

Review Article

Internal Trauma, Humeral Fracture, and Radial Nerve Paralysis: How Could it Occur in the Sport Setting? A Case Report and Review of the LiteratureElghoul Naoufal^{1*}, Elantri Ismail², Bouya Ayoub¹, Bennis Azzelarab³, Zaddoug Omar³, Tanane Mansour³, Jaafar Abdeloihab³¹Resident in Orthopedic Surgery and Traumatology, Department of Orthopedic Surgery and Traumatology, Military Hospital Mohammed V (HMIMV), Faculty of Medicine and Pharmacy, University Mohammed V, BP 10100 Rabat, Morocco²Specialist in Orthopedic Surgery and Traumatology, Department of Orthopedic Surgery and Traumatology, Military Hospital Mohamed V (HMIMV), Faculty of Medicine and Pharmacy, University Mohammed V, BP 10100 Rabat³Professor in Orthopedic Surgery and Traumatology, Department of Orthopedic Surgery and Traumatology, Military Hospital Mohammed V (HMIMV), Faculty of Medicine and Pharmacy, University Mohammed V BP 10100 Rabat, Morocco**Corresponding Author:** Elghoul Naoufal, E-mail: Naoufal.elghoul@gmail.com**ARTICLE INFO***Article history*

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Radial Nerve Palsy**ABSTRACT**

Thrower's fractures are Spiral fractures of the humerus in the ball. They represent very uncommon clinical entities that can simulate pathologic fractures. Moreover, the concomitant neurologic deficient is rare. Herein we report a 27 years old muscular man presented a spiral fracture of the humerus following a forceful throw of the ball during an amateur throwing challenge. Clinical and imaging findings showed a displaced Thrower fracture with radial nerve neurapraxia (known as Holstein Lewis fracture) prompting the patient to undergo surgery. The intraoperative aspect found that the nerve was near to the beveled distal humeral fragment with no incarceration. We performed an internal fixation using the Leicester plate and the nerve was kept away from the plate by the interposition of a soft tissue sheet. At the last follow up, the fracture united and radial nerve neurapraxia resolved and the patient regained the full range of motion of his right upper limb with no pain. In conclusion, although this type of fracture is rare, given their significant morbidity, we emphasize that the reactional throwers should undergo appropriate preseason training before practicing a throwing challenge or generally a throwing sport.

INTRODUCTION

Humeral shaft fractures account for less than 3% of all fractures.[1] Furthermore, to be caused by the throwing motion is extremely rare.[2,3]

In fact, Thrower fractures are Spiral fractures of the humerus in the ball. They are uncommon clinical entities that can be confused with pathologic fractures.[4] Furthermore, contrary to Holstein Lewis humeral fracture, Thrower's fracture is rarely associated with neurologic sequelae.[4,5] On the other hand, when the thrower's fracture is associated with radial nerve neurapraxia it is known to be called Holstein-Lewis fracture.[5]

To the best of our knowledge, the case presented here is among the rare cases of Holstein-Lewis humeral fracture following a forceful throw of

ball-shaped rock in an amateur challenge with no suspicion of an initial stress fracture and through our case we discuss its mechanism.

CASE PRESENTATION

A 27 years-old muscular man, right hand dominant, presented in the emergency department for severe pain and total impotence of the elbow following a forceful throw of the ball during an amateur throwing challenge (he wanted to throw the ball-shaped rock as far as possible and as quickly than others). On examination, his arm and elbow were swollen with neither open skin nor ecchymosis; Palpation of both arm and elbow was painful. The forearm and wrist were painless. Before

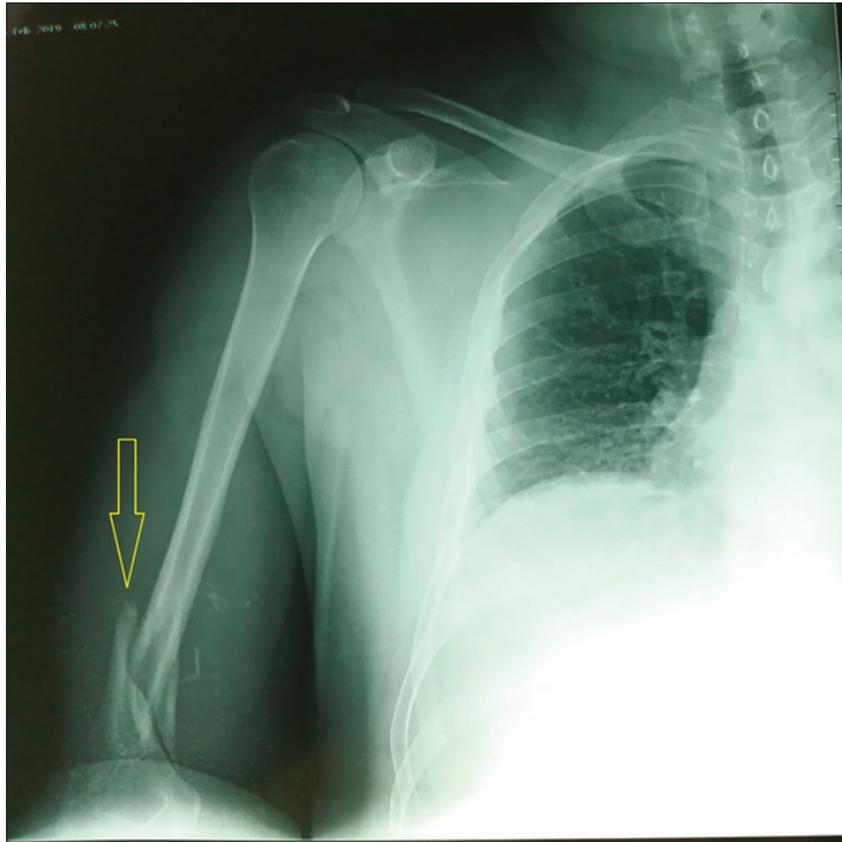


Figure 1. X-ray of both shoulder and arm showed a spiral fracture of the distal third of the humeral shaft. Note the beveled fragment (arrow)



Figure 2. A 3D computed tomography scan of the right arm revealed a simple spiral fracture with neither underlying pathologic process of the bone nor fracture of the ipsilateral elbow

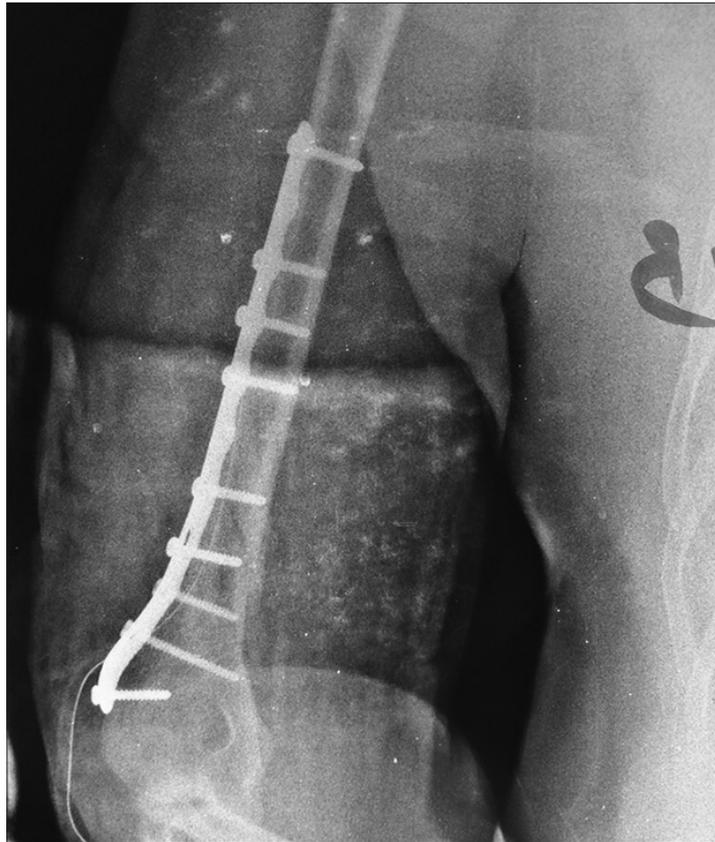


Figure 3. The postoperative radiograph of the arm confirmed the good position and reduction of the fracture

that day, he reported that he had experienced no prodromal arm pain. The neurovascular exam found radial nerve palsy: active finger or wrist extension was slightly possible along with anesthesia over the first web space dorsally. X-ray of both shoulder and arm revealed a spiral fracture of the distal third of the humeral shaft (Figure 1).

A computed tomography scan of the right arm was performed which revealed no underlying pathologic process and no fracture of the ipsilateral elbow (Figure 2) prompting the patient to undergo surgery.

In the operating room, under general anesthesia, patient in the supine position, an external approach was performed then, after a careful dissection, the intraoperative aspect found that the radial nerve was near to the beveled distal humeral fragment with no incarceration.

After which a Leicester plate was used to fix the fracture and the radial nerve was kept away from the fracture site by the interposition of a soft tissue sheet. The upper limb was placed into a coaptation splint and sling.

Clinical assessment of the patient one day post-operative revealed that he was afebrile with no pain no infection. The neurovascular examination showed persistent radial nerve paralysis. The post-operative x-ray was realized confirming the good position and reduction of the fracture (Figure 3).

Two days post-operative, the patient was discharged with a prescription for an oral analgesic to be reviewed in 2 weeks. After this time, the range of motion exercises of the shoulder and elbow were begun. Six months of follow up, the fracture united and radial nerve neurapraxia resolved and he regained the full range of motion of right upper limb with no pain.

DISCUSSION

Humeral fractures are typical due to direct trauma [6] Thrower's fractures are spiral fractures of the humerus caused by forceful throwing of a ball. The first case was described in 1930 by Wilmoth [7] Thrower's fractures are usually re-

ported in men in their 20s and 30s who are less seasoned athletes due to the lack of compensatory humeral cortical hypertrophy from repetitive throwing.[8,9] Slocum demonstrated that throwing ball requires 4 successive steps: the initial stance; the wind up; the forward action to release at which the shoulder is abducted, externally rotated by the deltoid and rotator cuff muscles respectively then the last step is the follow-through.[10]

In fact, during throwing, at the beginning, the elbow and shoulder are brought into extreme external rotation with an automatically valgus positioning of the elbow followed immediately by an internal rotation at the shoulder and extension at the elbow in which a greatest torsional force is applied in the distal humerus moreover the weight ball increase the force produced.[10,11] This fracture occur most often in amateur players. They tend to activate all the rotator cuff muscles as well as the biceps for power in an unsynchronized muscular activity and uncoordinated throwing style.[12] Furthermore, stress injury to the humerus has also been reported as a risk factor of Thrower's fracture.[13,14]

On the other hand, although the neurologic sequelae are rare, once a fracture is suspected and given the risk of nerve paralysis, a neurovascular exam should immediately be performed. It provokes most often a neuropraxia injury of the radial nerve which resolves spontaneously in most cases.[4,15]

Given the excellent result reported in the literature, the treatment of this type of fracture is typically conservative with a hanging cast even if associated with nerve palsies.[9]

We emphasize that the mechanism of Holstein Lewis fracture was due to a combination of lack of warm-up and fast extreme effort throw in unsynchronized strong muscular the activity got worse by the heavy ball-shaped rock. For the radial nerve neurapraxia, it might be due to the displaced beveled distal fragment because, anatomically in this localization, the nerve is tethered as it pierces the lateral intermuscular septum. For the management of our case, we realized a computed tomography to exclude a pathological fracture of the humerus

but subsequently found this to have been unnecessary according to the literature.[16]

Given localization and displacement of the fracture, we elected for its internal fixation to avoid the possibility of a malunion of the distal humerus, and promote early recovery.

CONCLUSION

At last, although, TF or HLF fractures are reported sporadically in the literature, they are still not widely recognized. Given their significant morbidity and through this observation we emphasize that the reactional throwers should undergo appropriate preseason training before practicing the throwing sport.

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