view. Depending on the appearance of the glenoid, further study with a CT scan may be needed to evaluate the amount of bony erosion, presence of dysplasia and available bone stock. In our patient, initial radiographs exhibited moderate degenerative changes with superior migration of the humerus evidenced by a decreased acromio-humeral distance. There was not significant bony loss associated with the glenoid. The combination of the patient's history, physical examination and radiographic analysis are consistent with rotator cuff arthropathy with pseudoparalysis. Further diagnostic studies would not be indicated in this patient.

Prior to consideration of any major arthroplasty in any patient a course of conservative measures should be undertaken. These should include medical treatment with anti-inflammatory medications, corticosteroid injections into the communicating subacromial and intracapsular spaces and physical therapy for strengthening and range of motion. After this course of treatment, the patient must be evaluated for their pain, current function, realistic functional needs and desires, quality of life and associated comorbidities. If the risks associated with the procedure are determined to be acceptable for the patients expected benefit, the follow technique for reverse total shoulder arthroplasty can be used.

4. Reverse Total Shoulder Arthroplasty

1. The patient is placed into the beachchair position and the arm is prepped and draped free in standard fashion.
2. The standard deltopectoral incision and approach is done exposing the rotator cuff and subacromial space. Blunt dissection is used to free the inferior surface deltoid from any adhesions to the underlying tissues.
5. Outcomes:
At 6-months follow-up this patient ranked her post-operative pain as a zero out of ten on the Visual Analog Scale. Her active range of motion included forward flexion to 140°, active external rotation of 25° and internal rotation to her gluteus. This patient had no intra-operative or post-operative complications at last follow-up.

6. Conclusion:
In the author’s experience, RTSA provides a patient with rotator cuff arthropathy with reliable pain relief and improvements in range of motion and functional outcomes. This patient was satisfied with the outcomes of this surgery.

Discussion
The use of RTSA for rotator cuff arthropathy provides significant improvements in pain, range of motion and functional outcomes scores. Overall patient satisfaction has ranged from 80-95% in the current literature. Like all procedures, RTSA is not without risk. Initial reports of complication were as high as 60%. As techniques have improved the complication rates have decreased.

Disclosures
No conflicts of interest declared.

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References