

Case Report

Spontaneous Fracture of the Scapula Spines in Association with Severe Rotator Cuff Disease and Osteoporosis

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- Osteoporosis
- Scintigraphy
- SPECT/ CT

Abstract

We present the case of a 74 year-old woman with diabetes mellitus and established osteoporosis who initially presented with increasing pain and disability of the shoulders. Investigations showed severe rotator cuff disease. This was treated conservatively with physiotherapy and corticosteroid injection into both joints with good pain relief but no improvement in function. She subsequently presented with increasing posterior thoracic pain with plain films reporting no evidence of rib fracture. Bone scintigraphy showed severe rotator cuff disease and degenerative joint disease at multiple sites. The single photon emission computed tomography (SPECT)/ x-ray Computed Tomography (CT) showed bilateral scapula spine fractures of long standing with a probable non-union on the left side.

These fractures are rare and difficult to treat when associated with rotator cuff disease.

INTRODUCTION

Fractures of the scapula spine are rare, with a reported frequency of less than twenty cases in the literature [1-8]. Of these, bilateral scapula spine fractures account for approximately four cases. The identified aetiologies for these fractures include severe rotator cuff disease, reverse shoulder replacement, osteoporosis, stress fracture and direct trauma. The most common aetiology associated with the finding is reverse shoulder replacement surgery [1,7].

We present the case of a patient with established rotator cuff disease who spontaneously developed increasingly severe posterior thoracic pain which was poorly localised. Plain films of the thorax failed to demonstrate suspected rib fracture and the patient was referred for bone scintigraphy.

CASE

A 74 year-old woman presented for bone scintigraphy with the principal complaint of progressive and increasingly severe posterior thoracic pain which she could not localise. She had a background of type II diabetes mellitus, osteoporosis and severe rotator cuff disease in both shoulders. She had previously undergone bilateral hip replacement surgery with good results. The rotator cuff disease had been treated with physiotherapy following corticosteroid/local anaesthetic injection into both joints. While this had improved the pain profile in the shoulders, the

level of dysfunction remained significant with marked restriction of abduction, flexion and extension. The patient reported that the posterior thoracic pain had started after hanging out her washing on the clothesline. This had progressively worsened over the past six months and was affecting the quality of her sleep as she had difficulty lying on her back. Plain film radiography had failed to demonstrate a suspected rib fracture.

Bone scintigraphy demonstrated bilateral rotator cuff disease (Figure 1) and scapula spine fractures of long standing with callus formation and metabolic activity on the right side only (Figure 2). A lucent line and relatively mild uptake characterised the left fracture (Figure 3), suggestive of non-union, given the length of history (> 3 months). There was evidence of severe rotator cuff-tear disease in both shoulders with the SPECT/ CT study showing "acetabularisation" of the acromion [8] by a high-riding femoral head and impingement bilaterally (Figure 4). Background changes of degenerative changes were widespread in the lumbar spine and elsewhere.

DISCUSSION

Although this injury is quite rare, the bone scan has the potential to contribute a number of significant conceptual pieces of information. Firstly, the patient's symptoms were quite non-specific although they appeared to have an acute onset. Rib fractures were suspected on clinical grounds, and this was subsequently excluded by scintigraphy. Scintigraphy

also provided a definitive diagnosis together with the other principal abnormality of rotator cuff disease. Scintigraphy encodes the fundamental pathophysiology of the process by virtue of its functionality. Hence the scan appearance of the humeral head migrating higher than normal and impinging on

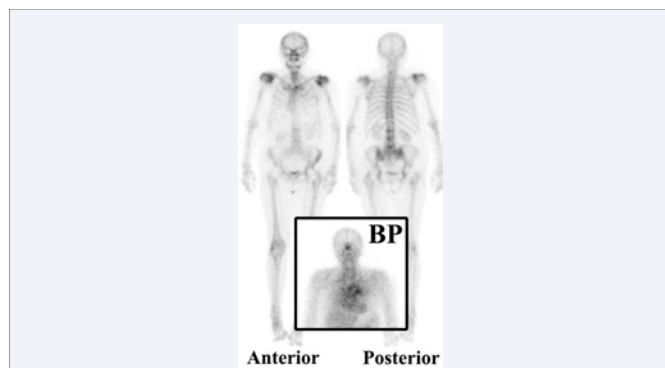


Figure 1 Whole body bone scan. The inset blood pool image demonstrates hyperaemia in both shoulders. The delayed study shows diffuse and intense increase in uptake of tracer in both shoulders. Widespread degenerative changes are apparent elsewhere in the study. There is good fixation of both hip replacements.

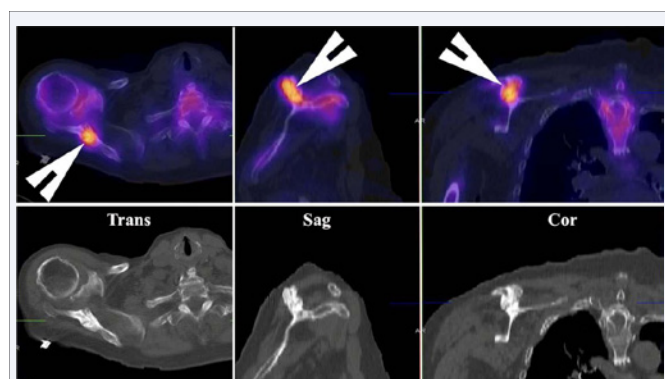


Figure 2 The SPECT/CT images of the right scapula demonstrate intense increase in uptake of tracer in the scapular spine with evidence of a fracture and callus formation (arrowheads). There is uniformly increased uptake of tracer at the fracture site.

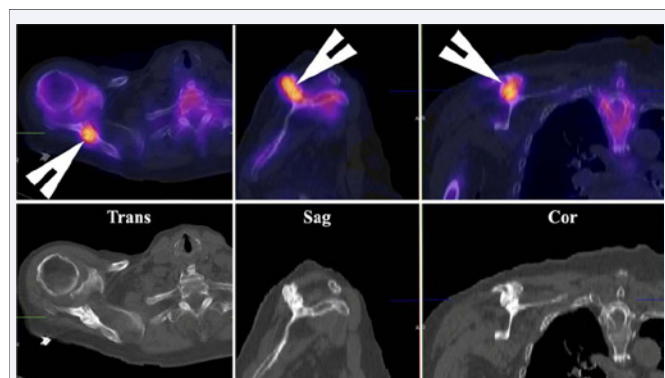


Figure 3 The SPECT/CT images of the left scapula demonstrate mild increase in uptake of tracer in the scapular spine at a site of fracture with her residual lucent line and callus formation around the fracture site.

the acromion to the point where it has been suggested there is a process of “acetabularisation” of the acromion [8]. This is a direct consequence of the severity of the rotator cuff disease, usually due to massive tears with retraction of the supraspinatus/infraspinatus [5]. There is a resultant loss of compression of the humeral head into the glenoid, allowing superior migration of the head and altering the kinematics of the glenohumeral joint [9]. The concept of rotator cuff-tear arthropathy was first described by Neer et al [10] in 1983 in 26 cases of the disease. The pathology involved massive cuff tears with pain and disuse of the shoulder that led to leaking of the synovial fluid and instability of the humeral head. The upward migration of the humeral head leads to subacromial impingement and eventual erosion of the anterior part of the acromion and glenohumeral articular cartilage. Hence the SPECT/CT finding of impingement of the humeral head with increased uptake and sclerosis (Figure 4).

The increased stress on the acromion is due to the rotational movement imparted by impingement of the humeral head on its anterior aspect (Figure 5C), which is transmitted to the scapula spine during any abduction of the humerus [5]. Such a stressor leads to remodelling of the acromion and scapula spine in keeping with Wolff's law [11], eventually resulting in a stress fracture [4] over time. However, this patient who also had established osteoporosis would have suffered from a much earlier insufficiency fracture [3]. Her pattern of history suggests that the fractures probably occurred 6 months earlier when she experienced acute pain while hanging her washing on the clothesline, when her humerus would have been repeatedly abducted.

The other great advantage of scintigraphy is that it signals the metabolic status of the fracture site as to whether there is non-union or delayed healing. Evidence from the literature [12] suggest that there is a good chance of healing when there is uniformly good uptake at the fracture site (>85% chance of

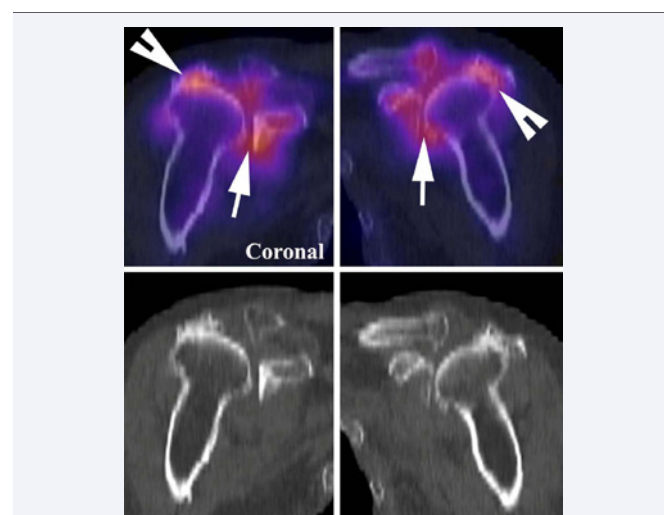


Figure 4 Coronal images of both shoulders demonstrate superior migration of both femoral heads with impingement against the acromion. Increased isotope uptake and sclerosis are evident at both sites (arrowheads). Migration of the humeral heads out of the glenoid is also apparent on both sides (arrows). Diffuse increase in uptake of tracer is present around the entire joints in keeping with an arthropathy.

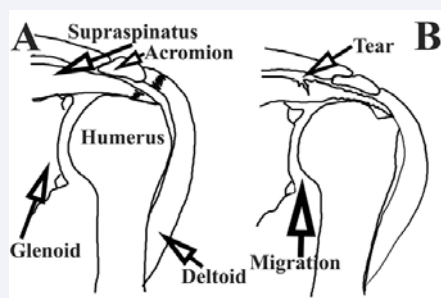


Figure 5 Graphical illustration of the pathophysiology of the scapular spine fracture. Panel A demonstrates the normal congruity of the humeral head and glenoid. Panel B demonstrates the upward migration of the femoral head and its impingement against the acromion due to loss of the compressive force of the supraspinatus/infraspinatus muscles.

healing) compared with reduced uptake in the fracture line but increased uptake at the ends of the fragments (~43% chance of healing) or reduced uptake in the fracture line and at the ends of the fragments which universally required surgical fixation. This patient has a good chance of healing on the right side due to globally increased uptake and little chance of healing on the left due to globally reduced uptake around the fracture. Although there is limited data available, it would appear that scapular spine fractures may require surgical fixation due to delayed healing or non-union in order to achieve an adequate functional response in these patients who are often elderly and would otherwise lose their independence [5].

CONCLUSION

We present a rare but distressing case of bilateral fractures of the scapula spine in association with severe rotator cuff-tear arthropathy. Diagnosis and several prognostic factors were provided by the bone scintigram. The pattern of uptake and the morphology of the SPECT/ CT study allow evaluation of the mechanism of injury and directly indicate that there must be a high-grade tear of the supraspinatus/ infraspinatus part of the cuff to allow superior migration and impingement of the humeral heads against the acromion.

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