Online Case Report

Stress fracture of the clavicle in a patient with no obvious risk factors

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A 28-year-old woman presented with right shoulder pain and, after a delay, a diagnosis of clavicular stress fracture was made. The patient gave no history of repetitive abnormal loading of the upper limbs which could have assisted the diagnosis. The authors wish to raise awareness of this rare diagnosis such that it can be considered in the differential for shoulder pain of unclear origin.

Key words: Stress fracture – Clavicle – Shoulder pain

Stress fractures of the upper limb are generally much less common than in the lower limb¹ and those of the clavicle are rare even within this group. Stress fractures of the clavicle have been described in athletes, following radical neck dissection and as an occupational injury in a cable-maker.² There are no reports in the literature of stress fractures of the clavicle in patients with no particular or obvious predisposing factors.

The authors describe a clavicular stress fracture in a patient with no clear predisposing activity, surgery or underlying bone disorder.

Case report

A 28-year-old Caucasian woman presented to accident and emergency with right shoulder pain. She was of slim build, 1.57 m tall and weighing 56 kg (body mass index, 22.7). Fracture of the clavicle was not suspected, as there was no history of trauma or risk factors. She gave no history of trauma, exercised twice a week at a gymnasium but did not undertake excessive repetitive movements or high-strain activities. Her gymnasium routine involved a balanced programme of cardiovascular and muscle

conditioning work. She used fixed-weight equipment to work all major muscle groups and undertook both weight bearing and non-weight bearing aerobic exercises.

Her work, as a staff nurse, involved moving patients with approved techniques and some lifting of equipment. This comprised 20% of her workload with no repetitive tasks. She had no significant past medical history, normal menstrual history and took no regular medications. There was no history of increase or change in her work or leisure activities prior to the presentation.

She was examined and the shoulder X-rayed, the medial clavicle was not imaged and no bony abnormality of the shoulder was seen. Her symptoms became centred on the medial end of the clavicle 1 month later and she was re-examined. Radiographs of the clavicle taken at this time revealed a lesion of the medial clavicle and she was referred to our clinic (**Fig. 1**).

Computed tomography (CT) and magnetic resonance imaging (MRI) scans revealed changes consistent with an incompletely healed fracture (**Figs 2 and 3**). Calcium, phosphate, alkaline phosphatase and parathyroid hormone assays were normal.

Figure 1 Plain radiograph of clavicle at time of diagnosis.

Figure 2 Computed tomography scan of clavicular fracture.

She was managed with rest and wore a broad-arm sling as required for analgesia purposes. Three months after the onset of symptoms, she was able to undertake normal activities. Soon after this, she returned to work but did not perform any moving or handling. Her symptoms returned, however, 2 months later (6 months after initial onset). Repeat plain radiography and CT assessment confirmed non-union

of the fracture. An X-ray guided percutaneous biopsy of the fracture was performed and revealed only bone necrosis with no abnormal features.

Surgery was therefore carried out, 8 months after the original onset of symptoms. An open biopsy was performed, followed by iliac crest bone grafting and internal fixation with a reconstruction plate. Histology from this biopsy revealed

Figure 3 Magnetic resonance image of clavicular fracture.

resorption of bone and active bony regeneration with no evidence of neoplasm, consistent with the diagnosis of stress fracture.

Five months following surgery, she was pain free and the fracture appeared to have healed on plain radiographs (**Fig. 4**). She did, however, suffer some cold intolerance and dysaesthesia inferior to the plate, which was also prominent.

Discussion

The clavicle is the only bony connection between the upper limb and the axial skeleton and, as such, is the main route for energy transfer from hand to trunk. Stress fractures occur when bone damage exceeds repair as a result of an excessive magnitude or frequency of loading. There are a variety of circumstances in which stress fractures of the clavicle have been described; all involve repetitive activities of the upper limb or alteration in the biomechanics of the clavicle.

The reports of clavicular stress fractures in athletes include those involved in gymnastics,³ rowing,⁴ platform diving⁵ and baseball.⁶ These sports share common features with others associated with upper limb stress fractures, such as throwing activities. There has been a report of stress fracture of the first rib in a soccer player, where no repetitive upper limb use occurred.⁷ The authors of the paper believed repetitive 'heading' of the ball brought about the fracture; thus, although their patient did not use the upper limbs, it seems likely a repetitive activity was to blame.

There is no epidemiological evidence regarding stress fracture or other musculoskeletal trauma in accident and emergency department nurses. Nor is there such data available for women exercising twice weekly.

Our patient is a reliable historian and gives no history to explain her stress fracture. Her recreational gymnasium use did not involve any excessive or repetitive training with weights. Her occupation as an accident and emergency staff nurse involves a wide

Figure 4 Plain radiograph of clavicle following open reduction and internal fixation with bone graft.

variety of tasks around the department. In addition to this variation in the requirements of her work, modern moving and handling techniques discourage repetitive loading of a single anatomical area. However, the site and radiological appearances in this case are typical of stress fracture. In addition, the histological, biochemical and radiological investigation excluded an underlying bone disease.

In patients with a clear history of repetitive abnormal loading of the clavicle, the rare diagnosis of a stress fracture of the clavicle may be suspected. However, this case raises awareness to the occurrence of this condition in a person with no obvious predisposing factors.

Her clinical course was unusual. It is generally accepted that upper limb stress fractures heal with conservative treatment.¹ It is the authors' opinion that 8 months was adequate time for non-operative management as this included 4 months of nearly complete rest of the limb. The outcome of open reduction and internal fixation was,

however, more routine. The fracture healed but the subcutaneous plate was symptomatic.

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