

First Rib Stress Fracture Masquerading as Periscapular Muscle Strain in a 10-Year-Old Softball Player

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Learning Point of the Article:

First rib stress fracture should be considered in young batting and overhead athletes with acute posterior shoulder or periscapular pain, particularly when symptoms recur with return to sport or occur with deep inspiration, because standard shoulder radiographs may incompletely visualize the first rib and the fracture can be overlooked unless the rib is deliberately reviewed.

Abstract

Introduction: First rib stress fractures are uncommon but should be considered in overhead and batting athletes who present with posterior shoulder or periscapular pain. Diagnosis may be delayed because symptoms often resemble periscapular muscle strain, and routine shoulder radiographs may not adequately show the first rib.

Case Report: A 10-year-old female softball and basketball player presented with acute right posterior shoulder pain after feeling a “pop” during a batting session. She had recently added upper body conditioning, including ring pull-ups and push-ups, to her training routine. Examination showed medial scapular tenderness, painful but preserved shoulder range of motion, intact strength, no scapular winging, and negative provocative shoulder testing. Shoulder radiographs were interpreted as normal, and she was treated conservatively for a presumed periscapular muscle strain. Her symptoms improved with rest but returned after she resumed softball. On reevaluation, repeat imaging revealed a healing non-displaced right first rib fracture that was visible in retrospect on the initial images. She was restricted from throwing, batting, and overhead activity and was started on calcium and Vitamin D supplementation. At a follow-up, she had returned to full softball participation without recurrent or ongoing pain.

Discussion: A first rib fracture can present like a routine periscapular muscle injury. Sudden pain during batting or throwing, a perceived “pop,” recurrence with return to sport, and pain with deep inspiration should prompt consideration of rib involvement. Because standard shoulder radiographs may incompletely visualize the first rib, clinicians should deliberately inspect the rib and consider additional imaging when suspicion remains high.

Conclusion: First rib stress fracture should be considered in batting and overhead athletes with posterior shoulder or periscapular pain, particularly when symptoms recur with return to sport or when pain occurs with deep inspiration. Because standard shoulder radiographs incompletely visualize the first rib, the rib should be deliberately reviewed, as early recognition allows conservative management, complete healing, and successful return to sport.

Keywords: First rib stress fracture, softball, Posterior shoulder pain, Pediatric athlete, Periscapular pain

Introduction

Posterior shoulder and periscapular pain in young athletes are

commonly approached as shoulder or soft-tissue problems. In softball and baseball players, the initial differential includes

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Author's Photo Gallery



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Figure 1: Initial right shoulder radiograph demonstrating a non-displaced first rib fracture, indicated by the arrow, that was not identified at the initial evaluation.

rotator cuff irritation, scapular dyskinesis, rhomboid strain, levator scapulae strain, labral pathology, and other overuse injuries. First rib stress fracture is much less common, but it should be considered because pain may localize to the scapular region rather than the chest wall.

Most published first rib stress fractures involve throwing athletes. Funakoshi et al. reported 24 first rib stress fractures in 23 overhead throwing athletes and identified acute posterior shoulder pain during throwing or batting as an important clinical clue [1]. The proposed mechanism involves repetitive muscular traction across the first rib, particularly from the scalene, serratus anterior, and intercostal muscles, with stress concentrating at vulnerable portions of the rib [1,2,3,4]. Batting-related cases have been reported, with repetitive traction and shear forces during the swing as the likely contributing mechanism [3].

The injury may be missed even when the athlete is evaluated and radiographs are obtained. Sheng et al. described three National Collegiate Athletic Association Division I athletes whose first rib stress fractures presented as vague rhomboid or interscapular pain [5]. Funakoshi et al. found that shoulder radiographs visualized only 46% of the first rib on average, compared with 97% on anteroposterior cervical spine radiographs [1]. For that reason, a first rib fracture may be present on initial imaging but overlooked when attention remains focused on the glenohumeral joint or periscapular soft tissue.

This diagnostic difficulty is not limited to youth athletes or settings with limited medical resources. New York Yankees outfielder Aaron Judge was diagnosed in March 2020 with a first rib stress fracture after several months of shoulder and pectoral

symptoms. The injury was believed by the Yankees organization to have occurred during an attempted diving catch the previous September [6,7]. Although this publicly reported case is not medical evidence, it shows that a first rib stress fracture can present as shoulder-region pain and remain unrecognized even in an elite athlete with access to high-level sports medicine care.

We report a 10-year-old softball player whose first rib stress fracture was initially diagnosed as a periscapular muscle strain. The fracture was visible in retrospect on the original shoulder radiographs but was not identified until repeat imaging was obtained 4 months later. This case shows how familiar clinical presentation and limited visualization of the first rib can delay diagnosis.

Case Report

A 10-year-old female athlete who played competitive softball and basketball presented to a sports medicine clinic with right posterior shoulder pain. She was accompanied by her father, who reported that the pain began approximately 2 weeks earlier during a batting lesson. She had recently started light workouts twice weekly focused on agility and lower body strength. Two days before her symptoms started, she added upper body conditioning, including ring pull-ups and push-ups.

During the batting lesson, she felt a “pop” in her right shoulder on her third swing, but she completed two additional swings. The pain worsened after the lesson, and she stopped all activity for 1 week. Her symptoms improved with rest. When she resumed throwing 1 week later, she reported mild pain rated 2–3 out of 10. She participated in a basketball scrimmage without discomfort. During a subsequent batting lesson, the

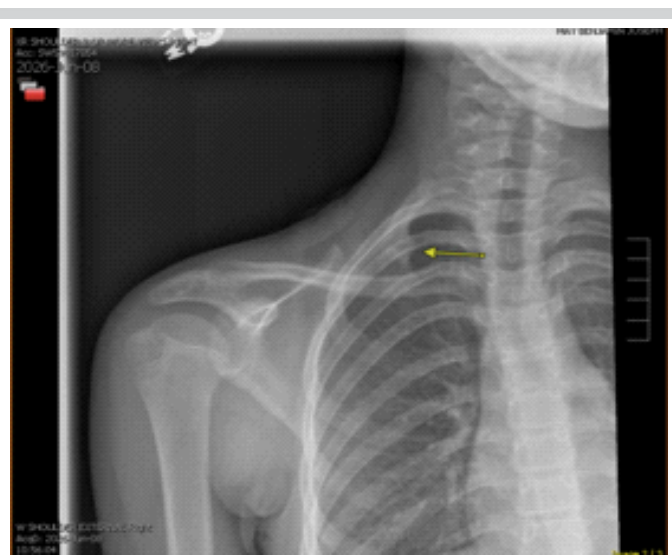


Figure 2: Follow-up right shoulder radiograph demonstrating complete healing of the right first rib fracture, with the previously seen fracture lucency no longer visible.

pain returned within 15 min, and she had difficulty getting out of bed the following morning.

The pain was localized to the posterior right shoulder and the medial scapular region. She had been using a tennis ball against the wall for self-massage, which she described as painful but temporarily helpful. Her father was concerned about a possible rotator cuff or ligament injury.

On examination, the shoulder appeared normal without swelling, ecchymosis, erythema, or deformity. Palpation demonstrated tenderness along the medial border of the scapula without glenohumeral joint tenderness. Forward flexion and abduction were both 170° and reproduced posterior pain. Internal rotation reached T10. Strength was 5 out of 5 with forward flexion, abduction, external rotation, and internal rotation, although resisted testing reproduced the pain. Neer, Hawkins, cross-body adduction, O'Brien, and empty can tests were negative. There was no scapular winging. Distal sensation and pulses were normal.

Right shoulder radiographs, anteroposterior, Grashey, and axillary views, were obtained and interpreted as normal. The initial diagnosis was a periscapular muscle strain, most likely involving the rhomboid musculature. She was treated with a 5-day course of oral prednisone and provided home physical therapy exercises. She was advised to avoid upper body, back, and chest exercises but was permitted to continue basketball and lower body or core exercises if these activities did not reproduce her pain.

Her symptoms improved with rest and activity modification. She participated in basketball throughout the winter without discomfort. Approximately 2 months later, she returned to softball and initially tolerated participation. As her batting volume increased, she developed recurrent pain while swinging. The pain returned to the superior and medial scapular region. Rest, ice, and anti-inflammatory medications provided partial relief, but symptoms persisted. She also developed pain with deep inspiration.

Four months after the initial presentation, she was reevaluated in a different clinic. There was no visible deformity. She had focal tenderness over the superior and medial scapula along the levator scapulae. Shoulder range of motion was full, and strength testing did not demonstrate weakness. Spurling test was negative. Provocative testing for rotator cuff, biceps, labral, and instability was negative. Sensation was grossly intact, and vascular examination was normal.

Repeat right shoulder radiographs were obtained with specific attention to the first rib and demonstrated a healing non-displaced right first rib fracture, which the radiology report stated, "likely explains the patient's pain."

Retrospective review of the initial radiographs confirmed that the non-displaced first rib fracture had been present but was not identified (Fig. 1). She was diagnosed with a first rib stress fracture and recurrent symptoms after returning to batting before the fracture had healed.

She was restricted from throwing, batting, and overhead activity for 6 weeks. Her Vitamin D was 32 ng/mL, and her serum calcium was 9.4 mg/dL. She was counseled about adequate dietary intake and was started on calcium and Vitamin D supplementation.

At a follow-up on June 8, 2026, she reported no pain during the previous 3–4 weeks. She had avoided throwing and batting and reported no new injuries. Examination showed no tenderness or deformity, full shoulder range of motion, normal strength, negative provocative shoulder testing, and intact neurovascular function.

Three-view right shoulder radiographs were compared with the April 2026 images and showed a healed right first rib fracture (Fig. 2). The fracture lucency was no longer visible, and no new fracture, dislocation, or other acute shoulder abnormality was identified.

Because she was asymptomatic and imaging confirmed complete healing, she was allowed to begin a gradual return to softball, including throwing and batting. She was advised to have 3–4 rest days/week during the 1st 3 weeks after resuming activity and to stop if pain or loss of motion developed. If she remained asymptomatic, she could then return to full participation as tolerated while continuing to incorporate at least 1 or 2 rest days each week.

The family was provided with a staged throwing program. They were advised that the throwing distances and number of repetitions had been designed for older baseball players and would need to be adjusted for her age and level of play. At her most recent primary care follow-up, she had returned to full softball participation and remained pain-free without recurrent symptoms.

Discussion

The initial presentation was consistent with a periscapular muscle injury. The patient had focal medial scapular tenderness, preserved shoulder strength, nearly full range of motion, no scapular winging, and negative provocative testing. The initial diagnosis of periscapular muscle strain was therefore reasonable. However, the mechanism was less typical for a routine muscle strain. Her pain began suddenly with a "pop" during batting and later returned when she resumed softball.

Pain with deep inspiration developed after the recurrence of symptoms. Although this finding is not specific, it suggested

possible rib or chest wall involvement, particularly because the repeat shoulder examination remained reassuring. A retrospective review later showed that the fracture was visible on the original radiographs but was not recognized because the evaluation focused on the shoulder and periscapular soft tissue.

First rib stress fractures are rare and may be under-recognized. Funakoshi et al. reported 24 fractures in 23 overhead throwing athletes, many of whom presented with posterior shoulder or upper thoracic pain [1]. Nchinda et al. described pediatric first rib fractures occurring without major trauma and found that exercise was the most common cause, ipsilateral shoulder pain was the most common presenting symptom, most fractures were non-displaced, and all patients were treated without surgery [8]. These findings are similar to the presentation in this case.

Marcussen et al. described 14 isolated traumatic first rib fractures sustained during sports and concluded that these injuries may be more common than sports medicine clinicians realize [9]. Their series involved acute traumatic fractures rather than stress fractures, but it supports consideration of first rib injury in athletes with shoulder pain. The authors also found that return to sport after rehabilitation and resolution of symptoms appeared reasonable [9].

The first rib is exposed to opposing muscular forces. The scalene muscles act on the superior aspect of the rib, while the serratus anterior and the intercostal muscles apply force inferiorly. Repetitive contraction can create traction and bending stress, particularly near the subclavian groove [1,2]. Bat swinging may produce additional rotational and shear forces across the rib [3]. The recent addition of ring pull-ups and push-ups may have increased her training demands before symptoms began, although a direct causal relationship cannot be established.

Routine shoulder radiographs may not fully visualize the first rib, which can contribute to missed diagnoses. Funakoshi et al. reported that shoulder radiographs visualized 46% of the first rib on average, compared with 97% on anteroposterior cervical spine radiographs [1]. In this case, however, the fracture was visible on the original shoulder images but was not recognized because attention remained focused on the glenohumeral joint and periscapular soft tissue. When the history raises concern for a first rib injury, clinicians should specifically inspect the rib and consider additional radiographic views, an anteroposterior cervical spine radiograph, computed tomography, magnetic resonance imaging, or musculoskeletal ultrasound if the diagnosis remains uncertain.

Sheng et al. reported three Division I athletes with first rib stress fractures that presented as persistent rhomboid or interscapular pain. Ultrasound demonstrated cortical irregularity at the

fracture site in each case [5]. Point-of-care ultrasound may be useful when the clinical suspicion remains high, although available evidence is limited, and the examination depends on operator experience.

Treatment is usually non-surgical and includes restrictions from painful activity, correction of training load, attention to nutrition, and gradual return to sport [1, 3, 5, 6, 7]. Funakoshi et al. reported healing in 71% of fractures at a mean follow-up of 7.5 months, whereas 29% developed non-union [1]. Persistent pain or neurovascular symptoms should prompt further evaluation because first rib non-union or associated anatomic changes may contribute to thoracic outlet compression [1, 10, 11].

Bone health and training factors should be considered in young athletes with stress fractures, including dietary intake, recent changes in training volume, prior stress injuries, and other risk factors for low energy availability [12,13,14]. She had not reached menarche, which may be developmentally appropriate at age 10 and should not itself be interpreted as menstrual dysfunction. In this patient, Vitamin D and calcium levels were 32 ng/mL and 9.4 mg/dL, respectively. She received nutrition counseling and was started on calcium and Vitamin D supplementation while the fracture healed.

This case is notable because the injury was mistaken for a periscapular muscle strain and was visible but overlooked on the initial radiographs. The delayed diagnosis reported in the case of Aaron Judge provides a recognizable example of the same clinical problem. It does not provide evidence regarding causality or recurrence, but it shows that the first rib stress fracture may present as shoulder or pectoral discomfort and remain unrecognized even in athletes receiving high-level medical care [6,7].

Conclusion

First rib stress fracture should be considered in batting and overhead athletes who present with sudden posterior shoulder or periscapular pain, especially when symptoms recur with return to sport or are associated with pain during deep inspiration. Routine shoulder radiographs may incompletely visualize the first rib, and the rib should be specifically reviewed

Clinical Message

First rib stress fractures are an uncommon but important cause of posterior shoulder and periscapular pain in adolescent athletes and should be considered when symptoms persist or recur despite appropriate treatment for a presumed muscular injury.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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