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Osteosynthesis of Ideberg type III glenoid fracture with retroclavicular cannulated percutaneous screw

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Summary

In this article we report a 74 year old patient with Ideberg-type III fracture who was treated with indirect reduction and fixation. The patient was a sportive biker who suffered from a high energy trauma (road accident). X-ray revealed a scapula fracture, and only after a CT-Scan we could confirm the fracture type (Ideberg-type III glenoid fracture). The patient was operated and re-evaluated at follow-up. During the surgery we prefered not to access intra-articular due to the low joint involvement. He was able to resume his daily activities at two months postoperatively. At three months ASES Score was 91.5; Constant Score was 71 (*vs* 96 of unaffected arm). The patient revealed to be satisfied with the treatment, moreover the clinical results are encouraging in view of further improvements in the following months.

Key words: Ideberg, glenoid fracture, scapular fracture, shoulder

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Introduction

Fractures of the scapula represent 0.4-0.9% of all fractures and approximately 25% involve the glenoid articular surface [1]. Men in the fifth decade of life after high-energy trauma are most often affected, frequently in association with other injuries of the rib cage, upper limb and pelvic ring. Instead, women are generally affected in the 7th decade of life following low-medium energy trauma [2].

The main cause of this type of fracture is the impact of the humeral head against the glenoid, sometimes associated with dislocation of the gleno-humeral joint. More rarely they are due to direct trauma or muscle contraction avulsions typical of seizures or electric shocks [3].

Radiological study involves X-rays in antero-posterior projection and according to Neer I, in some cases an axillary x-ray may also be useful. On the other hand, CT and 3D reconstructions with subtraction of the ribs and the proximal humerus are essential.

Ideberg type III fractures (Fig. 1) are injuries involving the glenoid with superior extrarticular extension beyond the base of the coracoid [4]. They are often associated with damage to the acromioclavicular joint, configuring a double lesion of the superior shoulder suspensory complex (SSSC) [5]. In addition, possible injuries to the suprascapular nerve have been described in the literature [6].

Treatment of these fractures is conservative if they are undisplaced. In the literature, however, there is no precise consensus on the degree of displacement necessary to

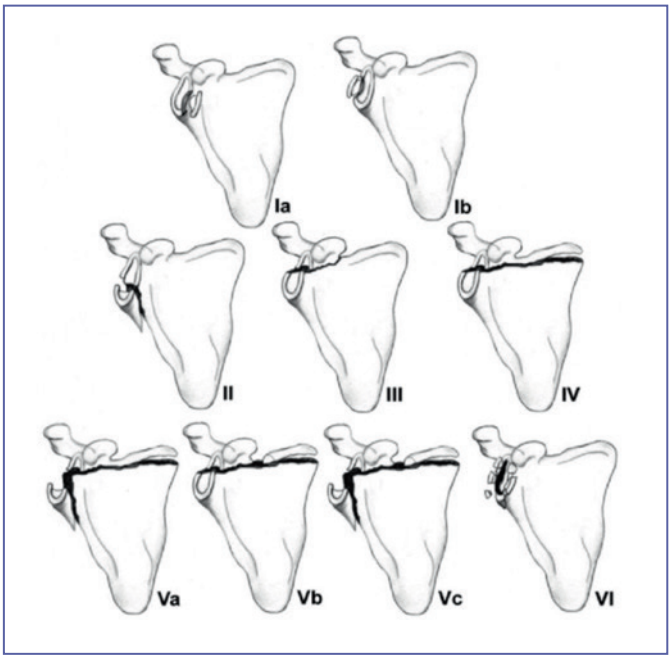

Figure 1. Ideberg classification of glenoid fractures.

indicate surgical treatment. Kavanagh proposed displacement of the fragments over 2 mm [7], while Mayo over 5 mm [8].
Herein, we describe a case of an Ideberg type III glenoid fracture treated surgically with a reduction performed through a deltopectoral approach and fixation with a cannulated screw through a minimally invasive retroclavicular approach.

Case report

A 74-year-old man suffered mixed trauma to his right shoulder following a fall on a bike. When he arrived at our emergency room, X-ray and CT scan of the shoulder showed a displaced Ideberg type III fracture of the glenoid, associated with a grade 3 acromioclavicular dislocation. The fracture marginally involved the upper portion of the glenoid; however, in accordance with the biomechanical studies conducted by Pècora et al. [9], it is precisely in this area that the greatest pressure is exerted by the head of the humerus when the limb is at 60° of abduction. Despite the minimal joint involvement, we therefore decided to proceed with surgical treatment.

Methods

Pre-intervention

The surgery was performed under general anesthesia without peripheral nerve block so as to evaluate, immediately after surgery, the possible presence of nerve damage. The patient was positioned in a beach-chair position and the arm was left free in order to facilitate the reduction procedures. The image intensifier was positioned behind the patient in order to perform antero-posterior (AP) scapula projections. After carrying out the preliminary radiographic checks, a sterile field was set up on the left shoulder (Figs. 2-3).

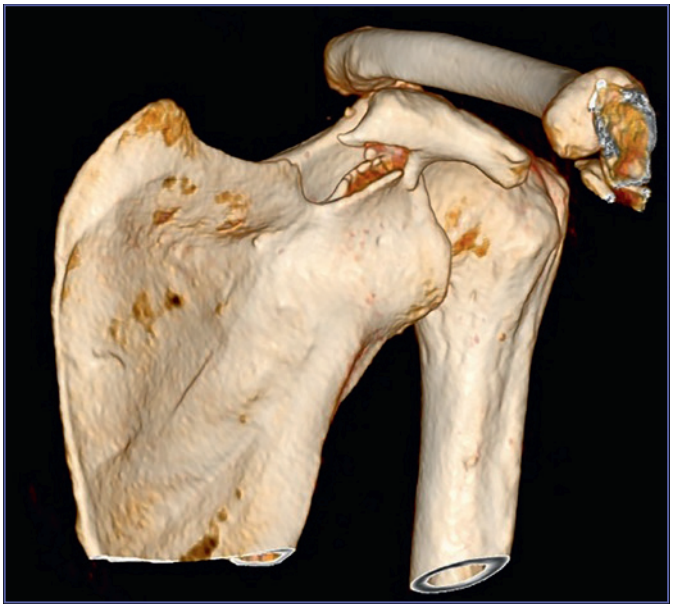

Figure 2. 3D CT scan.

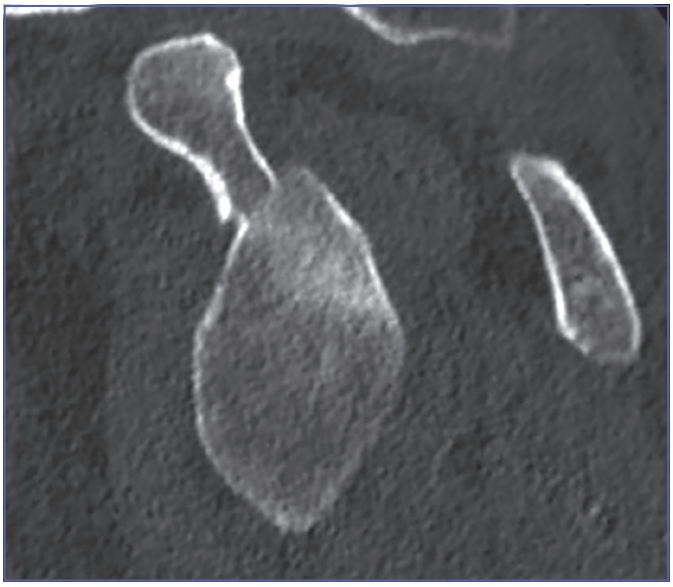

Figure 3. Sagittal CT scan.

Surgical procedure

The proximal part of the deltopectoral approach was involved. The coracoid process was identified and a 1.6 mm Kirschner (K) wire was inserted into it. We then used the K wire as a joystick with the aim of obtaining indirect reduction of the fragment. Considering the marginal involvement of the superior articular surface (< 10%), we preferred not to perform capsulotomy in this case. We then used the Neviaser portal [10] for osteosynthesis using a 4 mm cannulated screw. We then performed the final X-Ray of the osteosynthesis which were satisfactory with a stable fracture fragment in the shoulder and elbow mobilization tests. At the end of general anesthesia, we evaluated the active abduction and external rotation movements which were complete and pain-free.

Post-operative treatment

In the post-operative phase, we applied a universal shoulder brace to the patient with the possibility of removing it 3 times a day to perform passive mobilization of the shoulder (pendulum) and passive mobilization of the elbow in flexion-extension and pronation-supination with the prohibition of lifting weights. At 4 weeks, the patient was able to remove the shoulder brace and start activities for recovery of complete passive range of motion (ROM) and isometric reinforcement of the rotator cuff and deltoid muscle (Fig. 4).

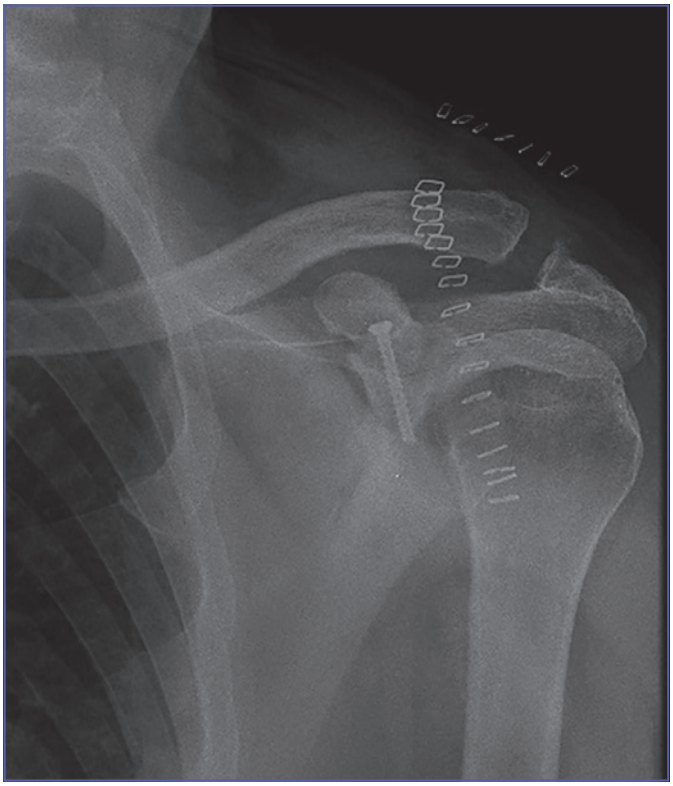

Figure 4. Post-operative X-Ray.

Results

At 14 weeks, we calculated the ASES score (Tab. I), constant shoulder score (Tab II) and UCLA score (Tab. III) to assess outcome. The patient almost completely recovered shoulder ROM in all planes. He was able to lift in abduction up to 0.75 kg with progressive recovery, which negatively affected his ability to perform recreational and work activities. He reports occasional pain which however does not interfere with rest, normal daily activities or personal hygiene. Overall he is very satisfied with the result obtained with surgical treatment. At X-ray follow-up, we observed the loss of reduction of the acromioclavicular joint which did not affect the patient's normal daily activities (Fig. 5).

Table I. ASES score.

ASES score	
Usual work	Retired
Usual sport/leisure activity	None
Shoulder pain at night	No
Use of pain killers	No
Use of strong pain killers	No
How many pills on an average day	0
Intensity of pain	1
Difficulty to put on a coat	Not difficult
Difficulty to sleep on the affected side	Not difficult
Difficulty to wash back	Not difficult
Difficulty to manage toiletting	Not difficult
Difficulty to comb hair	Not difficult
Difficulty to reach high shelves	Not difficult
Difficulty to lift 4,5 kg above sholders	Unable to do
Difficulty to throw a ball overhead	Somewhat difficult
Difficulty to do usual work	Somewhat difficult
Difficulty to do leisure activity	Not difficult
Result	**91.5**

Discussion

The approach described allows for reduction and osteosynthesis to be performed without the need to open the joint capsule. This avoids detachment of the subscapularis tendon and reduces the possibility of any infectious agents penetrating the joint. The suprascapular nerve, due to its course through the suprascapular notch, is likely to remain incarcerated within the fracture after closed reduction; for this, its functionality must be carefully evaluated both before and immediately after the intervention. It is therefore recommended not to proceed with

Table III. UCLA score.

UCLA score	
Pain during the past 4 weeks	Occasional and slight
Function	Most domestic chores, shopping and driving
Active forward flexion	150°
Strength of forward flexion	Grade 4
Satisfaction of patient	Satisfied and better
Result	**28**

Table II. Constant shoulder score.

Constant shoulder score	Affected arm	Unaffected arm	
Pain during past 4 weeks	None	None	
Unaffected sleep	Yes	Yes	
Full recreation	No	No	
Full work	No	No	
Arm position	Above head	Above head	
Strenght of abduction	7-9 Pounds	> 24	
Forward flexion	151°-180°	151°-180°	
Lateral elevation	151°-180°	151°-180°	
External rotation	Hand on top of head	Head on top of head	
Internal rotation	T12	T12	
Result	**71**	**96**	**Difference 25**

Figure 5. 14 weeks follow-up.

locoregional anesthesia of the brachial plexus so as to be able to test the functionality of the supraspinatus and infraspinatus muscles in the immediate postoperative period. It is also advisable in the immediate pre-operative period to check the positioning of the image intensifier for correct visualization of the fracture gap in order to reduce the duration of the surgical procedure. The clinical result on our patient was excellent overall. The modest results of the UCLA Score and the constant shoulder score are attributable to the lack of strength in anterior flexion and abduction which, however, are progressively recovering.

Conclusions

We believe that the deltopectoral approach associated with minimally invasive retroclavicular access may be a valid alternative for treatment of Ideberg type III glenoid fractures involving the marginal articular surface. This allows to obtain good reduction and stable osteosynthesis with a minimum invasiveness.

Ethical consideration

The institution approved the human protocol for this investigation; all investigations were conducted in conformity with ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments. All patients have given their informed consent for participation and there is no financial interest to report.

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Conflict of interest

None.

Author contributions

The Authors contributed equally to the work.

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