

Stress Fracture of the Neck of the Seventh and Eighth Ribs: A Case Report

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Abstract:

Purpose: This article describes a previously unreported site of stress fracture.

Case summary: A 20-year-old female sculler presented with a 10-day history of posterolateral thoracic pain and marked tenderness maximally over the seventh and eighth costovertebral joints. A radioisotope bone scan showed foci of increased uptake posteriorly in the region of the seventh and eighth ribs. Computed tomographic scan confirmed the diagnosis of stress fracture of the neck of the seventh and eighth ribs.

Discussion: Stress fractures of the ribs have previously been reported in rowers. All previous reports have involved fractures in the posterolateral aspect of the ribs. The mechanics of this fracture at the neck of the ribs is uncertain.

Relevance: This case is the first reported of a stress fracture of the neck of the ribs. It should be considered in the differential diagnosis of a rower with thoracic spine pain.

Key Words: Stress fractures—Ribs—Rowing.
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A 20-year-old National level woman sculler presented with posterior and posterolateral thoracic pain over the previous 10 days. She described the pain as a dull ache that would come on ~30 min into a routine training session. She was able to row each day but noticed pain on reaching for the catch. There was no history of similar episodes, but on occasions she had suffered low back pain. There was no anterior chest pain, no cardiac symptoms, no sensory symptoms, no motor weakness. She had a regular menstrual cycle and had not been pregnant. She was not on any hormonal or dietary supplementation. There was no past history of fractures or stress fractures and no family history of osteoporosis.

On examination the patient had full range of motion of the thoracic spine and shoulder joint. On palpation there was moderate tenderness over the spinous process of T-7 and mild tenderness over the spinous process of T-8. There was moderate tenderness over the T7-8 apophyseal joint and marked tenderness over the T-7 and T-8 costovertebral joints.

A plain radiograph was ordered and showed no abnormality. The provisional diagnosis was costovertebral joint sprain. The other differential diag-

noses included thoracic joint sprain, thoracic disc disruption, and paraspinal muscle sprain.

The patient was treated with rest from rowing, local electrotherapy, and joint mobilisation. After 4 days there was no improvement, so a corticosteroid injection was performed to the costovertebral joint. The addition of local anaesthetic to the corticosteroid injection resulted in short-term complete alleviation of the symptoms; however, after a few hours, pain and tenderness returned, and there was no improvement over the following few days.

A radioisotope bone scan was then performed (Fig. 1). It showed foci of increased isotope uptake at the posterior end of the right seventh and eighth ribs, the appearances consistent with fractures. A CT scan was ordered but due to the patient's study commitments could not be performed for 3 weeks. The appearances showed evidence of callus formation at the fracture sites (Fig. 2). The final diagnosis was stress fractures of the neck of the seventh and eighth ribs.

Treatment consisted of rest from rowing for ~3 weeks until pain-free, followed by a graduated return to activity. Full rowing was resumed after 6 weeks. Fitness was maintained during this period of inactivity, and careful attention was paid to possible technique faults in conjunction with the coach.

DISCUSSION

Although rib stress fractures have been reported widely among rowers, this is the first case of reported stress fractures at the neck of the rib.

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Stress fractures of the ribs can be divided into stress fracture of the first rib and stress fractures of the lower ribs. Stress fractures of the first rib have been widely reported and occur most commonly in pitchers (1,3,5,6,8-10,12). These fractures typically occur in the groove for the subclavian artery. This groove also lies between the forces pulling up on the rib (scalenus) and forces pulling down (intercostals and serratus anterior). Stress fractures of the first rib are typically slow to heal, and the development of a pseudarthrosis or nonunion are not uncommon, however usually nonpainful.

Stress fractures of the lower ribs have been less commonly reported; however, in recent years, the number of reports appear to have increased (4,7,11), possibly due to an increase in the number of women taking up the sport of rowing. Holden and Jackson (4) reported seven cases of stress fractures of the lower ribs in women athletes. Four were elite rowers, and one each was engaged in tennis, golf, and gymnastics. The rowers were all elite scullers. Rassad (11) reported three cases of rib fractures in young golfers, and McKenzie (7) reported a stress fracture of the rib in an elite oarsperson.

All previous rib stress fractures reported in the

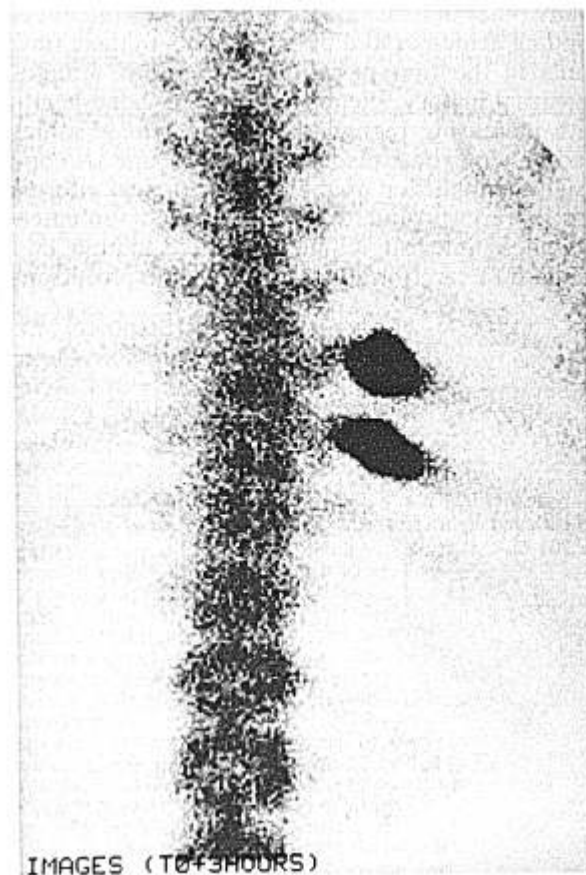


FIG. 1. Radioisotope bone scan showing focal uptake of technetium in the posterior seventh and eighth ribs on the right side.



FIG. 2. CT scan appearance, 3 weeks after radioisotope scan, showing evidence of callus formation at the fracture site.

literature have been in the postero-lateral region. This is thought to be the area that would undergo the greatest bending, shear, tensile, and compression stresses and therefore have the highest bending stress (2). This is thought to be mainly due to the force couple of scapular retraction and protraction acting through the serratus anterior muscle.

The mechanism of the fracture in this case, at the neck of the seventh and eighth ribs, is more difficult to determine as there are no muscles attaching to this area of the rib. This patient had not had any recent change of training or technique. She was performing a regular weight circuit, but was not using heavy weights.

CONCLUSION

This is the first case of stress fracture of the neck of the ribs reported in the literature. Common to other rib stress fractures, the fracture occurred in an elite sculler. The mechanism of development of the fracture is uncertain.

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Clinical Comments

My review of the literature indicates that all previous rib stress fractures in athletes have been of the first rib or in the postero-lateral region of the lower ribs, therefore making this case indeed unique. A recent report of rib stress fractures in Taiwanese amateur golfers (1) reports five cases of rib stress fractures located "posteriorly" on the left side, as opposed to the more typical location of laterally on the right side, in right-handed golfers. Not enough information is given in the translated abstract to determine whether some of these stress fractures occurred at the neck of the ribs. It is interesting that the findings in this case report involved two ribs, as multiple stress fractures of the ribs in rowers are infrequently reported. The unusual location of the stress fractures raises intriguing questions with regard to the mechanism of injury, because there were no risk factors for decreased bone density, no change in her training regimen or technique, and no change with regard to her routine weight training. The latter is unlikely to be an etiologic factor as there is only one reported case of stress fracture of the ribs associated with weight training, and that was of the first rib. Despite the unusual location of the stress fractures, they followed the usual course of resolution reported in the literature for stress fractures in rowers of a 4-8 week period of rest or modification of training before return to competitive rowing. The brief period of time in which the diagnosis was made compared to other cases, which typically report intervals of 2-6 months from onset of symptoms to time of diagnosis, illustrates the importance on maintaining a high index of suspicion for stress fractures as a cause of back or rib pain in rowers.

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I enjoyed reading the interesting report by Brukner and Khan (1) on an unusually located stress fracture in a rower. Of greater importance to myself is not that a stress fracture can occur in this, or any other unusual location, but rather the understanding demonstrated by the authors in their statements in the first paragraph about this athlete's menstrual history, dietary habits, and bone health. With increasing recognition of the female athlete triad (amenorrhea, disordered eating, and osteoporosis), the inclusion of appropriate clinical information in reports and the integration of enhanced awareness into our clinical practice should be a standard of care for all sports medicine physicians.

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