CASE REPORT

Sternal stress fracture in a middle-aged woman

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SUMMARY

A middle-aged premenopausal woman presented with 3 months of right chest wall pain after beginning a new weight training programme. Examination was significant only for mild-to-moderate tenderness to palpation over the right pectoral muscle and sternoclavicular joint. In-office musculoskeletal ultrasound scan, chest X-ray and shoulder X-rays were unremarkable. Subsequent MRI of the chest wall showed oedema in the sternum at the level of the sternoclavicular joint consistent with a sternal stress fracture. She was started on calcium and vitamin D supplementation and told to rest for 6 weeks. After this she began to gradually increase her activity and was pain free after 4 months.

BACKGROUND

Sternal stress fractures are exceedingly rare injuries. Our case involves an otherwise healthy woman without known risk factors. The age, historical presentation, mechanism of injury and the association with recreational fitness training are atypical features when compared with earlier case reports.

CASE PRESENTATION

A 46-year-old healthy premenopausal woman presented to our sports medicine clinic with 3 months of right chest wall pain. She initially felt pain while cycling when she was 'hunched' over the handlebars, but denies any other inciting event. Pain was described as soreness and a dull ache that worsened at night so that she could not lie on her right side to sleep. Prior to the onset of symptoms, she had initiated work outs with a personal trainer for 3–4 months that focused on upper body exercises. The pain never stopped her from weight lifting as she could always complete her work out, but afterwards felt extremely sore in the right chest wall. She denies fevers, sweats, chills, weight loss, shoulder pain, neck pain or radiculopathy.

Examination revealed a well-appearing woman in no distress. Chest wall examination revealed mild diffuse tenderness to palpation over the right pectoral muscle and moderate tenderness to palpation over the right sternoclavicular joint. Shoulder examination was normal except for pain with cross-adduction that reproduced pain in her chest wall but not in her acromioclavicular joint. Remaining shoulder, neck, heart and lung examinations were normal.

INVESTIGATIONS

In-office musculoskeletal ultrasound scan revealed normal clavicle, sternoclavicular joint and acromioclavicular joint. Two-view chest X-ray and three-view shoulder X-ray were both normal. Subsequent

MRI of the chest wall showed marrow oedema in the right aspect of the sternum at the level of the sternoclavicular joint (figures 1 and 2).

DIFFERENTIAL DIAGNOSIS

A middle-aged woman presenting with insidious onset of right medial chest wall pain after an increasing weight training programme could have a stress fracture of the sternum or first/second rib, chronic insertional pectoral muscle tear, costochondritis or sternoclavicular osteoarthritis. Given the close proximity of these anatomic structures, advanced imaging with MRI helps to differentiate these possible diagnoses. This is important as treatment can vary widely based on the condition, and treatments for certain conditions may impede the healing of others. For instance, a corticosteroid injection would help the pain associated with sternoclavicular osteoarthritis and anti-inflammatories would be appropriate treatment for costochondritis. However, both these treatments could potentially impede the healing of a chronic insertional pectoral muscle tear or a stress fracture. Although unlikely, a moderate degree of coronary artery disease that would only be symptomatic with maximal physical exertion could also be considered in the differential diagnosis.

TREATMENT

Based on the MRI results, the patient was diagnosed with a sternal stress fracture. She was started on calcium and vitamin D supplementations as this has previously been shown to decrease incidence of stress fractures in female navy recruits.¹ She was also fitted with a figure-of-8 brace to be worn as needed for comfort. The patient was told to avoid heavy pushing, pulling or lifting activities for 6 weeks.

Figure 1 Axial image of MRI chest wall with marrow oedema at the right aspect of proximal sternum at the level of the sternoclavicular joint.

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Figure 2 Coronal image of MRI chest wall with marrow oedema at the right aspect of proximal sternum at the level of the sternoclavicular joint.

OUTCOME AND FOLLOW-UP

At the 6-week follow-up visit, her pain had 40% improved and she was started on a very light weight lifting programme as long as pain was minimal. At 3 months follow-up, her pain was 75% improved and her weight lifting activity was increased. At 4 months follow-up, she was pain free and allowed to do unrestricted activity.

DISCUSSION

To the best of our knowledge, this is only the eighth case reported in the literature of an atraumatic sternal stress fracture in a patient who was not elderly and had no osteoporosis risk factors. Keating discussed a 19-year-old wrestler who sustained this doing hyperextension trunk stretches.² Robertsen *et al*³ reported on a 26-year-old man who was doing strenuous abdominal work out and felt a sudden sharp pain during a sit-up. McCurdle *et al*⁴ and Hill *et al*⁵ described three cases of female military recruits who developed acute chest wall pain while doing tricep dips. Swarup *et al*⁶ reported on a 14-year-old boy who sustained an atraumatic sternal fracture after trying to lift his body over his arms and felt sudden chest pain. Finally, Barbaix⁷ described a 23-year-old semiprofessional golfer who developed a several day history of worsening chest wall pain after 1 month of intense training with a new set of golf clubs. With the exception of the previous presentation by Barbaix, all of the cases involved acute episodes of atraumatic chest pain,

with subsequent X-rays showing a fracture line. This is in stark contrast to our case, in which the patient had several months of vague pain and a normal X-ray.

Sternal fractures are generally the result of direct trauma, particularly in motor vehicle accidents. Frequently, this will involve the driver with the so-called 'steering wheel' injury. However, our case adds to the literature that a stress injury can occur in the unusual location of the sternum. It usually occurs in conjunction with a rapid increase in upper body exercises. We advocate that sternal stress fracture should be added to the differential diagnosis of acute and chronic chest wall pain, particularly in patients who are new and untrained weight lifters.

Learning points

- ▶ Sternal stress fracture should be part of the differential diagnosis for chest wall pain.
- ▶ New and untrained weight lifters are at higher risk.
- ▶ Rest is the mainstay of treatment.
- ▶ The X-ray can be normal so MRI may be needed to diagnose.

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