SCAPHOID STRESS FRACTURE IN GYMNASTICS ATHLETE: A CASE REPORT

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ABSTRACT

We present a case report of an 18 year-old gymnast who was diagnosed with a scaphoid stress fracture associated with a distal radial epiphysiolysis, reporting the treatment of choice. After a brief literature review about this rare association, the authors ask for attention concerning the importance of physical and image examination in making right diagnosis and finding associated injuries.

Keywords – *Epiphyses, slipped; Fractures, stress; Wrist*

INTRODUCTION

Stress fractures of the lower extremity are common and are often related to athletic activities. Meanwhile, those of the upper extremity are rare, with few cases reported in the literature[1]. Scaphoid fractures are diagnosed by a history of acute trauma to the wrist in dorsiflexion, pain in its radial aspect, on palpation of the scaphoid and in the anatomical snuffbox[2,3]. Patients who have similar complaints without a history of acute injury, but perform activities involving repetitive stress should be examined carefully and the hypothesis of stress fracture of the scaphoid should be investigated[1,4]. It is important to pay attention to the fact that the implications of repetitive dorsiflexion and compression of the wrist are often related to the injuries of the growth plate of the radius, with radiographic evidence of openness and irregularity of the distal radial physis[5,6]. Although wrist pain in gymnasts is classified as "normal and direct consequences of the sport"[2], complaints of pain in these young athletes should be carefully evaluated. Herein we report the case of a gymnast who had a stress fracture of the scaphoid associated with epiphysiolysis of the distal radius.

CASE REPORT

An 18-year-old gymnast was evaluated with complaints of insidious and increasing pain in his right wrist. His training routine was six hours a day, three days a week for the previous seven years.

Approximately three months before the visit to the doctor, he developed severe pain in the wrist, which worsened in extension, especially during the activities on the vault and the parallel bars.

It was initially believed to be a muscle injury and treated conservatively, applying ice and reducing athletic activity, but with little improvement. There was no history of pain or trauma to the affected wrist.

Physical examination revealed the presence of skin calluses on the right distal radius and scaphoid. The patient reported pain in the anatomical snuffbox and distal radial epiphysis. He had 38° of extension of the wrist to the right and 60° to the left. The range of motion was limited to 12° of radial deviation in the right wrist, but was not limited in the flexion and ulnar deviation of the same. Grip strength assessment of the right hand showed 46.5 kilograms-force (kgf), and on the left, 81.5 kgf. Pronation, supination, and digital mobility were within normal limits.

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A posteroanterior radiograph of the wrist showed a scaphoid waist fracture and an opening of the radial aspect of the distal radial epiphysis (Figure 1). Magnetic resonance imaging (MRI) was performed and revealed a complete scaphoid waist fracture and a representative sign of bone marrow edema in the proximal and distal poles. He also showed swelling in the radial portion of the physis, suggesting displacement (Figures 2 and 3).

We opted for surgical treatment with percutaneous fixation of the scaphoid and *in situ* fixation of the radial styloid process (Figure 4).

In the first week after surgery, we used a long orthesis, which immobilized the metacarpophalangeal joint of the thumb, and began rehabilitation in order to control swelling, treat scarring and increase movement. After eight weeks, radiographs showed signs of consolidation, and on physical examination the wrist showed 52° of extension, 62° of flexion, 12° of radial deviation, and 20° of ulnar deviation. Grip strength of right hand reached 66 kgf.

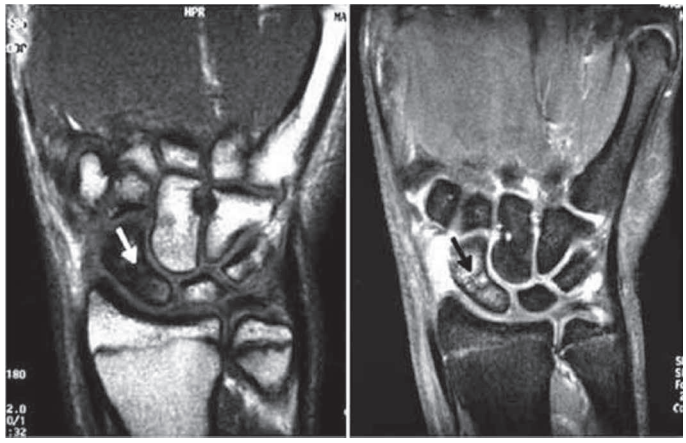
In the twelfth week the patient was able to return to physical activities gradually; at 16 weeks, he returned to training on the equipment.

At final evaluation, six months after surgery, the athlete was competing with no complaints.

Figure 1 – Coronal X-ray with fracture of the scaphoid waist (arrow) and opening of the radial aspect of the distal radial epiphysis (*).

DISCUSSION

Wrist pain is a common symptom in gymnasts[7]. Dobyns and Gabel[3] reported that 88% of the gymnasts studied experienced wrist pain during activity and that 80% to 90% of injuries are secondary to constant mechanical overload.



Figures 2 and 3 – Magnetic resonance image in T1 and T2. The coronal section shows a complete fracture of the scaphoid waist (arrow) and a representative sign of bone marrow edema in the proximal and distal poles.

Figure 4 – Posteroanterior radiograph showing percutaneous fixation and in situ fixation of the radial styloid process eight weeks after surgery.

The scaphoid is the most commonly fractured carpal bone. Characteristically, it is difficult to diagnose due to its small size and irregular shape. Another important feature is the risk of progression to nonunion or avascular necrosis, resulting from the proximal pole circulation's dependence on the vessels that cross the waist of this bone.

Despite the high relative incidence of injury, stress fracture of the scaphoid is relatively rare, with only a few references in the literature[1,3-5,8-10]. Rarer still are the fractures associated with traumatic epiphysiolysis.

Prior to the onset of symptoms, our athlete performed repetitive activities that reproduced the mechanism of acute fracture. These activities were performed with high intensity due to scheduled competitions that were approaching. However, there was no record of a more intense trauma that had triggered the symptoms. The fact that the pain was

insidious ruled out the possibility of an undiagnosed acute fracture. Another feature related to the stress fracture was the presence of edema around the scaphoid bone.

The concomitant epiphyseal lesion observed on radiograph and MRI appeared as a complicating factor of the scaphoid fracture, requiring greater attention to the wrist. Weiker[5] proposed that the wrists injuries of gymnasts are due to a weakness in the muscles of the wrist and fingers of the gymnasts. This weakness prevents adequate cushioning of the impact of dorsiflexion movements of the wrist. Thus, there is impact on the distal radius and the carpal bones. The volar wrist ligaments protect the proximal pole of the scaphoid while its distal portion is exposed to impact. The weakest point of the scaphoid is the waist, located immediately distal to the volar ligaments and is therefore the most likely site of injury. This principle holds true for stress fractures through repetitive forces applied in a lesser degree than those needed to trigger an acute fracture.

The reasons for choosing surgical treatment of the scaphoid and distal radius were: a) the possibility of absolute stabilization of a fracture that was potentially established over a few months and that would be spared the risk of deviation and, consequently, a major surgical procedure, b) the possibility of early rehabilitation with a gain in range of motion during strengthening of the intrinsic and extrinsic muscles of the wrist, and c) better control of two close injuries.

Hand therapy sought to optimize rehabilitation as much as possible, to allow for an early return to sports activities in the shortest time possible.

Chronic pain in the wrist of a gymnast, even without a history of acute trauma, should raise the suspicion of a possible stress fracture of the scaphoid. The radiograph is the initial examination of choice, but is often not capable of revealing injury. In suspected cases, MRI is the examination of choice. Even bone scintigraphy may have negative results, as was shown in the series by Hanks et al.[11]. For high-performance athletes, surgical treatment may represent a possibility of early return to sports.

REFERENCES

1. Webb BG, Rettig LA. Gymnastic wrist injuries. Curr Sports Med Rep. 2008;7(5):289-95.
2. Manzione M, Pizzutillo PD. Stress fracture of the scaphoid waist: a case report. Am J Sports Med. 1981;9(4):268-9.
3. Dobyns JH, Gabel GT. Gymnast's wrist. Hand Clin. 1990;6(3):493-505.
4. Aronen JG. Problems of the upper extremity in gymnasts. Clin Sports Med. 1985;4(1):61-71.
5. Weiker GG. Hand and wrist problems in the gymnast. Clin Sports Med. 1992;11(1): 189-202.
6. Coady CM, Micheli LJ. Stress fractures in the pediatric athlete. Clin Sports. 1997; 16(2):225-36.
7. Matzkin E, Singer DI. Scaphoid stress fracture in a 13-year-old gymnast: a case report. J Hand Surg Am. 2000;25(4):710-3.
8. Gabel GT. Gymnastic wrist injuries. Clin Sports Med. 1998;17(3):611-21.
9. Inagaki H, Inoue G. Stress fracture of the scaphoid combined with the distal radial epiphysiolysis. Br J Sports Med. 1997;31(3):256-7.
10. Linscheid RL, Dobyns JH. Athletic injuries of the wrist. Clin Orthop Relat Res. 1985;(198):141-51.
11. Hanks GA, Kalenak A, Bowman LS, Sebastianelli WJ. Stress fractures of the carpal scaphoid: a report of four cases. J Bone Joint Surg Am. 1989;71(6):938-41.