Acromion and Scapular Spine Fracture after Reverse Shoulder Arthroplasty: Rate of Detection by CT Scan

Daniel F Schodlbauer, Austin Vegas, Julie Ellen Glener[1], Casey Michelle Beleckas [2], Albert Mousad, Jonathan Chad Levy[3]
[1]Piedmont Bone and Joint, [2]Levy Shoulder To Hand Center At the Paley Orthoped, [3]Levy Shoulder to Hand Center at the Paley Orthopedic & Spine Institute

INTRODUCTION:

Acromion/scapular spine fractures (ASF) after reverse total shoulder arthroplasty have been reported at a rate of 3.9 percent. Radiographs have been shown to be unreliable at identifying these fractures, with an estimated 20% false negative rate. A CT scan is typically performed when initial radiographs are inconclusive and clinical suspicion for ASF remains high. However, the accuracy of identifying ASF fractures after reverse shoulder arthroplasty with CT has not been studied. The purpose of this paper is to evaluate the ability of CT scans to detect clinically suspected ASF fractures after reverse shoulder arthroplasty when initial radiographs are inconclusive.

METHODS:

A retrospective review of our institution's shoulder and elbow repository identified 111 patients treated with reverse shoulder arthroplasty from 2006 to 2022 that subsequently sustained an ASF. Upon clinical suspicion of an ASF, a 4-view radiographic series was obtained. If no fracture was clearly identified, a thin-cut CT was obtained. Additional four-view radiographic series were taken at each subsequent follow-up. Rate of detection by CT scan was defined using the number of cases with positive scans out of the number in which both a CT scan was performed, and a fracture was identified on either CT scan or other additional follow-up imaging.

RESULTS:

After inconclusive radiographs, a CT was ordered for 61 patients (55%) at a median of 1.3 weeks after the onset of signs/symptoms suspicious for ASF. Fractures were identified in 52 cases (85.2%) at a median of 1.6 weeks after the onset of sign/symptoms. The fracture was not seen on CT in 9 cases at a median of 0.9 week after the onset of sign/symptoms, representing a false negative rate of 14.8%. These fractures were later identified on radiographs at a median of 5.9 weeks following the CT scan. No statistical differences were observed in sensitivity of CT scan between fracture types. Fractures initially missed on CT scan eventually displaced and became non-unions.

DISCUSSION AND CONCLUSION:

The results of this study demonstrate CT scans can be helpful in identifying and characterizing ASF following reverse shoulder arthroplasty, with an overall rate of detection (sensitivity) of 85%. Consideration of alternative advanced imaging may be needed for patients with negative CT scans and a high index of clinical suspicion for ASF.

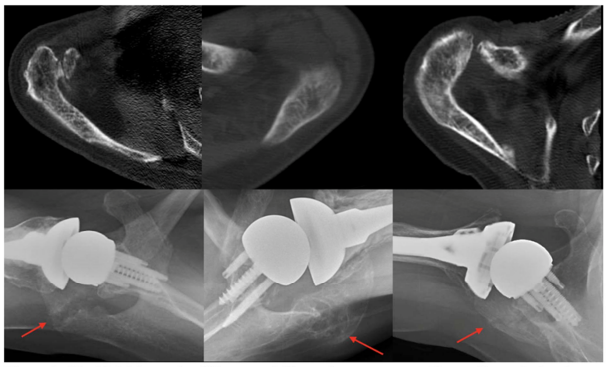

Figure 1. (*Top)* Initial negative CT scan and (*Bottom*) most recent axillary radiograph showing displaced non-united fractures. *Red arrows* indicate (*left to right*) Type 1, 2A, and 2B fractures.

Table I. Modified Levy Fracture Types Detected by Imaging Method

Type	1	2A	2B	3
Total	20 (17.5%)	33 (28.9%)	28 (24.6%)	33 (28.9%)
Initial Radiographs				
True Positive	1	16	16	18
False Negative	19	17	12	15
CT				
True Positive	16	13	10	15
False Negative	3	4	2	0

There was a total of 114 fractures amongst 111 patients with three patients sustaining 2 fracture types.