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CASE REPORT

Stress fracture of the acromium presenting as a suspected metastasis: A rare consequence of deltoid strengthening program in rotator cuff arthropathy

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Introduction

Acromial fractures constitute 9% of fractures of the scapula, which amounts to 3–5% of shoulder girdle injuries.⁵ Stress fractures have been previously described in the body of the scapula, the acromium,^{7,9} the superomedial corner,¹⁰ the lateral border and the coracoid process.¹ We describe a stress fracture of the base of the spine of the scapula in a patient with bony metastatic disease who was investigated for a possible scapula lesion on the basis of an increased uptake in this area on an isotope bone scan. Further imaging demonstrated a stress fracture secondary to the patient performing vigorous deltoid strengthening exercises. The radiological diagnosis was equivocal on an early MRI and isotope bone scan but a CT scan proved diagnostic.

Case report

An 85-year-old woman with a with a 1 year history of progressive right shoulder pain and associated night

pain was evaluated. She had been previously diagnosed with metastatic carcinoma of an unknown primary origin 6 months prior to her presentation to the shoulder unit. This was on the basis of a symptomatic bony metastasis to the 10th thoracic vertebra. A Magnetic Resonance Imaging scan had suggested a metastatic lesion which was confirmed on a vertebral body biopsy. The histology was consistent with a metastatic carcinoma but further investigations did not reveal either a primary tumour or other metastatic lesions.

On examination there was wasting of the supraspinatus and infraspinatus. Forward active elevation of the shoulder was limited to 60°, active abduction to 40°, active external rotation to 45° with internal rotation to the level of the greater trochanter with poor cuff output. There was no bony tenderness. Radiographic evaluation (*Fig. 1*) showed superior migration of the humeral head with reciprocal changes in the acromium consistent with a cuff arthropathy.

The initial recommended treatment was deltoid rehabilitation to compensate functionally for the deficient rotator cuff. At 3-month follow-up, she reported good pain relief and increased active range of motion with this program. At oncological review, an isotope bone scan was ordered as the patient

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Figure 1 AP radiograph of the right shoulder demonstrating superior migration of the humeral head.

described non-specific generalized bone pain. This demonstrated focal increased uptake within the right glenoid, not noted previously, raising the question of a coincidental osseous metastasis. A subsequent MRI of the right shoulder suggested a suspicious lesion in the spine of the right scapula (Fig. 2). To further evaluate the bony pathology a CT scan was performed (Fig. 3). This demonstrated a stress fracture through the base of the acromial process with no evidence of a malignant process. The patient was treated by rest and at latest follow-up, 6 months post presentation, had no shoulder symptoms.



Figure 2 A contrast enhanced axial section MR image (T1-weighted image) of the right gleno-humeral joint.

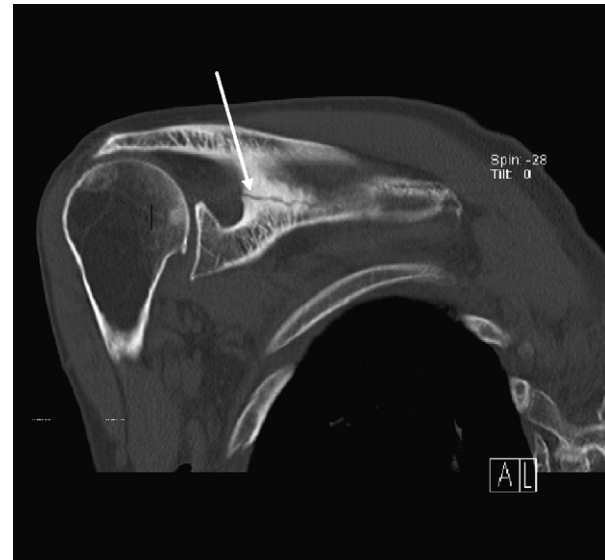


Figure 3 Axial section CT image of the right shoulder showing a fracture through the base of the spine of the scapula.

Discussion

Stress fracture of the acromium is a rare complication of rotator cuff arthropathy and in this case presented as a possible bony metastasis in a patient with known bony metastatic disease with non-specific pain.

A review of the literature highlights several previous reports of stress fractures of the scapula due to either repetitive subcritical loads^{5,7} or a single muscle contraction.⁷ Being relatively mobile on the chest wall, the scapula is generally well protected from physical strain.

In our case, the mechanism was probably rigorous forward elevation of the arm as she performed her deltoid exercises. Dennis et al.² in his series of three cases described acromial stress fractures associated with cuff-tear arthropathy. He suggested that superior migration of the humeral head in association with rotator cuff arthropathy ensued until the head articulates with and erodes the undersurface of the acromial process resulting in acromial thinning.² In our lady, the rigorously performed deltoid regime is likely to have applied additional stress to the already thinned and weakened acromion process thereby resulting in a stress fracture.

It is often difficult to visualize this fracture without adequate penetration radiographs in the correct plane. Roy et al.⁸ advocate the axillary view as the best projection for diagnosis. Previously published cases have either been linear undisplaced fractures or diagnosis on isotope bone scans. If a plain radiograph turns out to be negative, then either an MRI or

bone scan should be considered to further evaluate the clinical finding.⁴

The advantage of MRI is better spatial resolution and better specificity for stress fractures.³ MRI is able to easily detect minor stress reactions such as bony contusions on a short T1 inversion recovery (STIR) sequence or a fat-suppressed T2-weighted fast spin echo (FSE) sequence. It is sensitive enough to detect further malignant entities which result in marrow distortion and adjacent soft tissue abnormalities thereby distinguishing pathologic from stress fractures.³

In comparison to MRI, CT has a lower sensitivity for stress reactions and fracture thus a higher rate of false negatives (sensitivity: 88% versus 42%).⁴ However, where a lucent fracture line is not visible on plain radiographs, CT may be helpful in demonstrating vertical or oblique fracture lines.⁶ In addition, CT is also useful in confirming the diagnosis of other similar radiological conditions such as a nidus in osteoid osteoma or permeative filtration or cortical destruction in tumour or infection.

Conclusion

Shoulder pain is a common complaint in elderly patients. We believe the diagnosis of a stress fracture of the acromium, although a rarity, should be considered in patients with cuff arthropathy who develop pain after commencing deltoid rehabilitation. The routine use of good quality axillary radiographs in such patients may yield a higher rate of diagnosis. Whilst it is true that MRI is the single best

technique in assessment of patients with a suspected stress fracture which is radiographically occult, occasionally even MRI and bone scans in combination may prove inconclusive. It is in this scenario that a diagnostic CT may prove invaluable.

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