Case Report

Stress fracture of the clavicle in a young adolescent male - A case report

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Introduction

Traumatic fractures of the clavicle are very common in adults and children. The incidence of this in the adolescent and adult population is reported to be 29–64 per 10,000 [11,13,16]. Stress fractures of the clavicle, by comparison, are relatively rare. In this case report, we discuss a 13-year-old male who developed shoulder pain after performing multiple triceps dips [8]. Plain radiographs demonstrated an un-displaced stress fracture of the medial aspect of the clavicle.

Case report

KM, a left hand dominant, fit and well 13-year-old boy presented with a five day history of pain and swelling over his right clavicle. Pain suddenly developed while performing body weighted triceps dips, an exercise which he regularly performed over the past school year during break. On this occasion, he had performed approximately 20 triceps dips when he noted an uncomfortable ‘pop’ sensation, immediately associated with pain over the right clavicle, radiating to his shoulder. Prior to this incident, he had no pain in the area. On examination, he had some pain and tenderness over the medial aspect of the clavicle. His limb was distally neurovascularly intact otherwise. Plain film X-rays showed a unicortical stress fracture at the junction of the middle and medial third of the clavicle (see Fig. 1). He was immobilised and followed up in the fracture clinic 4 weeks later. X-rays at that stage showed that the fracture had early callus formation (see Fig. 2). On examination in clinic, he had no pain over the clavicle and normal range of motion. He was thus discharged from the clinic, with no further scheduled follow up.

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Discussion

The clavicle is a sigmoid shaped long bone which articulates with the acromion and the sternum. It is the first long bone to ossify, and begins intramembranous ossification in the fifth week of foetal life. It is also the last bone to complete fusion of its epiphysis [11]. While the clavicle protects the axillary vessels and the brachial plexus, it also acts as a strut for the upper extremity. Several muscles have important attachments to the clavicle. With contraction, the deltoid and pectoralis major produce a downward force, which is opposed by the action of trapezius and sternoclidomastoid.

Stress fractures are relatively common in the sporting population, accounting for up to 10% of all injuries [10]. They are often related to overuse or significant compressive loading, and usually occur in the lower extremities [9]. Stress fractures of the upper extremity are uncommon, and are usually associated with upper limb dominated activities such as swimming, tennis, and weight lifting. They account for up to 9% of all stress fractures, and have been recognised in the scapula, clavicle, humerus, and the ribs [4].

Clavicle stress fractures are particularly rare. They have been described in patients secondary to a nervous tic [19], following a radical neck dissection [6], and in two cases have been reported as idiopathic with no cause identified [3,12].

This case report describes several unique factors related to a rare stress fracture of the clavicle: the fracture was clearly demonstrated on plain radiograph, the patient was a 13-year-old boy, and the fracture occurred in the medial aspect of the clavicle. Only eight cases have been reported related to sporting injuries [1,2,5,7,14,15,17,18], and to our knowledge, this is the first case report of a stress fracture of the clavicle in an adolescent male performing body weight exercises. The exact mechanisms of stress fractures in the clavicle have not been clearly identified. It was suggested that in the case of the javelin thrower, repetitive contraction of the deltoid and the pectoralis major were suggested causes [2]. Whereas in the diver, it was suggested that the fracture occurred from the stress of repeatedly striking the water, which radiated up the arm into the clavicle [17]. We believe that repetitive action of the synergistic effects of the deltoid and pectoralis major on the clavicle during a triceps dip may have caused microarchitecture disruption, contributing to the development of a stress fracture in this adolescent male.

Conclusion

Overall, this case study represents a stress fracture of a clavicle with a unique mechanism of injury in a young adolescent male. The body weight exercise of performing repetitive triceps dips caused forces to be rapidly transmitted to the clavicle, via the actions of the pectoralis major and deltoid muscles, to cause the fracture. This case study highlights the importance of including stress fractures in the differential diagnosis of shoulder pain in a young athletic adolescent.

Declaration of competing interest

None.
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