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ORIGINAL ARTICLE

Outcome of reverse shoulder arthroplasty with pedicled pectoralis transfer in patients with deltoid paralysis

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Background: Management of shoulder arthritis associated with deltoid paralysis can be very challenging. The purpose of this study was to report the outcome of reverse shoulder arthroplasty with pedicled pectoralis transfer to reconstruct the anterior deltoid in patients with symptomatic shoulder arthritis and a paralyzed deltoid.

Methods: This study included 31 patients with an average age of 51 years (range, 27-73 years). All patients had chronic deltoid paralysis with significant loss of function due to progressive arthritis associated with rotator cuff deficiency. All patients underwent reverse shoulder arthroplasty with pedicled pectoralis muscle transfer. Additional transfers were performed in patients with no preoperative external rotation: 5 underwent latissimus transfer, and 3 underwent direct lower trapezius transfer to the infraspinatus.

Results: At an average follow-up of 37 months, 29 patients had significant improvements in pain; the shoulder subjective value; the Disabilities of the Arm, Shoulder and Hand score; and shoulder range of motion, mainly flexion of 83° and external rotation of 15°. Two patients sustained postoperative acromial fractures and had persistent pain after surgery with minimal improvement in shoulder flexion and external rotation. One of them had a failed attempt at open reduction–internal fixation of the acromion.

Conclusion: Reverse shoulder arthroplasty with pedicled pectoralis transfer is a promising procedure that may lead to improved pain and function in patients with shoulder arthritis associated with deltoid paralysis.

Level of evidence: Level IV; Case Series; Treatment Study

Keywords: Pectoralis; axillary nerve; deltoid; paralysis; reverse; shoulder; arthroplasty

Shoulder arthritis associated with deltoid paralysis is a complex pathology associated with damage to the axillary nerve and resultant disabling shoulder dysfunction. Whether iatrogenic or from a prior trauma, the axillary nerve injury and resultant deltoid paralysis lead to poor shoulder motion and possible instability. Patients diagnosed with a combination of deltoid paralysis and shoulder arthritis have very few surgical management options. Deltoid paralysis has traditionally been thought to be a contraindication to anatomic and reverse shoulder arthroplasty (RSA) because of the associated shoulder dysfunction and instability,[2,3,6,12] particularly with reverse arthroplasty in which the deltoid is the main dynamic stabilizer and the functional motor that moves the shoulder.

The treatment options for deltoid paralysis involve nerve transfer,[7,8,13] tendon transfer,[4,5,9] or glenohumeral arthrodesis.[1,10,11]

Institutional review board approval was obtained prior to the study. Each author certifies that his or her institution approved the human protocol for this investigation and that all investigations were conducted in conformity with ethical principles of research.

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Although isolated deltoid paralysis treated with transfer of a triceps nerve branch to the axillary nerve has shown success in brachial plexus cases without arthritis,[7,8,13] the recovery process takes months to years to see its true effects, and it has not been reported in the setting of progressive glenohumeral joint arthritis. Transfer of the pectoralis major to reconstruct the deltoid has also been described in small case reports[5,9]; however, little is known about the use of these transfers in the setting of arthritis.

To our knowledge, the outcome of RSA with pedicled pectoralis transfer has not been previously reported. The purpose of this study was to report the outcome of RSA and pedicled pectoralis transfer for anterior deltoid reconstruction in patients with symptomatic shoulder arthritis and a paralyzed deltoid.

Methods

Patient population

This study included 31 patients. All patients had chronic deltoid paralysis with significant loss of function due to progressive arthritis associated with rotator cuff deficiency (Fig. 1). All patients underwent RSA with pedicled pectoralis muscle transfer. Additional transfers were performed in patients with no preoperative external rotation: 5 underwent latissimus transfer, and 3 underwent direct lower trapezius transfer to the infraspinatus.

We retrospectively reviewed 31 shoulders in 31 patients (Table I). There were 22 men and 9 women; the right shoulder was involved in 14 cases and the left in 17. The mean age of the patients was 51 years (range, 27-73 years). All patients had chronic deltoid paralysis from axillary nerve palsy, confirmed on electromyography. They presented with marked loss of shoulder function due to progressive arthritis associated with rotator cuff deficiency. The causes of the axillary nerve palsy were as follows: prior shoulder dislocation (n = 11), prior shoulder open reduction–internal fixation (n = 6), brachial plexus injury with no prior nerve transfer (n = 3) or with failed prior nerve transfer (n = 6), prior arthroscopic shoulder osteocapsular arthroplasty with iatrogenic nerve injury (n = 3), and prior gunshot wound (n = 2) (Table II). Of note, in 4 of the 11 patients with prior shoulder dislocation, the injury occurred more than 20 years before presentation.

Table I Patient demographic characteristics

Characteristic	Data
Age, y	51 (range,27-73)
Sex, n	
Male	22
Female	9
Affected shoulder, n	
Right	14
Left	17
Tobacco use, n	
Yes	6
No	25
Diabetes, n	
Yes	3
No	28
BMI	28.2 (range,23-37)

BMI, body mass index.

Table II Cause of axillary nerve injury

Cause	n
Prior shoulder dislocation	11
Prior ORIF	6
Brachial plexus injury with no nerve transfer	3
Brachial plexus injury with failed nerve transfer	6
Prior arthroscopic osteocapsular arthroplasty with iatrogenic nerve injury	3
Gunshot wound	2

ORIF, open reduction–internal fixation.

On examination, gross inspection of the shoulder musculature showed atrophy of all 3 parts of the deltoid (anterior, middle, and posterior), with a positive sulcus sign (+1 in 21 patients, +2 in 6 patients, and +3 in 4 patients). All patients had normal scapulothoracic function. Shoulder flexion and abduction were very limited (average, 15°; range, 0°-30°) (Fig. 2). The findings of the Jobe test were positive

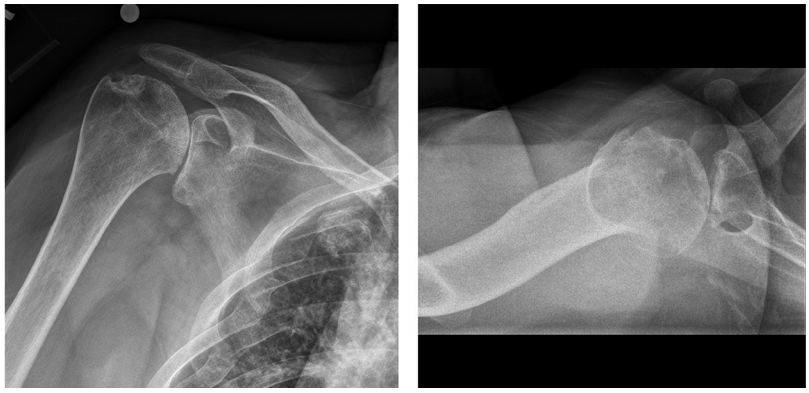

Figure 1 Anteroposterior and axillary radiographic views showing advanced arthritis with proximal migration of the humeral head associated with posterior subluxation in the setting of complete chronic deltoid paralysis.