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ORIGINAL STUDY

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Coracoid fracture caused by lifting a heavy object: a rare clinical presentation

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The purpose of this narrative review was to highlight the research on the influence of weather conditions on patients with osteoarthritis, the pathophysiological mechanisms and the therapeutic consequences. A search was conducted using the Pubmed, Medline and Web of Science databases. Barometric pressure, temperature and humidity are the weather conditions that are found to be correlated most to the worsening of pain complaints. But, due to the difficulty of measuring the impact of these variables and the great diversity in study protocols, an analysis of studies regarding this topic shows conflicting results. Central sensitization mechanisms and the function of a Transient Receptor Potential channel might explain the pain hypersensitivity to cold weather. Joint pain, caused by central sensitization mechanisms, cannot always be treated with joint arthroplasty. When pain remains present after joint arthroplasty, centrally mediated pain constitutes an important role.

Keywords: Osteoarthritis; weather; hypersensitivity; central sensitization; arthroplasty.

INTRODUCTION

The coracoid process is a hook-shaped bone structure. Fractures of the coracoid process are extremely rare, accounting for 13% of all scapular fractures and 5% of all shoulder girdle fractures *(1-2)*. These fractures are often accompanied by acromioclavicular (AC) joint or glenohumeral joint fractures, scapular fractures, clavicular fractures, proximal humerus fractures, or rotator cuff tears *(2,3)*. There is no consensus for coracoid process fractures mainly because the coracoid process is a key structure of the superior shoulder suspensory complex (SSSC) that serves as a critical anchor for many tendinous and ligamentous attachments. To our knowledge, coracoid process fractures are relatively rare and, to date, only a few cases have been reported in the orthopedic literature. In this report, we present a male patient who had an isolated displaced coracoid process fracture caused by lifting heavy objects and underwent operative treatment.

CASE PRESENTATION

The 39-year-old male patient presented with a right shoulder pain. The patient noticed a click on the right shoulder while lifting the sofa one week earlier and had no additional direct trauma. Subsequently, he had a limitation of shoulder motion with pain. In physical examination, he had a pain during abduction and external rotation of the right

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shoulder, and his right elbow and wrist movement was normal. He had no neurovascular deficit. Direct shoulder radiographs revealed a right coracoid fracture (Figure 1.A). A computed tomography (CT) scan was performed to investigate additional tissue injury and to evaluate the surrounding tissues (Figure 1.B). The coracoid fracture of the patient was classified as type 2 according to Ogava classification *(3)* and Eyres classification *(4)*. The patient underwent surgical management due to the displaced nature of the fracture. Under general anesthesia, the shoulder was opened using the deltopectoral approach in the beach chair position following the administration of perioperative antibiotic prophylaxis with cefazolin. The fracture line was visualized after lateral retraction of the cephalic vein (Figure 2.A). The fracture was then reduced and two K-wires were used for fixation. One 4.5 mm screw with washer was applied after 3.2 mm drilling under the guidance of a centralized K-wire (Figure 2.B). Complete stabilization was achieved and the anatomical layers were closed after bleeding control. No complication was observed and a postoperative CT scan (Figure 3.A) and direct shoulder radiogram (Figure 3.B) showed the shoulder in its normal position. The patient was discharged uneventfully with the recommendation of using a shoulder arm strap for two weeks. The strap was removed and active and passive shoulder exercises were initiated under the guidance of

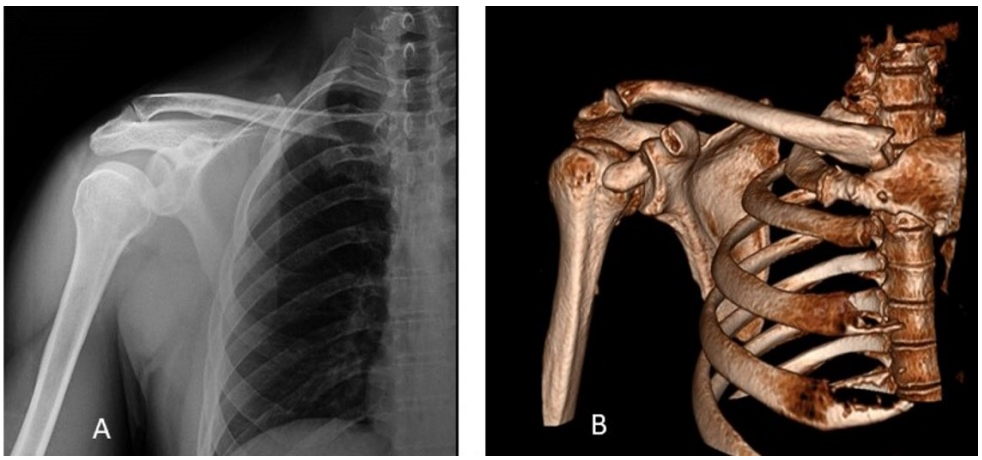

Fig. 1. – A. Direct radiogram of isolated coracoid process fracture, B. 3D Tomography scan of isolated coracoid process fracture.

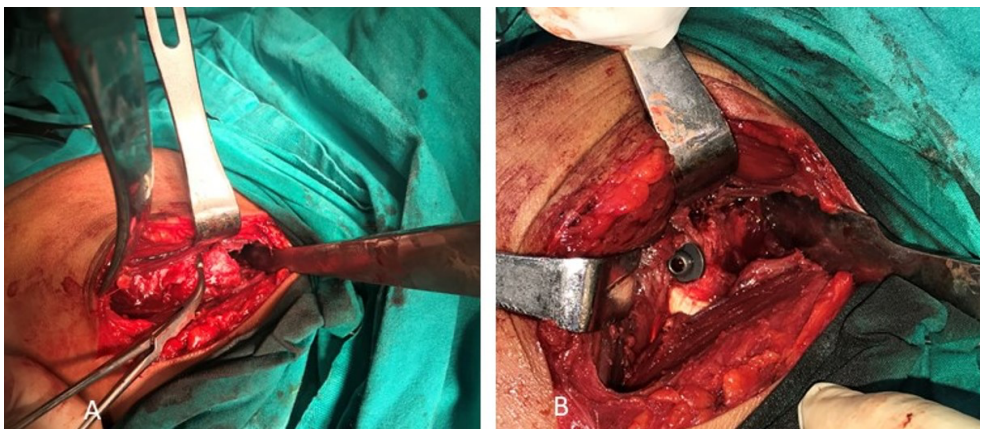

Fig. 2. – A. Intraoperative visualization of coracoid process, B. Surgically fixation of coracoid process.

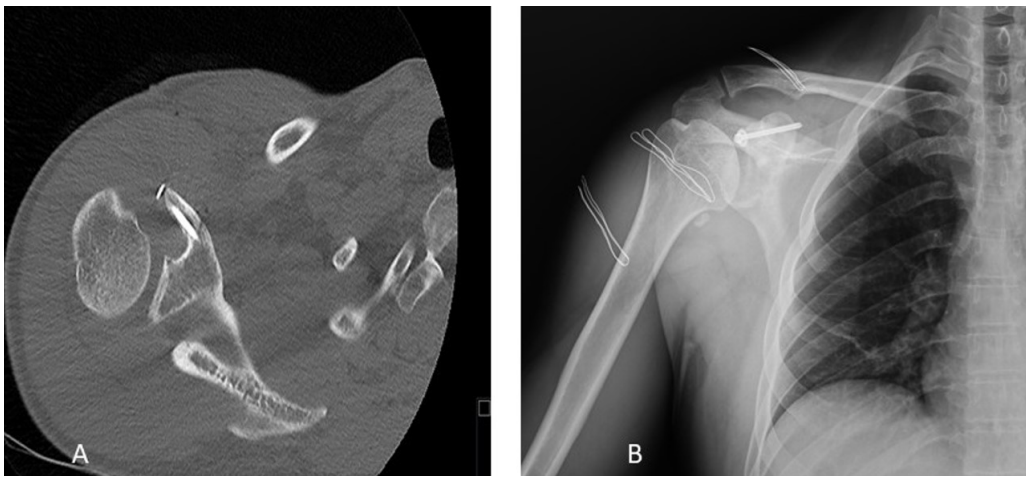

Fig. 3. – A. Postoperative tomography of reduced coracoid process, B. Postoperative direct radiogram of right shoulder.

a physical therapist. Resistance exercises were initiated at week 6 postoperatively and the patient reached a full range of motion without pain after this week. The patient started working at week 4 after the surgery and a complete fusion was observed at week 6.

DISCUSSION

The coracoid process has a critical role for the attachment of numerous tendinous and ligamentous structures including pectoralis minor, coracobrachialis, and short head of the biceps brachii muscle and tendon, and the coracoclavicular, coracohumeral, coracoacromial, and transverse scapular ligaments. The brachial plexus and axillary artery are located in the medial side of the coracoid process and are important for coracoid injuries as well as surgical exploration since they can lead to neuropraxis and bleeding. The literature on isolated fractures is highly limited since they are extremely rare. The coracoclavicular ligament prevents the displacement of the coracoid process and thus the fractures of this process are often seen on the base and are usually minimally displaced. Coracoid fractures are usually accompanied by acromioclavicular joint separation *(5)*. The treatment of coracoid fractures is not completely clarified due to its rare nature. The decision of whether to perform surgical or conservative treatment is dependent on the coracoclavicular ligament. Surgical management can be applied if the fracture line is placed in the proximal site of the ligament and conservative management is preferred if the fracture line is distally located to the ligament *(5)*. Direct shoulder radiographs are usually insufficient for obtaining a definitive and reliable visualization for the diagnosis of coracoid fractures and these fractures can be missed with plain radiographs *(6)*. Further radiographic examinations should be required in cases with a high level of suspicion due to the difficulty of the diagnosis and the superposed plans in conventional radiographic examination. Axillary radiography can be more reliable for coracoid fractures when compared with direct radiography *(7)*. However, CT may be useful for analyzing the surrounding tissue injury and planning operational course with measuring of coracoid base *(8)*.

Coracoid fractures commonly occur after a direct trauma that leads to a strong contraction of the conjoint tendon. However, in our patient, the fracture occurred after an indirect trauma. The operative strategies were recommended for cases with painful nonunion, displacement of more than 1 cm, or multiple disruptions of the SSSC *(9)*. A previous review evaluated a total of 110 coracoid fractures and reported that the most common fractures included Ogawa type I fractures (87%), followed by Ogawa type II fractures (13%) and unclassified fractures (9%). The authors also noted

that successful outcomes were obtained in Ogawa type II and type I fractures after conservational treatment if the fracture was not associated with disruptions of the SSSC *(01)*. In a case report presented by Archik et al., a 15-year-old male patient presented with a complaint of persistent pain in the right shoulder following a jerk during bowling who was diagnosed with osseous avulsion of the distal tip of the coracoid process. The authors performed open reduction and internal fixation using a 3.5 cannula screw and achieved complete recovery after the surgery *(6)*. Kennedy et al. presented a patient with an Ogawa type II fracture who was treated with open reduction and anchor suture fixation. Similarly, the authors obtained good results during the short-term postoperative period *(11)*. Güleç et al. presented a 34-year-old male patient with a coracoid base fracture resulting from motor vehicle accident. The authors performed open reduction and fixation using a 3.5 mm cannula screw and reported excellent outcomes at postoperative week 6 *(12)*. Similarly, we also reduced the coracoid fracture surgically and the patient recovered completely at week 6. However, our patient had no history of direct trauma but had a history of indirect trauma and was operated on as described in the literature. The patient was discharged uneventfully after the surgery.

CONCLUSION

The literature includes few cases of isolated coracoid fractures resulting from an indirect trauma such as lifting a heavy object. In the view of previous literature and according to our results, open reduction with internal fixation seems to be successful for type 2 fractures with displacement of more than 1 cm and leads to rapid recovery with good outcomes after the surgery. Additionally, we suggest that coracoid fractures should be investigated with further cohort studies rather than case reports and a consensus should be designed for allowing better guidance.

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