

# A case report on perioperative management of a posterolateral acromion isolated fracture

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## Key points

This case report presents diagnosis, anesthesiological management and surgical treatment of an acromial isolated fracture, a rare condition commonly associated with other injuries of the shoulder as fracture of glenoid process, scapula or clavicle and disruption of superior shoulder suspensory complex.

## Abstract

An isolated posterolateral acromion fracture was diagnosed in a 55 years old amateur cyclist after a fall on the shoulder. Diagnosis was made by clinical examination and was confirmed by x-ray and computerized tomography. The fracture was treated with open reduction and fixation with two cannulated screws and tension band under locoregional anesthesia, using a combination between ultrasound guided and ENS assisted supraclavicular brachial plexus block and suprascapular nerve block in anterior approach. Fracture healing was completed without symptoms or functional limitations. Six months after surgery patient had completely returned to his preinjury sport activities.

## Keyword

acromial isolated fracture, direct fall on the shoulder, suprascapular block anterior approach, brachial plexus supraclavicular block.

*Pellegrini et al. Perioperative management in acromion fracture*

## Introduction

Isolated fractures of the acromion process are rare. They represent 8-10 % of all fractures of the scapula, which represent 1% of all fractures<sup>1,2</sup>. This fracture is commonly associated with other injuries of the shoulder as fracture of glenoid process, scapula or clavicle and disruption of superior shoulder suspensory complex<sup>2</sup>. The most frequent mechanism of injury is a direct fall on the shoulder; early diagnosis has a crucial importance in order to decide the proper treatment and avoid complications. Diagnosis is made by clinical examination and x-ray exams based on anteroposterior projections and, in some cases, axillary and scapular “Y” views<sup>1</sup>. Computerized tomography allows a more accurate study of the fracture and facilitating its classification and subsequent treatment<sup>3</sup>. We aim to present a case report on a posterolateral acromion isolated fracture and its perioperative management.

### Case report

A 58-years-old male amateur cyclist sustained a right shoulder injury after a direct fall on it.

He went to the emergency room few days after the trauma presenting to our attention with pain during active and passive movements, no pain during acupression of the acromion, functional impotence, edema and right shoulder ecchymosis.

Clinical examination showed normal neurological assessment. During shoulder inspection and palpation, a morphological deformation with crepitus over posterolateral angle of the acromion was pointed out. Anteroposterior and lateral radiographic views of right shoulder showed a displaced fracture of the posterolateral angle of the acromion with a reduction of the subacromial space; no associated injuries were found. 3D reconstructed computer tomography provided more details on fracture allowing an optimal classification. Fracture was classified as a Khun stage III (because of the inferiorly displaced fragment and the reduction in the subacromial space) and Ogawa type I (fracture interested the anatomic acromion) (*Figure 1 and 2*).



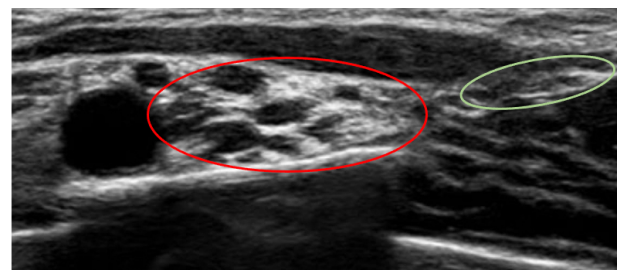
**Figure 1.:** Preoperative anteroposterior x-ray image.



**Figure 2.:** Preoperative 3D reconstructed CT scan.

Patient was informed about his clinical condition and necessity for surgical intervention; he also underwent anesthesiological evaluation while being informed about chosen anesthesiological approach for surgery.

Following monitoring of vital parameters (NIBP, pulse oximetry, ECG, body temperature using a spot-on sensor) and sedation with Midazolam IV 0.03 mg/kg, targeted regional anesthesia was performed. Due to history of cervical pain, a combination of right sided ultrasound guided and ENS assisted supraclavicular brachial plexus block and suprascapular nerve block in anterior approach (single entry point for two blocks) was chosen (*Figure 3*); Ropivacaine 3 mg/kg for a total of 30 ml (25 ml supraclavicular block, 5 ml suprascapular block) was used, waiting for an onset time of at least 30 minutes.



**Figure 3.:** A combination of ultrasound guided and ENS assisted supraclavicular brachial plexus block (red circle) and suprascapular nerve block in anterior approach (green circle). Best combination to get a single entry point for two blocks.

Surgical management consisted of a posterior surgical approach through right deltoid muscle with a 6 cm long incision placed directly over the posterolateral angle of the acromion (*Figure 4*).



**Figure 4.** Surgical approach through deltoid muscle.

Open reduction and osteosynthesis were achieved using two 4,00 mm cannulated screws and a cerclage based on n°1 FiberTak anchor and high strength wire (*Figure 5 and 6*). Under fluoroscopic guide, fixation was found to be stable.



**Figure 5.:** Osteosynthesis with two cannulated screws.

Postoperative period was uneventful. Patient was hospitalized for two days and his right shoulder was sling-immobilized for 4 weeks. Patient returned for the

first radiographic control after 1 month; radiographs was found to be acceptable with a good bone consolidation and a normal subacromial space. Patient was then allowed to start active and passive exercises under the supervision of a physiotherapist. Subsequent clinical and radiographic controls carried out at 4 and 6 months after surgery showed a remarkably stable fracture, without displacement and a noticeable improvement in physical performances (*Figure 6*).



**Figure 6.** Radiographic control at 6 months

3 months after surgery patient restarted cycling and swimming without symptoms. He reported just a mild supraspinatus fatigue after heavy cycling. Functional outcome was also evaluated at 6 months applying the Costant Murley Score. He totalized 98 points, reporting just a slight limitation in abduction, with a range of motion between 121 and 150 degrees. Patient was completely satisfied with an excellent quality of life and no limitation during sport activities and daily work.

### Discussion

Scapula is a triangular bone articulated with distal clavicle and humeral head where numerous tendons and ligaments insert<sup>4</sup>. Acromion is the most lateral bony projection of the scapula, forming the outer angle of the shoulder<sup>5</sup>. Acromion fractures are a quite rare event. They represent 8-10 % of all fractures of the scapula, wich represent 1% of all fractures<sup>1,2</sup>. This fracture is commonly associated with other injuries of the shoulder

as glenoid process, scapula or clavicle fractures and superior shoulder suspensory complex disruption<sup>2</sup>. The most common mechanism causing these fractures is a massive and direct force often found in high speed accidents, motor vehicle collision or cycling fall<sup>3,6,7</sup>. Other rare causes recently described are overuse injuries, stress fractures and shoulder arthroplasty, all related to tension applied on the acromion by deltoid muscle<sup>2,8,9,10</sup>. There are two main classifications for acromion fractures described in literature: Ogawa and Khun's classifications. Ogawa classifies fractures in two types according to their localization: type I fractures interest acromion and extremely lateral spine; type II fractures are located in more medial spine<sup>11</sup>. Khun classifies acromion fractures in three types according to their displacement: type I fractures are minimally displaced and they could be avulsion fractures with no direct trauma (type IA) or traumatic fractures (type IB); type II fractures are displaced without causing a reduction of the subacromial space; type III fractures are displaced inferiorly and cause a reduction of the subacromial space causing impingement. Khun et al. recommend open reduction and internal fixation only in fractures associated with subacromial space reduction<sup>1</sup>.

Studies report good clinical outcomes in non-displaced or minimally displaced fractures sling treated conservatively. However, displaced fractures complicate if not surgically treated<sup>13</sup>. Complications associated with nonoperative treatment of displaced acromial fractures are painful stiff shoulder, symptomatic nonunion, rotator cuff tears, subacromial impingement and activity limitation, humeral head subluxation and brachial plexus injury. Therefore, early surgery should be considered for the displaced fractures<sup>12,13,14</sup>.

Hill et al. recommend surgical treatment in event of complications or displacement >1 cm upon radiographic evaluation<sup>15</sup>. Early surgical treatment allows a complete return to pre-injury activities. On the other hand, more than 50% of patients treated belatedly will have significant functional limitations<sup>21</sup>. Various fixation

techniques exist, including K-wire fixation, tension band wiring, screw fixation, plate fixation or arthroscopic treatment. Unfortunately, various studies in literature have analyzed a small number of patients not sufficient to evaluate the real efficiency of each technique<sup>13,15,16,17</sup>. Osteosynthesis with k-wires is considered by many an inadequate treatment, because unable to accomplish an adequate fracture compression not allowing a stable fixation, as described by Bauer et al. who reported implant failure<sup>6,13,18</sup>. Plate fixation is also not endorsed by all authors. For distal acromion fractures conventional plate fixation may not be optimal due to thin nature of the bone causing possible malunion and impingement. Plate osteosynthesis could also lead to infection and irritation<sup>18</sup>. A tension band technique should be considered to permit rotational control of the distal fragment and compression at fracture site<sup>15,18,19</sup>. Cannulated screws are less invasive, their removal is not necessary and they allow for an excellent clinical outcome<sup>20</sup>. Fixation with screws is a good solution in case of lateral and non-comminuted fracture<sup>2</sup>.

Based on literature evidences our patient was treated with two cannulated screws and a tension band using a FiberTak anchor and high strength wire, in order to reach rotational control and a more stable compression.

A combination of ultrasound guided and ENS assisted supraclavicular brachial plexus block and suprascapular nerve block in anterior approach allowed us to get an effective and complete block for shoulder surgery using a single needle entry point while avoiding common interscalene block risks and complications.

## Conclusion

Isolated acromion fractures are a rare entity. They are commonly treated conservatively, but the patient must be treated with osteosynthesis if the displacement is > 1 cm or there are complications as painful stiff shoulder, symptomatic nonunion, rotator cuff tears, subacromial impingement or associated fractures.

In order to reach the best results in terms of reduction, compression, stability and hardware tolerance, cannulated screws and tension band can be an excellent surgical solution.

A combination of ultrasound guided and ENS assisted supraclavicular brachial plexus block and suprascapular nerve block in anterior approach allows to get an effective and complete block for shoulder surgery using a single needle entry point while avoiding common interscalene block risks and complications.

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