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CASE REPORT

Triple fracture of the shoulder suspensory complex[☆]

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KEYWORDS

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PALABRAS CLAVE

Complejo suspensorio hombro;
Clavícula;
Coracoides;
Acromion;
Fractura triple lesión;
Cirugía

Abstract The superior suspensory complex of the shoulder (SSCS) is a ring shaped structure composed of bones and soft tissues that play a fundamental role in the stability of the shoulder joint. Isolated injuries of the SSCS are relatively common, but injuries that affect 3 components are extremely unusual.

We present a triple injury of the SSCS in a 26-year-old patient with a Neer type II clavicular fracture, a Kuhn type III acromion fracture and an Ogawa type I coracoid fracture.

An open reduction and stabilization of the clavicle was performed with 2 Kirschner nails. The acromial fracture was synthesized with 2 cannulated screws, and the coracoid fracture was treated conservatively. After 24 months of follow up the patient had an excellent functional outcome according to the Constant-Murley shoulder score and QuickDASH scoring system, and all the fractures healed correctly.

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Triple rotura del complejo suspensorio del hombro

Resumen El complejo suspensorio del hombro (CSSH) es una estructura anular cuya integridad es fundamental para mantener la biomecánica del hombro. Las lesiones aisladas del CSSH son relativamente frecuentes, pero las lesiones que afectan a 3 componentes son extremadamente raras. Hay solamente 3 casos publicados en la literatura, y nosotros en este trabajo exponemos uno más.

Presentamos una triple lesión del CSSH en un varón de 26 años con una fractura de la apófisis coracoides tipo I de Ogawa, fractura de acromion tipo III de Kuhn y fractura de clavícula tipo II de Neer.

Se realiza una reducción abierta y fijación interna de la clavícula con 2 agujas de Kirschner roscadas y síntesis del acromion con 2 tornillos canulados. La fractura de coracoides se trató de forma conservadora. A los 24 meses de la cirugía las 3 fracturas consolidaron correctamente y el paciente obtuvo un resultado funcional excelente según las escalas de Constant-Murley y QuickDASH.

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Introduction

The superior suspensory complex of the shoulder (SSCS) is an annular structure whose integrity is essential to maintaining shoulder biomechanics. It consists of the clavicle, acromion, coracoid, acromioclavicular joint and coracoclavicular and coracoacromial ligaments.

Simple isolated ruptures are common and do not significantly alter the anatomical and functional stability of the annulus. They are usually due to direct trauma pressing the shoulder downwards or to an indirect force displacing the shoulder upwards or downwards.¹

However, a disruption in 2 or more structures compromises the integrity of the annulus and causes a potentially unstable situation, which may lead to complications such as consolidation delays, losses of strength and even degenerative arthropathies.²

We present a patient who suffered a triple SSCS lesion: fracture of the coracoid, acromion and distal third of the clavicle. The literature only contains 3 cases which are similar to the one reported in this work.³⁻⁵ This was a very unstable situation requiring a careful approach in order to avoid long-term complications. The clinical presentation and treatment options are discussed below.

Case report

The patient was a 26-year-old male with no known diseases who was admitted to our center due to intense pain symptoms in the left shoulder and a mild head injury after suffering a motorcycle accident.

Clinical examination revealed a large hematoma in the left shoulder associated with intense pain at that same level which increased with mobilization. Radiographic examination revealed an Ogawa type I fracture of the coracoid process, a Kuhn type 3 acromion fracture and a Neer type II fracture of the clavicle.⁶⁻⁸ A computed tomography (CT) scan of the left shoulder confirmed the triple SSCS lesion (Fig. 1).

The affected limb was temporarily immobilized with a sling. Surgery was performed 2 days after admission through open reduction of the clavicle and subsequent stabilization with 2 threaded 2 mm Kirschner wires, as well as an open reduction of the acromion fracture and osteosynthesis with 2 cannulated 4.5 mm screws. We did not perform any surgery on the coracoid process. Functional assessment was performed at 24 months after surgery using the Constant-Murley test and DASH (disabilities of the arm, shoulder and hand) questionnaire in its abbreviated form (QuickDASH). These scales assess the strength and range of motion of the shoulder, as well as subjective complaints by patients.^{9,10}

The postoperative control radiographs were satisfactory (Fig. 2). There were no complications in the immediate postoperative period (e.g. iatrogenic injury secondary to surgery, infection, scarring problems), so the patient was discharged 2 days after surgery.

At 2 weeks after surgery, we removed the sling and started rehabilitation with pendular shoulder exercises. We obtained various monitoring radiographs at 2, 4 and 8 weeks of surgery, which showed a satisfactory consolidation of fractures (Fig. 2). The Kirschner wires were removed at 6 weeks

of the initial surgery, and we then began an intensive rehabilitation cycle.

We conducted a new review at 24 months after hospital discharge, in which we tested the strength, stability, function and mobility of the shoulder using the Constant-Murley and QuickDASH scales.^{9,10}

We obtained an excellent functional outcome according to both rating scales used; 90 points with the Constant-Murley test, and 2.3 points in the QuickDASH. The patient was able to abduct the shoulder to 165°, perform an antepulsion of 155°, internal rotation to the T10 level and an external rotation with the arm at the side of the body of 90° and from 20° to 90° abduction. The patient returned to his previous work related to construction at 8 months of surgery and reported being very satisfied with the outcome of the treatment.

Discussion

The SSCS is an annular structure whose integrity is essential to maintaining shoulder biomechanics. It consists of the clavicle, acromioclavicular joint, acromion, coracoacromial ligament, coracoid and coracoclavicular ligaments.¹¹ Simple SSCS ruptures are frequent. These lesions are stable from an anatomical point of view because the overall integrity of the annulus is not significantly altered and, in general, conservative treatment offers excellent or good results.¹¹

Scapular fractures account for 1% of all fractures. The most common mechanism of injury is usually through direct trauma on the lateral or posterosuperior part of the shoulder. Moreover, acromion fractures occur in 8% and coracoid fractures in 2-5% of all scapular fractures.¹² According to Ogawa et al., coracoid fractures can be classified into 2 types according to their location. Type I fractures are proximal to the coracoclavicular ligament. These fractures are unstable and, therefore, require open reduction and internal fixation. However, type II fractures are distal to the coracoclavicular ligament and could be caused by contractions of the *coracobrachialis* muscle, the short head of the biceps or the *pectoralis minor* muscle. Type I fractures appear to be frequently associated with acromioclavicular dislocations. In this case, the coracoclavicular ligament is usually intact.⁶

When the SSCS suffers ruptures in 2 or more points, the integrity of the complex is clearly compromised and this creates a potentially unstable anatomical situation. Double SSCS lesions are rare. There are several possible combinations, with the most common being an association of acromioclavicular dislocation or fracture of the distal third of the clavicle with a fracture at the level of the acromion or coracoid.¹³

However, triple SSCS lesions are extremely rare. Only 3 cases similar to ours have been reported in the literature, so the correct treatment has to be based on very isolated cases.³⁻⁵ These are very unstable lesions requiring surgical treatment to prevent complications such as pseudoarthrosis (or nonunion), malunion, muscle weakness, functional deficit, secondary subacromial syndrome and degenerative acromioclavicular arthropathy.^{1,2,11}

Lecoq et al. described a triple SSCS lesion with involvement of the distal third of the clavicle, acromion and

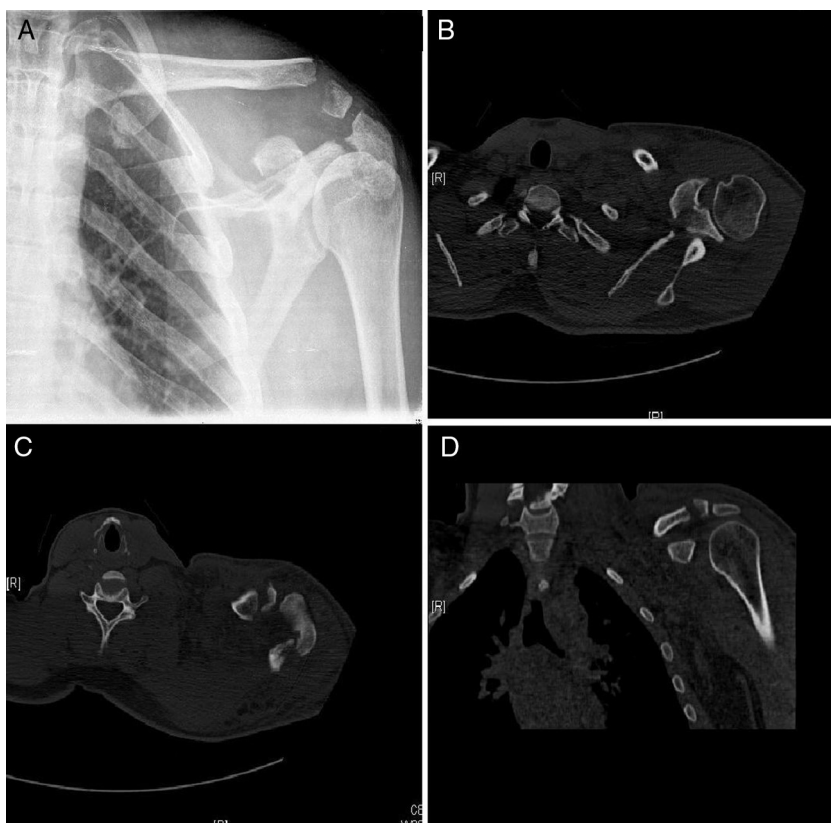


Figure 1 (A) Plain radiograph of the left shoulder revealing an Ogawa type I fracture of the coracoid process, a Kuhn type III fracture of the acromion and a Neer type II fracture of the clavicle. (B–D) Computed tomography scan of the left shoulder confirming the diagnosis.

coracoid. This case was treated by an osteosynthesis of the coracoid apophysis with screws for small fragments. The fractures in the clavicle and acromion were treated conservatively, achieving a good functional outcome after 12 months follow-up.³ Jung et al. described a displaced fracture of the distal clavicle, a fracture of the coracoid and a nondisplaced fracture of the acromion. These lesions were treated by synthesis of the coracoid apophysis with a screw for small fragments and stabilization of the clavicle with 2 Kirschner wires. The acromion fracture was treated

orthopedically.⁴ Unlike the cases mentioned previously, Kim et al. described a dislocation of the acromioclavicular joint associated to a displaced fracture of the coracoid apophysis, acromion fracture and humeral diaphysis fracture. This case was first treated by fixation of the humeral fracture with an intramedullary nail. This was followed by internal fixation of the coracoid with a cortical, half-threaded 6.5 mm × 50 mm screw and of the acromion with tension cerclage. Lastly, the acromioclavicular dislocation was stabilized with 3 Steinmann transarticular nails. In this case,

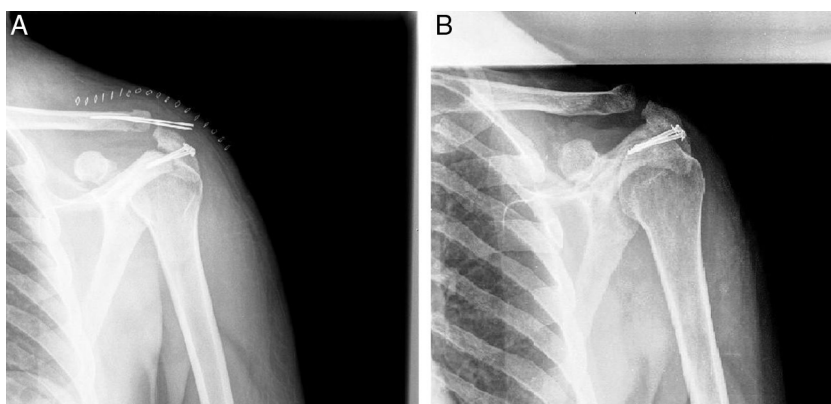


Figure 2 (A) Postoperative control radiograph showing a good reduction of the fracture. (B) Control radiograph showing satisfactory consolidation of the fractures.

the authors obtained a good functional outcome at 5 years follow-up.⁵

Despite the similarity between the above cases, their treatments were very different. In our case we opted for a synthesis of the clavicle with threaded Kirschner wires and synthesis of the acromion with 2 cannulated 4.5 mm screws. We did not consider it necessary to fix the coracoid apophysis, as we achieved its anatomical reduction through the stabilization of the other fractures. Some authors recommend removing the Kirschner wires in floating shoulder lesions several months after the intervention.¹⁴ In our case, we removed them after 6 weeks, once we confirmed signs of consolidation in postoperative control radiographs. This therapeutic approach achieved an almost complete range of glenohumeral motion, as well as an excellent functional outcome according to the Constant-Murley test and the Quick-DASH functional assessment questionnaire.^{9,10} For these reasons, we believe that our line of treatment is an appropriate therapeutic option for the treatment of these lesions.

Level of evidence

Level of evidence IV.

Ethical responsibilities

Protection of people and animals. The authors declare that this investigation did not require experiments on humans or animals.

Confidentiality of data. The authors declare that they have followed the protocols of their workplace on the publication of patient data and that all patients included in the study received sufficient information and gave their written informed consent to participate in the study.

Right to privacy and informed consent. The authors declare that this work does not reflect any patient data.

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