

Proximal humeral physeal widening: little leaguer's shoulder or a variation of normal development?

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Little leaguer's shoulder is a syndrome involving the proximal humeral epiphyseal plate and has been reported in adolescent athletes between 13-16 years of age. We present an adolescent case with radiological findings of little leaguer's shoulder syndrome in a non-athletic patient. The patient had applied significant rotational stress to the proximal humeral physis as a result of overuse due to physiotherapy, but the left asymptomatic side appeared more affected radiologically, which led to the idea that this may be a physiological change that occurs in adolescents. We thus evaluated the anteroposterior radiography of 10 healthy male adolescents of the same age with no skeletal or muscular complaints. We demonstrated a minimal widening of the lateral part of the proximal humeral epiphysis in two of these 10 patients. We believe little leaguer's shoulder should also be considered in adolescents with proximal humeral pain and a history of overuse. A larger study must be conducted to investigate whether these finding may be a variation of physiological development.

Key words: little leaguer's shoulder, proximal humeral physeal widening, adolescents, physiological development.

Longitudinal bone growth in children results from endochondral ossification at the physeal-metaphyseal junction. The metaphyseal vessels induce mineralization of the cartilaginous matrix, remove degenerated physeal chondrocytes, and transport the osteoblasts, which will lay down lamellar bone¹. During development, the proximal humerus initially contains three separate ossification centers that coalesce around the age of seven years, and fuse with the humeral metaphysis sometime between the ages of 16 and 20 years².

Little leaguer's shoulder is a syndrome involving the proximal humeral epiphyseal plate, and was first coined in 1953 by Dotter³. He described the case of a 12-year-old little league pitcher who developed a gradual onset of pain in the throwing shoulder. Radiographs showed a fracture through the epiphyseal cartilage of the proximal humerus.

The syndrome has been reported in adolescent athletes between 13-16 years of age and is

characterized by pain when using the shoulder muscles for activities such as pitching⁴. The syndrome is thought to be caused by an overuse of the shoulder related to significant rotational stress applied to the proximal humeral physis⁵.

We present an adolescent case with radiological findings of little leaguer's shoulder syndrome in a non-athletic patient.

Case Report

A 13-year-old male presented for evaluation of right shoulder pain. The patient stated that he had experienced pain in the lateral proximal humerus for approximately six years. During this period, the patient had been evaluated repeatedly by different specialists and had been given a physiotherapy program. The patient stated that he had repeated the exercises over and over again but the pain seemed to increase, worsening in the past few months. There was no history of numbness, tingling, weakness, or neck pain.

The physical examination demonstrated positive tenderness to palpation over the right proximal humerus, especially the epiphyseal gap, but no pain on rotation or swelling was observed. Range of motion was not affected, but on abduction, crepitation was positive. Out of the rotator cuff tests administered (Neer, drop arm, Hawkins, subscapular lift-off, belly press tests), only minimal pain on the Hawkins test was obtained. The acromioclavicular joint was tender. The passive cross-chest abduction test and O'Brian test both revealed pain. The Crunk test (labral lesion) was found to be negative. The patient had no complaint of pain on the left shoulder. Anteroposterior radiography of the shoulders demonstrated a widening of the lateral part of the proximal humeral epiphysis in the right shoulder and a greater widening in the left asymptomatic shoulder (Figs. 1, 2). The patient's bone age was also 13 years, and he was Tanner stage 2 for pubertal development.

Treatment consisted of recommending total abstinence from physiotherapy, especially movements such as overhead throwing. Taping was used for 10 days to prevent acromioclavicular crepitation, which the patient had made a habit. The strapping allowed other motions while limiting abduction. The patient was re-examined at weekly intervals, and by the fourth week, a significant decrease in pain was noted. A progressive and controlled return to physical activity was advised.

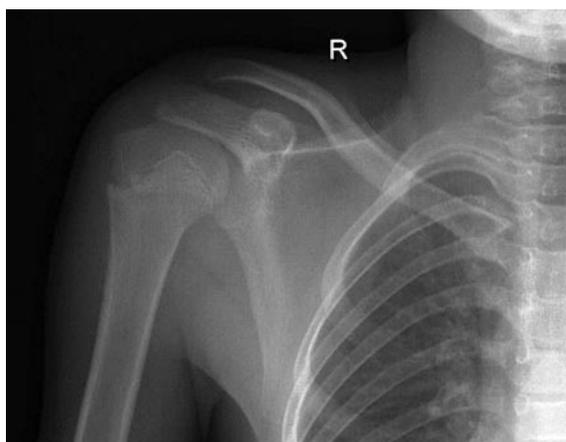


Figure 1. Radiograph of the left shoulder. Anteroposterior radiography of the left asymptomatic shoulder demonstrating a widening of the lateral part of the proximal humeral epiphysis.

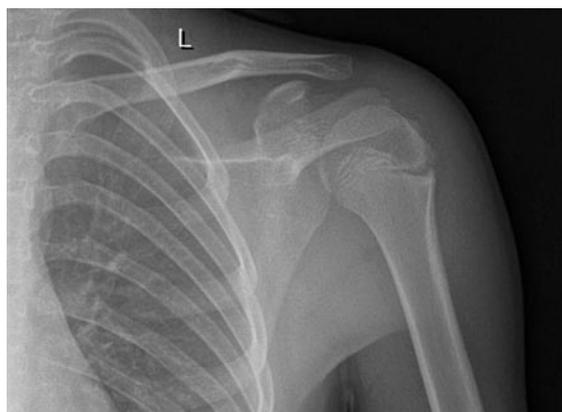


Figure 2. Radiograph of the right shoulder. Anteroposterior radiography of the right shoulder demonstrating a widening of the lateral part of the proximal humeral epiphysis before treatment.

The patient was re-evaluated four months later. He stated that he had no remaining pain, and the physical evaluation demonstrated no tenderness in the shoulder. Anteroposterior radiography of the shoulders still demonstrated a similar widening of the lateral part of the proximal humeral epiphysis.

Control Subjects

The team assessing the patient was a multidisciplinary group consisting of specialists in adolescent medicine, sports medicine and physiotherapy. Therefore, the etiology of these clinical and radiological findings in this case was discussed not only with respect to an overuse or trauma to the extremity but also regarding a variation in the developmental stages of bone formation in adolescents. We thus randomly selected 10 healthy male adolescents of the same age with no skeletal or muscular complaints and evaluated the anteroposterior radiography of their shoulders. We demonstrated a minimal widening of the lateral part of the proximal humeral epiphysis in two of these patients.

Discussion

Due to the unique aspects of the developing skeleton, adolescents are at a greater risk of developing epiphyseal plate injuries. These include increased laxity of the joints, underdeveloped muscles, particularly those of the shoulder, and open epiphyseal plates⁶.

Additionally, accelerated growth occurring at this age coupled with the fact that 80% of longitudinal growth of the humerus occurs at the proximal physis also contributes to this finding⁵.

Proximal humeral physeal widening has mainly been reported in baseball pitchers⁴, but has also been known to affect cricket players⁷, adolescent gymnasts⁸ and badminton players⁹. The classic radiographic finding in little league's shoulder is widening of the physis of the proximal humerus. It is believed that optimal visualization of these changes is achieved by comparing bilateral internal and external rotational anteroposterior radiographs of the shoulder⁴. To our knowledge, this is the first case report of little leaguer's shoulder syndrome in a non-athlete.

Little leaguer's shoulder is thought to be an overuse syndrome related to significant rotational stress applied to the proximal humeral physis¹⁰. During the act of throwing, the shoulder changes from an abducted externally rotated position to an internally rotated adducted position¹¹. The exercises performed by our patient were very similar.

Physiotherapy is often the first-line management for non-specific shoulder pain¹². Because the patient was not an athlete, we discussed that the etiology could be due to two reasons, the first being the significant rotational stress applied to the proximal humeral physis as a result of overuse due to physiotherapy. However, what we found interesting in this patient was that the left asymptomatic side appeared to be affected more radiologically, although the patient had no complaint regarding this shoulder. We thus considered whether this may be a physiological change that occurs in adolescents. A study by Laor et al.¹³ observed local physeal widening in a group of children aged between 6 months to 15 years who were evaluated for various reasons. They concluded that growing bone may represent the imprint of a previous or ongoing interference with endochondral ossification from a prior metaphyseal insult, rather than a primary metaphyseal disorder.

Studies of the incidence of physeal injuries indicate an increased occurrence of fractures during puberty, and show a peak fracture rate occurring at the time of peak height velocity¹⁴. We believe the cause for the physeal widening

may be a physiological variation of development due to the accelerated growth in puberty.

The current patient was re-evaluated four months later, and although he had no complaint, there was no radiological improvement. We believe this also supports that this finding may be a part of physiological development and a variation of bone growth in puberty.

There is no definite treatment protocol for physeal injuries, and approaches vary. Some authors recommend rest until the symptoms subside¹⁵, whereas others have recommended no throwing until the proximal humeral physis has closed. We also achieved rapid recovery via strapping and rest.

Although the syndrome has generally been considered in the differential diagnosis of shoulder pain in athletes, we believe little leaguer's shoulder should also be considered in adolescents with proximal humeral pain and a history of overuse. Further, we believe a larger study must be conducted to investigate whether these findings represent a variation of physiological development.

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