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Stress fracture of the clavicle in a case of frozen shoulder: Case report and review

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Abstract
Stress fractures are usually a rare incidence, but if it occurs, its more common in the lower limbs. Upper limb stress fractures are comparatively quite rare, wherein clavicular stress fractures are particularly uncommon. There have been a very few reported cases of clavicle stress fractures, and the cases have been reported in patients with nervous tics, post radical neck dissection and rarely due to sports.
We report a case of clavicle stress fracture of a 55-year old female, who has been suffering from frozen shoulder.

Keywords: Stress fracture, frozen shoulder, sports

Introduction
Stress fractures are injuries commonly noticed in athletes and are usually caused by overuse [3, 6]. Stress fractures in upper extremity is very rare when compared with lower extremity [4].
Clavicular stress fractures are so rare that only less than 20 cases has been reported yet [1-9]. Causes can be idiopathic [2, 8], sports related [1, 3, 5, 8], nervous tics [9], post radical neck dissection, following coraco clavicular ligament reconstruction [8].
This is the first reported case of stress fracture of the clavicle in a case of frozen shoulder.

Case report
A 55 year old female, a known case of T2DM and Hypothyroidism under regular treatment. She is a homemaker.
She came to our out-patient department with the complaints of restriction of movements in her left shoulder for past 2 months. But recently, in addition to the restriction, the shoulder started to ache, even with a mild attempt to move. She has no history of trauma. Pain is mainly localised to the mid-shaft of the clavicle. Pain is non-radiating and increased with shoulder movements.
She has been doing her daily activities even with the limited and restricted movements of her left shoulder for past 2 months.
She was clinically found to have shoulder movements of 0 to 60 degrees of abduction and 0 to 60 degrees of flexion. There was a severe bony tenderness over the mid shaft of the clavicle.
She was advised for a X-ray of the shoulder and the radiograph did reveal the fracture of the clavicle in the mid shaft. [Figure 1]

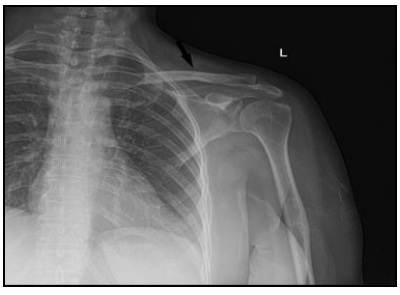

Fig 1: X-ray of the shoulder and the radiograph did reveal the fracture of the clavicle in the mid shaft

Discussion

Stress fractures usually occurs in lower limbs. Even if they occur in upper limbs, it has been reported due to upper limb dominated activities, such as throwing sports, swimming, baseball pitching and tennis.

In our case, the major stress riser for the clavicle was its anatomical contour and altered biomechanics due the frozen shoulder, thus making the junction of the medial two third and lateral third the vulnerable area.

The lateral one-third of clavicle is flat in shape and changes into spiral contour from the middle third. Thus, potentially making it the weakest site.

Due to the frozen shoulder, the shoulder joint along with scapula, lateral third of clavicle and its attached muscles were acting as a single unit, thus whenever she tried moving her shoulder it led to loading and bending stresses on the clavicle and eventually causing the stress fracture at the weakest site.

The probable contributory reason being the opposite attachment of the two powerful muscles, trapezius and deltoid. There are 5 important muscles which are attached to the clavicle. Trapezius has insertion over superior surface of lateral one-third and superior surface of medial one-third of clavicle gives sternocleidomastoid origin. Antero-inferiorly deltoid originates from lateral one-third and pectoralis major arises from superior surface of medial half of the clavicle. Subclavius is attached to the inferior surface over the middle half.

Deltoid is the major abductor of the arm and trapezius helps to elevate the scapula. In this case of frozen shoulder, in an attempt to abduct, deltoid has to pull the arm more against resistance and causing bending stress on the lateral one third of clavicle. With contraction, the pectoralis major and deltoid muscles produce a downward force, while the trapezius and sternocleidomastoid muscles will oppose this movement. Repetitive activation of these muscles results in enough strain to create micro architecture disruption, eventually leading to the stress fracture at its weakest point.

Thus, every patient with frozen shoulder should always be checked for tenderness over the shaft of the clavicle, especially at the junction of middle and lateral third and a radiograph of clavicle to rule out the stress fracture before planning for shoulder manipulation.

During shoulder manipulation one hand of the surgeon should be over the clavicle and scapula. Thus, the proximal segment of the girdle is stabilised and the other hand should be used for manipulation of the shoulder. This would definitely prevent the movement of the clavicle and prevents further displacement of the fracture.

Clavicle stress fracture should always be considered as a differential diagnosis for shoulder or clavicle pain, especially in cases of frozen shoulder, before planning the further treatment.

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