Acquired Acromion Compromise, Including Thinning and Fragmentation, Is Not Associated With Poor Outcomes After Reverse Shoulder Arthroplasty

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INTRODUCTION:
Background
Acquired acromial compromise, including thinning (less than 30% of the normal acromion) or fragmentation resulting from acromiohumeral impingement or previous acromioplasty, is a concern in reverse shoulder arthroplasty (RSA). This condition may lead to shoulder pain and difficulties in arm elevation because of acromial insufficiency fracture.
Questions/purposes
(1) Do patients with acromial compromise (thinning less than 30% of normal acromion or fragmentation) have worse functional outcome scores, ROM, and strength after RSA compared with patients without acromial compromise?
(2) Are patients with acromial compromise at a higher risk of complications such as acromial insufficiency fracture after RSA? (3) Do patients who develop acromial insufficiency fracture have predisposing associated factors and worse clinical outcomes?
METHODS: Between January 1, 2016, and December 31, 2020, we treated 398 patients with RSA, and all patients were considered potentially eligible for this study. Our clinic is part of the orthopaedic department within a tertiary general hospital, serving patients from across the country. Among them, 49% (197 of 398) of patients were excluded for the following reasons: 8% (31 of 398) because of proximal humerus fracture, 5% (19 of 398) because of osteonecrosis, 9% (35 of 398) because of previous infective arthritis, 5% (18 of 398) because of a deformed shoulder, 4% (14 of 398) because of poor general condition after surgery, 3% (12 of 398) because of death, and another 17% (68 of 398) were lost before the minimum study follow-up, leaving 51% (201 of 398) for analysis. A preoperative acromial compromise was defined as follows: (1) thinning of the acromion (< 3 mm), which means a thickness of less than 30% of the normal acromion thickness (8 to 9 mm), and (2) acromial fragmentation. Acromial thickness was measured using a CT scan. The middle portion of the anterolateral acromion, situated lateral to the distal end of the clavicle, was crosschecked using the axial view. Measurements were subsequently performed from both coronal and sagittal views. In all, 29 patients with acromion compromise and 172 without acromion compromise met the inclusion and exclusion criteria. There was no differential loss to follow-up before 2 years between patients with and without acromial compromise in this study (36% [16 of 45] versus 23% [52 of 224]; p = 0.12). We matched patients using propensity score, pairing them in a 1:3 ratio based on gender, age, bone mineral density, diagnosis, previous rotator cuff repair surgery, subscapularis repair or latissimus dorsi transfer performed during surgery, the type of prosthesis used, and follow-up duration. Twenty-three patients with acromial compromise (acromion compromised group) and 69 patients without acromial compromise (normal control group) were matched; the mean 6 SD duration of follow-up was 40 6 22 months in those with acromial compromise group and 43 6 19 months in normal control group. Pre- and postoperative, functional outcome scores, ROM, and shoulder strength were compared. Shoulder scaption refers to lift the arm in the scapular plane, and scaption strength was measured by applying upward force with the arm at 90° while seated, pushing it as far as possible and measured using a handheld myometer. Complications, including acromial insufficiency fracture, scapular notching, dislocation, periprosthetic infection, and overall risk of complication, were analyzed. Acromial insufficiency fracture was diagnosed based on clinical and radiological findings. Clinically, sudden pain and tenderness at the acromion, along with reduced shoulder elevation, raised acromial insufficiency fracture suspicion. Radiologically, acromion tilt on plain radiograph or fracture line on coronal CT view confirmed diagnosis of acromial insufficiency fracture.
RESULTS:
Comparing both groups, patients with a compromised acromion had no difference in American Shoulder and Elbow Surgeons scores (60 6 12 versus 64 6 12; mean difference -4 [95% CI -11 to 2]; p = 0.16), Constant scores (48 6 10 versus 54 6 12; mean difference -6 [95% CI -13 to 0]; p = 0.06), forward flexion degree (125 6 24 versus 130 6 21; mean difference -5 [95% CI -16 to 6]; p = 0.36), and scaption strength (5 6 3 versus 6 6 3; mean difference -1 [95% CI -3 to 0]; p = 0.13). Having acromial compromise was not associated with increased risk of overall complications (30% [7 of 23] versus 19% [13 of 69], relative risk 2 [95% CI 1 to 4]; p = 0.26). However, the only complication that was higher in the acromial compromised group was infection (13% [3 of 23] versus 0% [0 of 69], relative risk: not available; p = 0.01). Only the lateralized glenoid prosthesis demonstrated negative association with the acromial insufficiency fracture occurrence; no other factors showed an association. The use of lateralized glenoid prostheses was not observed in patients with acromial insufficiency fracture (0% [0 of 7] acromial insufficiency fracture versus 39% [33 of 85] no acromial insufficiency fracture, relative risk 0 [95% CI 0]; p = 0.047).

DISCUSSION AND CONCLUSION: In patients with acquired acromial compromise—such as thinning or fragmented acromion because of advanced cuff tear arthropathy or previous acromioplasty—primary RSA resulted in no different functional outcome score, ROM, shoulder strength, and overall complications compared with the patients without acromial compromise. Our findings suggest that a thin or fragmented acromion may not necessarily be exclusion criteria for RSA, potentially aiding surgeons in their decision-making process when treating these patients. However, one of the major complications, postoperative infection, is more frequently observed in patients with acquired acromial compromise. Pre- and postoperative caution would be necessary to prevent and detect infection even when short-term outcomes are favorable in this study. Further studies with large cohorts and long-term follow-up durations are needed.