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Case report

Successful surgical treatment of a four part fracture dislocations of the proximal humerus and coracoid avulsion

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Summary. Fracture-dislocation of the proximal humerus (usually occurring after violent trauma) may be more frequently associated with a poor long-term results because the destruction of the hinged periosteum is associated with an high-risk of avascular necrosis of the head of the humerus (1, 2). Concomitant coracoid fracture with anterior shoulder dislocation in such case is something extremely rarely reported (8). Herein, we describe a challenging case of a 44 years old man with 4-parts fracture of the right proximal humerus, dislocation of the glenohumeral joint associated with coracoid avulsion. Considering the severe functional damage on the right shoulder, the patient was immediately treated with open reduction internal fixation (ORIF) at the level of the proximal humerus and with the concomitant placement of one screw at the level of coracoid avulsion. At a 15 months follow up we observed an excellent clinical and radiographic results. We take the opportunity of this unusual case for briefly discuss on such clinical condition and surgical options. (www.actabiomedica.it)

Key words: fracture dislocation humeral head, coracoid avulsion

Introduction

Fracture-dislocation of the proximal humerus in young people are generally reported after violent trauma. The long-term results in such cases may be poor more frequently because the hinged periosteum is generally destroyed and , accordingly, the risk of avascular necrosis is very high (1, 2). Concomitant coracoid fracture with anterior shoulder dislocation is only anecdotically reported (8). In these cases, two ethiological mechanisms are theorized: the direct impact of the dislocated head of the humerus on the coracoid process or a sudden strong pull of the muscle attached at the coracoid process during shoulder dislocation (12, 14, 15). To our best knowledge this combination of fractures with dislocation of the shoulder has not been described in the literature since now.

Case Report

A 44 year old right handed man fell down from the stair and slammed on his right shoulder reporting intense pain and immediate function inability. The patient was transported at Emergency Department of our Hospital (Arcispedale Santa Maria Nuova in Reggio Emilia) where was visited at first orthopaedic aid. Radiological assessment showed an anterior shoulder dislocation associated with fractures of the proximal humerus (affecting the neck and both great and little tuberosities) and coracoid avulsion (Fig. 1). At clinical examination we noted a large hematoma at the level of the right upper arm while the neurological and vascular examination did not showed any pathological finding. A computer tomography scan was performed, this revealing a remarkable displacement of the fractures

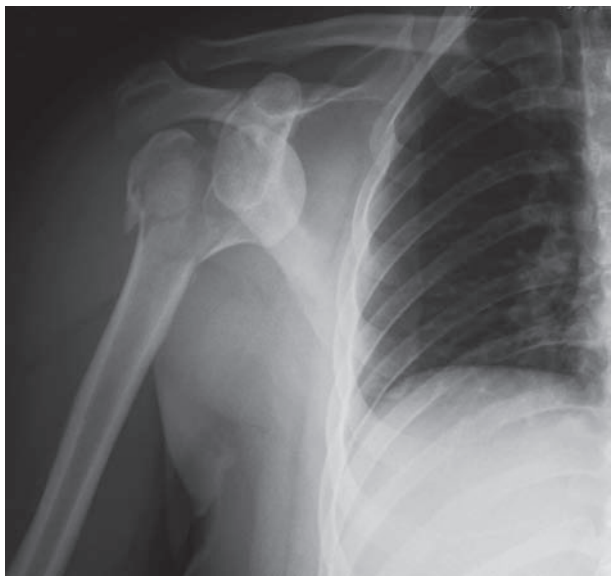

Figure 1. Post traumatic radiological assessment

(Figs. 2-3). Considering the severe pain and functional damage on the right shoulder, we planned an emergency surgical repair.

Surgical procedures was performed in the supine position via a standard delto-pectoral approach. Under fluoroscopic guide an open reduction internal fixation (ORIF) was done using a locking plate and screws at the level of the proximal humerus after having reduced the glenohumeral joint and one screw at the level of coracoid process (Fig. 4); ethibond sutures

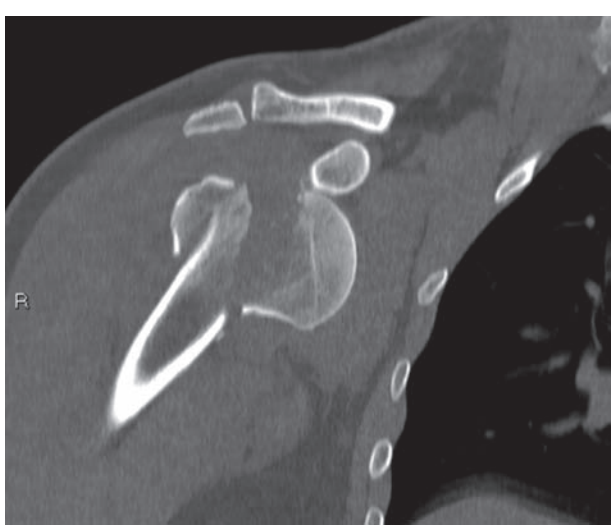

Figure 2. Computer tomography of the fractures

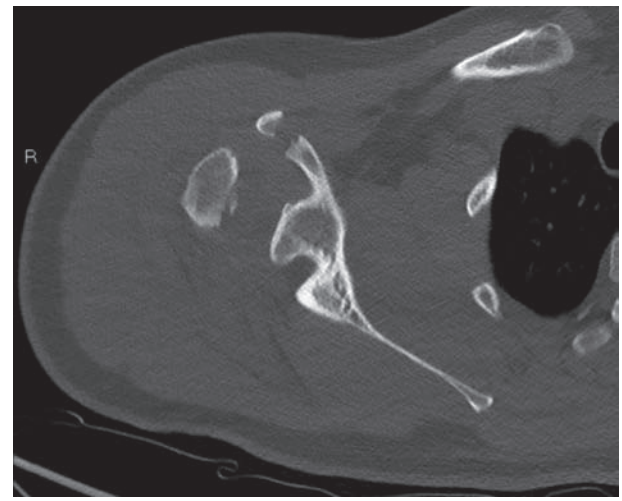

Figure 3. Computer tomography of the fractures

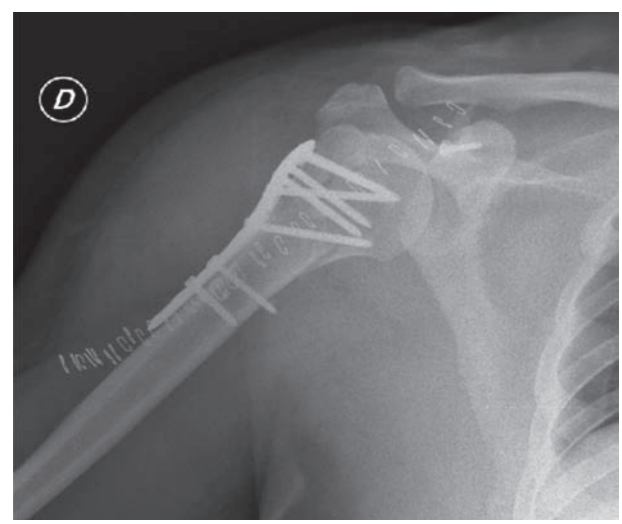

Figure 4. Post-operative radiological assessment

were used to integrate fixation of both tuberosities. In the post-operative he wore a sling with pillow for four weeks, after 10 days begun passive motion of the shoulder avoiding external and internal rotation. After one month shoulder movements and progressive strengthening exercises were begun actively. The patient completed a clinically and radiographically follow-up at 1,2, 6 and 9 months. At the last follow up we performed also Constant scoring system. At the 2 months follow up, symptoms had disappeared and the patient was able to resume his work activities without discomfort but he was not allowed to ride his motor-

cycle. At the 6 months evaluation he was allowed to return to practice motocross. At the 15 months and last follow up he did not show any problems. Constant score was 93 and we observed the following ranges of movement (Figs. 5-6-7-8): 1) active forward elevation and abduction: complete; 2) external rotation: up to 35°; 3) internal rotation: D7. None impingement symptoms were referred and we noted a complete recovery of the strength at the level of conjoined tendon (short head of biceps and the coraco-brachialis). At radiological assessment all fractures were healed with partial reabsorption of the avulsed coracoid process detected (Figs. 9-10).

Figure 5. Range of movements at last follow up

Figure 6. Range of movements at last follow up

Figure 7. Range of movements at last follow up

Figure 8. Post-operative radiological assessment

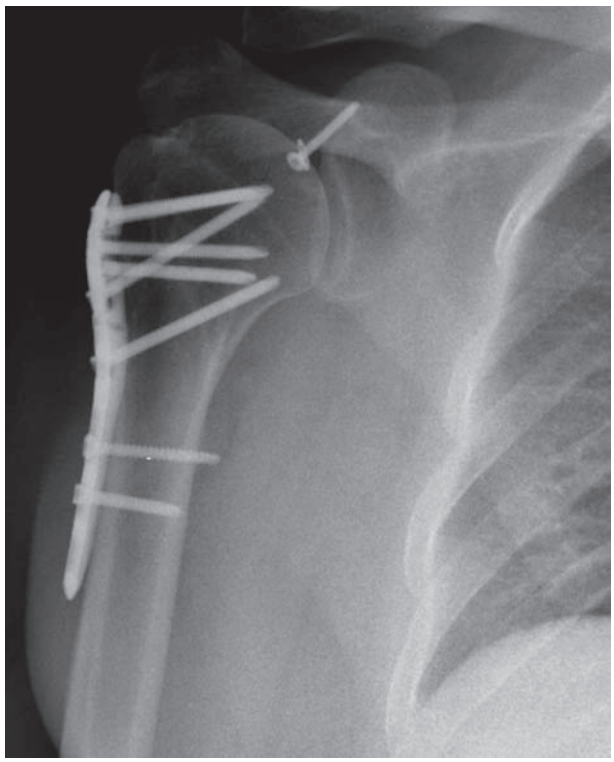

Figure 9. Radiological assessment at last follow up

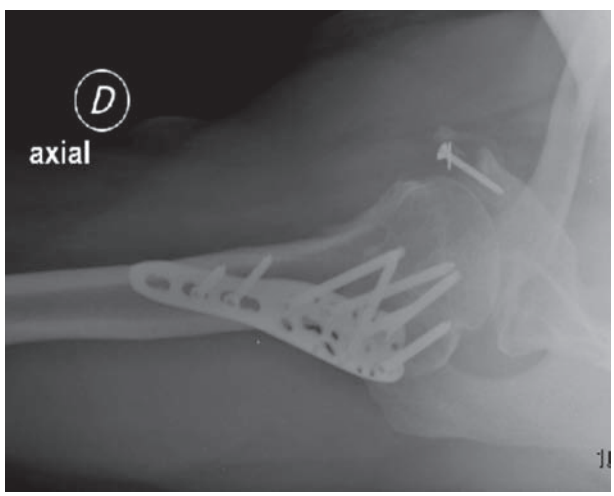

Figure 10. Radiological assessment at last follow up

Discussion

Dislocation of the shoulder is common and may be associated with a variety of complications to omolateral shoulder: crush fracture of the humeral head, fracture of the glenoid rim, neurovascular injuries, rupture of the rotator cuff, fracture of the tuberosities, fracture or avulsion of the coracoid (1). Associated fracture of the humeral neck are not common and are described also rare iatrogenic displacement during attempted reduction of the shoulder, in this type of injuries closed manipulation should be avoided (3). In the present case, we observed an anterior glenohumeral dislocation associated with fracture of both neck and tuberosities of the proximal humerus and a coracoid avulsion. At careful review of the pertinent literature, such clinical presentation has never been reported at our best knowledgement.

Four part fracture-dislocation of the proximal humerus have a worst prognosis, this is due to the devascularisation of the humeral head as result of the capsular disruption, therefore there is a high risk of osteonecrosis or nonunion (2). In younger patients (<60 years) an open reduction and internal fixation (ORIF) may be considered the gold standard treatment and, in this setting, every attempt should be made to reduce the fracture and obtain the original anatomy of the humeral head (1, 17). In the experience of Soliman et al (18) 39 patients younger than 40 years old with four-part fracture dislocations were treated with osteosynthesis adopting K-wires or proximal humerus plate. The Authors reported a total of 8 avascular necrosis, of which seven were fractures of the anatomic neck, and one fracture at the level of the surgical neck. Others (4) reported an interesting case of anterior shoulder dislocation associated with fractures of the coracoid process, of the great tuberosity and of the glenoid rim; the patient was treated conservatively with emergency shoulder reduction only and long-term results were satisfactory

On the other hand, the fracture of the coracoid process is rarely reported usually related with shoulder injuries (14, 15). Only few cases are reported associated to shoulder dislocation. Fractures of the coracoid are probably caused by traction forces from the attached conjoined tendon or the results from direct contusions of the humeral head to coracoid process. Ogawa (12) found that 37 of 67 coracoid fractures were associated with ipsilateral acromion-clavicular dislocations (16). Higher incidence of this type of combination of lesions is documented in football population (11, 13). For diagnosis of coracoid fracture it may be necessary

a computed tomography scan to verify the displacement and the extension of the fracture (10). Ogawa and colleagues (12) adopted a single malleolar screw on the majority of type-I fractures (avulsion of the tip of the coracoid) reporting excellent results. In fact, the use of screws in the stabilizzation of the coracoid fracture has been successfully purposed in order to avoid a pseudoarthrosis of the coracoid process (7, 9) even if undisplaced fractures may be successfully treated conservatively (8).

Conclusions

In open reduction and internal fixation of the proximal humerus the surgical goal consist of the achievement of an anatomical reduction of this element considering that the rotator cuff should be accurately inserted in the head of the humerus. A right balance between the exposed fragments and the preservation of the soft tissues is something very pivotal.

An absolutely stable construct must be achieved; in this context osteosynthesis of the fracture/dislocation of the proximal humeral head in a young man requires an early surgical treatment (until 6 hours) for bloody supply preservation and humeral head vascolarization. Finally, when a coracoid avulsion is associated with such injury a simultaneously surgical treatment should be attempted using a single cortical screw.

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