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Case report

Coronoid Stress Fracture in a 24-Year-old Boxer: A Case Report

Hasan Barati [1], Mojtaba Baroutkoub [1], Bardia Hajikarimloo[2], Mohammadali Abdollahzadeh[1], Reza Tavakoli Darestani [*1]

[1] Department of Orthopedic and Trauma Surgery, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
[2] Shahid Beheshti University of Medical Sciences, Tehran, Iran.

*** Corresponding Author**: Reza Tavakoli Darestani, Department of Orthopedic and Trauma Surgery, Shahid Beheshti University of Medical Sciences, Tehran, Iran. Fax: +98 2173430000, Email: rezatavakolidarestani@yahoo.com

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Abstract

Background: Stress fractures develop when a bone cannot remodel in response to repetitive force. They are less frequent in the upper extremities, and the coronoid process is an infrequent site for stress fractures. Coronoid stress fractures present with pain and tenderness of the elbow, which is exacerbated by full extension of the elbow.

Case presentation: A 24-year-old male boxer was admitted to the hospital after complaining of pain in the anterior part of his elbow for the past seven months. Physical examination revealed exacerbation of pain during hyperextension positions and training, tenderness of the elbow at the anterior region, and decreased range of motion. Coronoid stress fractures should be considered in athletes, especially gymnasts with chronic elbow pain. Initial treatment is conservative management of the pain. If conventional treatment fails, fixation of the fragment with a surgical approach and subsequent rehabilitation must be performed.

Keywords: Stress Fractures, Coronoid Process, Elbow.

Introduction

Among upper extremity joint dislocations, the elbow is one of the most common, and approximately 25% of dislocations are associated with fractures [1]. Elbow dislocations without fractures usually happen in younger patients, are treated non-surgically, and have an excellent clinical prognosis [2]. Elbow fractures accompanied by dislocations are more challenging to manage and may cause long-term morbidity and disability. Inappropriate treatment, even surgical or non-surgical, can lead to post-traumatic arthritis, elbow stiffness, mechanical pain, and persistent instability [3].

Under high axial loading pressure, a transverse olecranon fracture with dislocation occurs. It is characterized by the instability of the glenohumeral joint and the anterior displacement of the radial head relative to the capitulum [4]. Coronoid Fractures are essential and commonly involve more than half of the coronoid height. They occur by rotating in hyper flexion or hyperextension postures [5].

Because of unsupported connective tissue, the anteromedial part of the coronoid is susceptible to injury [6]. Fractures of the anteromedial aspect of the coronoid happen when a Varus posteromedial rotatory injury occurs [7].

Coronoid fractures consist of three types; Regan and Morrey described the location of the fracture along the coronoid on lateral view radiographs. At the same time, a new classification system was introduced by O'Driscoll et al. based on the anatomic location of coronoid fragments [8-9]. Important structures attaching to the coronoid process include:

The anterior joint capsule.

The tendon of the brachialis muscle.

The anterior attachment of the medial collateral ligament (AMCL).

The most important part of the coronoid is the sublime tubercle, the insertion site of the AMCL, and it plays a significant role in elbow stabilization. The

coronoid process is the essential bony stabilizer of the elbow joint [10].

In this case study, we will present a 24-year-old Boxer guy who had a stress fracture of the elbow that did not respond to treatment and necessitated surgery. We did not identify a case identical to ours in our literature search.

Case presentation

A 24-year-old boxer was admitted to Imam Hossain Hospital, Tehran, Iran, with a complaint of pain in the anterior part of the elbow. The pain was initiated approximately one year ago and has exacerbated over the past seven months. In a physical examination, the pain increased during hyperextension positions and training. We also found tenderness of the elbow at the anterior part and a decrease in the range of motion of the right elbow, but no instability in the stress valgus and varus tests was observed. The pulses and sensations of both upper extremities were excellent and similar on both sides. Flexion movement was limited in the right elbow by 20 degrees less than the left one. Past medical history demonstrated no obvious provoking trauma. The history of previous fractures or multiple concussions was also adverse.

The patient was evaluated by radiographs, which showed an irregularity in the anterior part of the right elbow, which was suspected of being a fracture of the coronoid process. The patient underwent a CT scan to confirm the diagnosis, demonstrating a nonunion fracture of the coronoid process. According to O'Driscoll et al., the fracture was categorized as Type 2 [5].

The fractured fragment was not displaced, and the gap along the joint line was 3.1 mm. The mechanism of injury was interpreted as a re-traumatization of a coronoid nonunion. The patient underwent 15 separate rehabilitation sessions with an expert physiotherapist. Because there was no cessation of pain and no improvement in range of motion, he was considered for surgery. The ORIF facility fixed the fractured fragment, and the patient underwent rehabilitation after surgery.

One and three months after surgery, the patient had no pain, and the range of motion in both elbows was similar. The physician let him restart his training after six months.

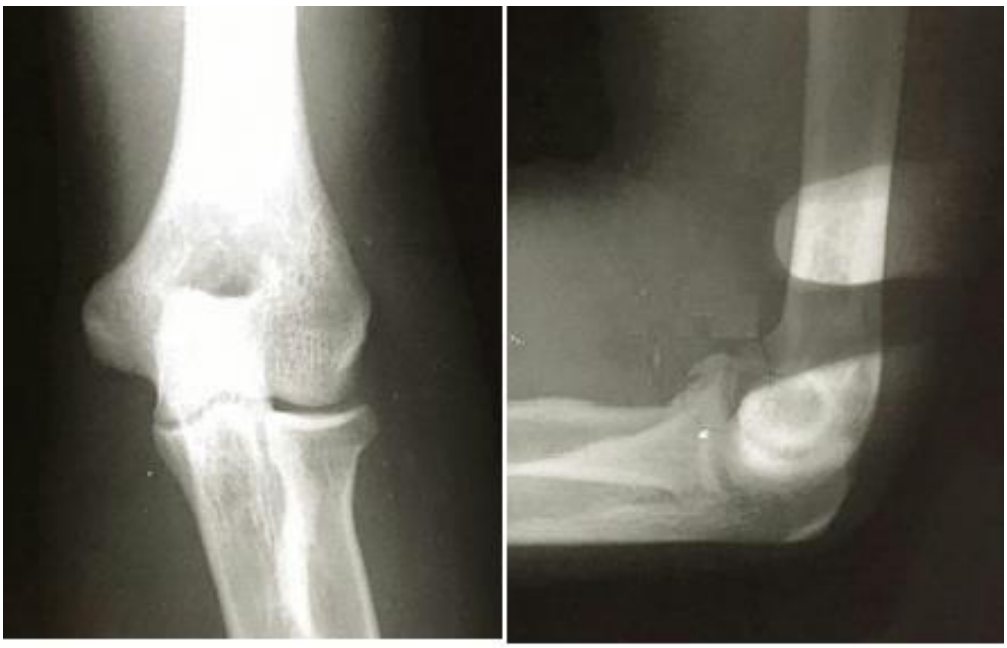

Figure 1: Radiographs of the elbow at the diagnosis demonstrated irregularity of the coronoid process

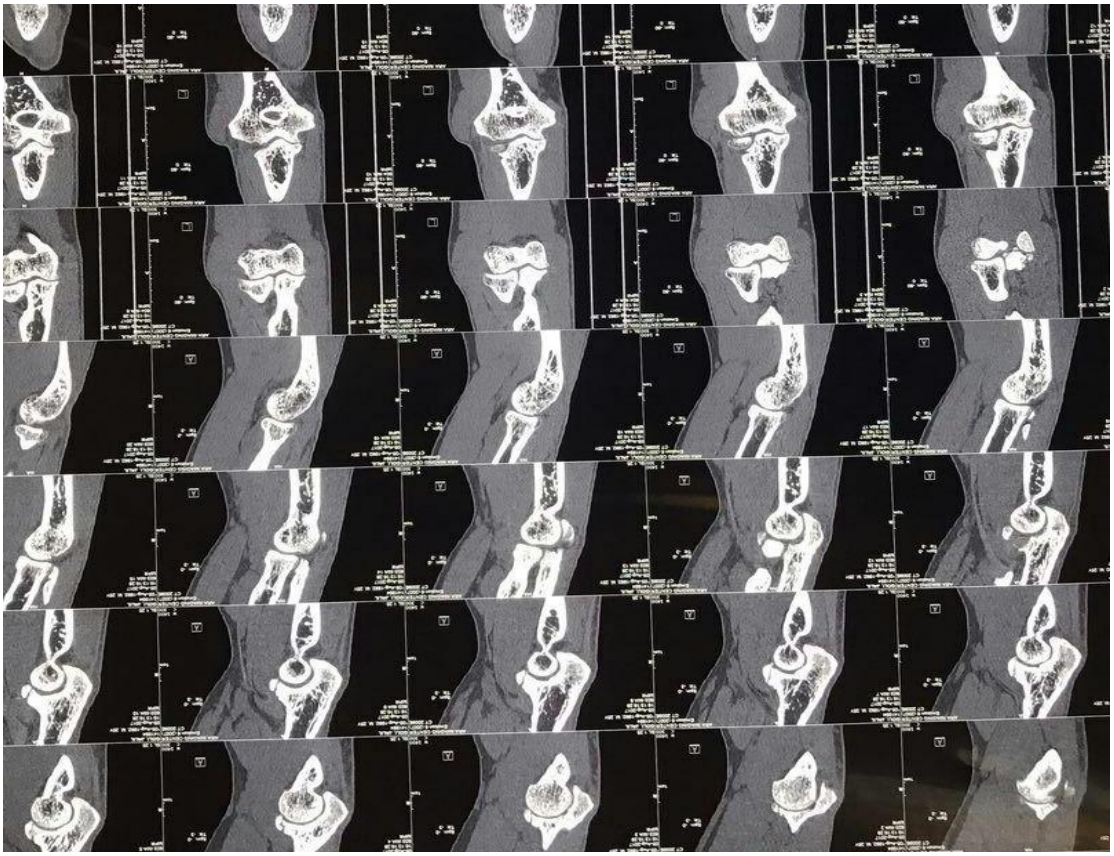

Figure 2: Sagittal view of coronoid stress fracture of the elbow on CT scan.

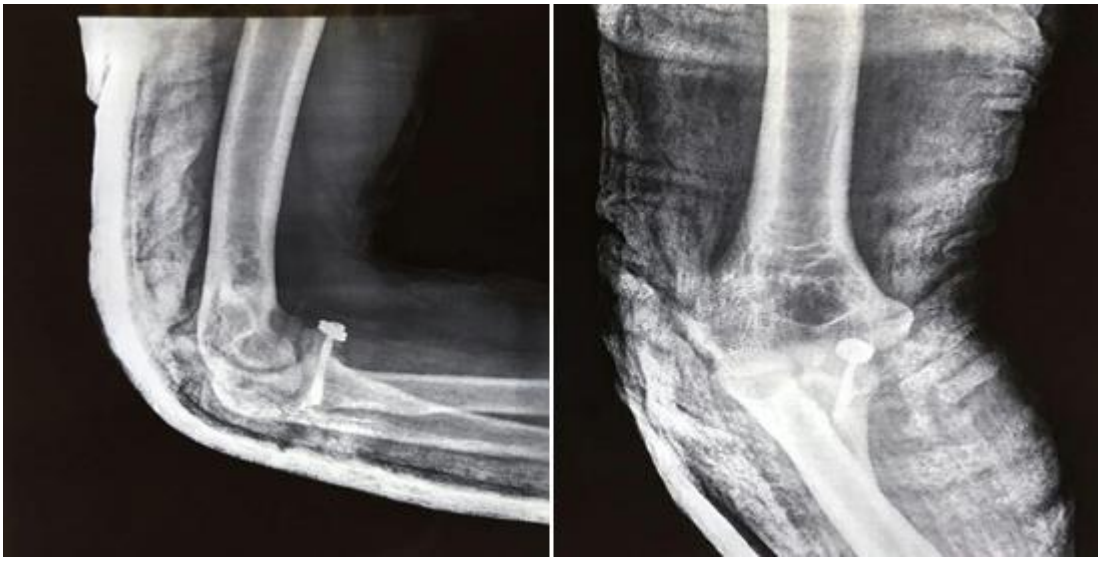

Figure 3: Post-operation radiographs demonstrating fixation of the fracture by screw.

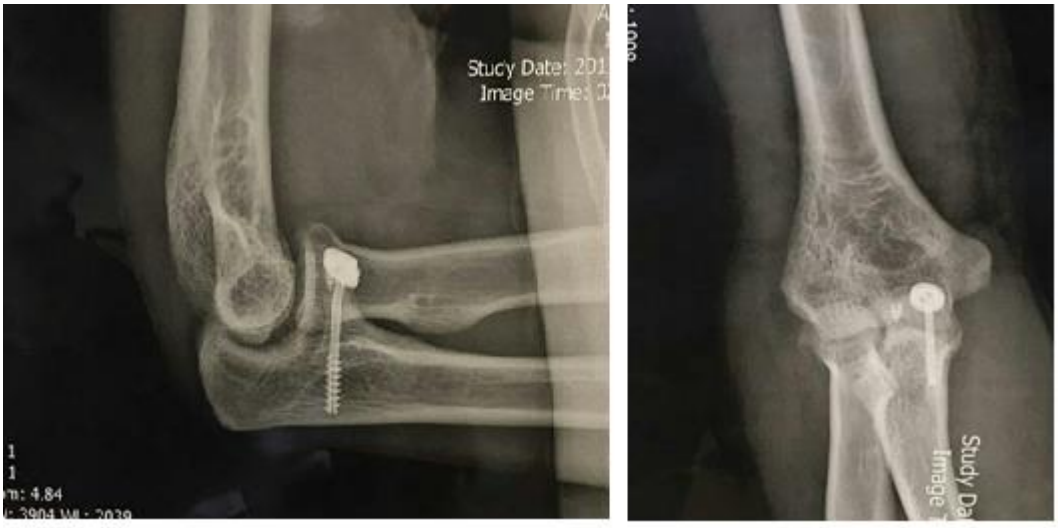

Figure 4: Follow-up radiographs were obtained three months subsequent to the surgery and demonstrated the proper response to the intervention.

Discussion

In this case study, we describe for the first time a 24-year-old Boxer man's nonunion stress fracture of the elbow, which did not respond to physiotherapy and necessitated surgery.

Stress fractures happen when a repetitive force surpasses the strength of the bone, and the bone fails to remodel. They are usually due to an overuse process and are more common in the lower limbs than the upper limbs. Coronoid stress fractures are rare and tend to occur in gymnasts. They present with pain and tenderness over the elbow, exacerbating with full extension. The mechanism of a coronoid stress fracture is axial forces that cause varus posteromedial muscles with the medial trochlea riding onto the anteromedial side of the coronoid, resulting in shearing and overuse conditions. Radiographs demonstrate normal findings at first, but with the progression of the fracture, sclerosis and a periosteal reaction emerge. In addition, an MRI or CT scan must be conducted [11].

A previous case report by T. Hetling et al. reported a 19-year-old gymnast who admitted to having elbow pain after competitions. Imaging indicated an old fracture of the coronoid process. They discussed that Gymnasts have high mechanical loading pressure, even up to 14 times more than body weight. In gymnasts, overuse lesions are typically seen in the wrists, and single coronoid process fractures are unusual. They concluded that sudden and overuse trauma in gymnasts is known, but no nonunion of the coronoid process has been described before [12]. Kerl et al. report a non-united coronoid stress fracture in a 16-year-old female gymnast with chronic pain of the anterior left elbow that was elicited by weight-bearing actions. Physical examination revealed swelling and pain in the antecubital fossa and tenderness at the coronoid with no prior history of trauma. The patient conducted radiographs and magnetic resonance imaging (MRI), and they confirmed a coronoid stress fracture. The conservative management failed; therefore, arthroscopic-assisted fixation was performed, and subsequently, the fracture healed [13].

In our study, the patient made several physiotherapy attempts. Still, it failed to improve the pain, so surgery was performed, and the ORIF facility fixed the fractured fragment, and the patient underwent rehabilitation after the surgery. Within six months of follow-up after the surgery, the pain was refined, the range of motion had been regained to the normal range, motor and sensory functions were intact, and most importantly, the patient could return to his professional career. In addition to the clinical outcomes, radiological improvements in the setting of the coronoid stress fracture were observed.

Conclusion

Coronoid stress fractures should be considered in athletes with chronic elbow pain. Initial treatment is conservative management of the pain. If the conventional treatment fails, fixation of the fragment with a surgical approach and subsequent rehabilitation must be performed.

Authors' contributions

All authors contributed equally in the study.

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Disclosure statement

None.

Ethical Statement

None.

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