

## Non-union of Scapular Spine Fracture Case-Report: A Cause of Classical Subacromial Impingement Syndrome

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### ABSTRACT

Fractures of the scapular spine are relatively uncommon and in most cases healing of the fracture is achieved following conservative treatment. We report a case of a 36 year old male who developed a painful atrophic non-union scapular spine fracture producing secondarily subacromial impingement symptoms and his sustained recovery 9 years after treatment by open reduction, internal fixation and bone grafting.

**Key words:** Scapulothoracic; Scapular spine nonunion; Open reduction; Internal fixation; Bone graft

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### INTRODUCTION

Scapular fractures are relatively uncommon, representing around 1% of all fractures, only 6% of which occur at spine of the scapula<sup>[1]</sup>. These fractures result from high energy trauma most commonly in traffic accidents and are often accompanied by other thoracic structures injuries<sup>[2,3,4]</sup>. Conservative management is the conventional treatment for these lesions, and non-union of the scapular spine is rarely reported.

Alterations in scapulothoracic illness kinematics are frequently associated with manifestations of rotator cuff disease, from impingement to tendinopathy to tearing<sup>[5]</sup>. We report a rare case of non-union of the scapular spine presented with mainly subacromial impingement syndrome symptoms at 2 years of development, which was successfully treated with open reduction, bone grafting and internal fixation of the scapular spine.

### CASE REPORT

A 36 year-old man with chronic pain at his left shoulder was referred to our Orthopedic Department. He was diagnosed with multiple rib fractures and scapular spine fracture due to an automobile accident two years before, which had been managed conservatively. Since that time he had continually suffered from moderate pain from the posterior part of his left shoulder, and 1 year after the trauma also developed progressive subacromial impingement symptoms.

Clinical examination revealed tenderness over the lateral aspect of the scapular spine. Passive and active abduction and forward flexion were uncomfortable beyond 90°, while internal and external rotation function remained intact. Although supraspinatus and infraspinatus tests appeared normal, there was evidence of mild inhibition when muscle strength was tested against resistance, and atrophy of supraspinatus fossa was present. Injury of the suprascapular nerve was excluded by electromyography.

Imaging studies showed an II-B type fracture of lateral scapular spine according to Ogawa classification<sup>[6]</sup>. Anteroposterior projection

with the arm adducted showed a complete non-displaced fracture, while displacement with lateral tilt of the acromion was identified in the same projection with the arm abducted (Figure 1). Furthermore, computed tomography (CT) demonstrated the absence of union of the fracture site (Figure 2).

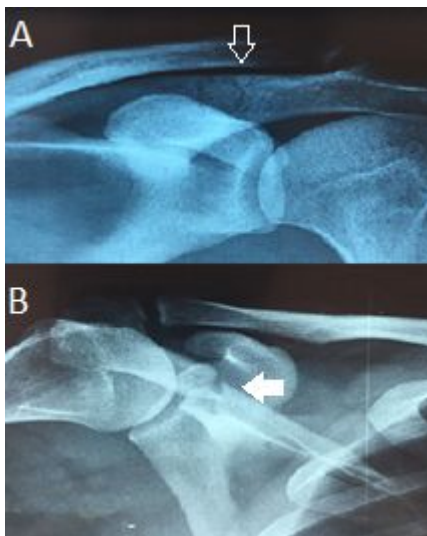
Operative treatment was performed with the patient in a lateral decubitus position. An incision was made above the scapular spine from the posterolateral corner of the acromion extending 6 cm medial to the palpable fracture site. Once the nonunion site was exposed, the atrophic tissue was removed and a cancellous bone graft was harvested from the ipsilateral iliac crest. A low-contact dynamic compression contoured plate (LCDCP) was used for fixation with 3 cortical screws on either side of the nonunion and harvested bone graft was packed into the fracture site.

Passive exercises were initiated at 1 week followed by isometric exercises. Active motion was allowed after 4 weeks, and increasing active range of motion was permitted after radiographic control at 6 weeks (Figure 3). CT scan at 3 months demonstrated complete healing of the fracture site (Figure 4), allowing scapulothoracic strengthening exercises, and progressive engagement in sporting activities. Contact sports were allowed to begin after 6 months. Remarkably, after 9 years of surgery, the patient enjoys an active lifestyle free of pain with a full range of motion.

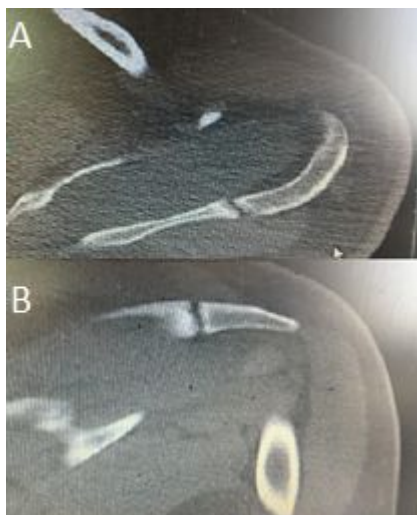
## DISCUSSION

More than two thirds of the fractures of the scapula are located at the body or neck<sup>[6]</sup>, and traumatic scapular spine fractures, especially those in the lateral spine, are very uncommon. The incidence of severe thoracic trauma, predominantly from traffic accidents<sup>[4]</sup>, has been reported to be as high as 84% in patients that sustain a scapular fracture, with multiple rib fractures being the most frequent associated lesion<sup>[4,7]</sup>. Therefore, in such situations computed tomography is recommended for early diagnosis of thoracic injuries and associated scapular fractures, and it is imperative that orthopedic surgeons working in complex trauma centers be aware of the increased risk of misdiagnosing or late diagnosing of a scapular fracture due to associated lesions.

Given that 90% of scapular fractures are minimally displaced by support provided by surrounding soft tissues, conservative treatment is indicated in these lesions. Early physiotherapy starting 7 to 10 days after initial injury is recommended by most of the authors, and healing times of scapular fractures generally range from 6 to 8 weeks<sup>[7,8]</sup>. Nevertheless, there are few reports published of scapular fractures non unions, in which most of the cases after misdiagnosed and absence of inadequate immobilization and physiotherapy control program, had led to failed healing of the fracture after conservative treatment, resulting in final surgical fixation<sup>[1,9]</sup>. In the present case, adequate immobilization at the time of the initial injury was not



**Figure 1** Anteroposterior projection. An II-B type fracture of lateral scapular spine according to Ogawa classification. (A) A non-displaced fracture of the lateral spine (white hollow arrow). (B) Note the displacement of the fracture site with lateral tilt of the acromion when traction of the deltoid is applied at the acromion and lateral spine insertion (white arrow).



**Figure 2** (A) CT axial plane and (B) coronal plane, evidence of an atrophic non-union of the lateral scapular spine proximal to the acromion base.



**Figure 3** Six weeks postoperative radiologic control. (A) Anteroposterior projection. (B) Lateral projection. Persistence of the reduction and correct plate position.



**Figure 4** Axial plane of Computed tomography postoperative control at 3 months. Complete healing of the site fracture is present (white arrow).

performed and a combination of chronic pain and progressive rotator cuff dysfunction was the initial presentation at our institute 2 years later.

During activation and pull of the deltoid muscle, a dissociated acromion will tilt inferior and laterally, narrowing the supraspinatus outlet and resulting in secondary impingement and weakness of the rotator cuff. Therefore, surgical fixation of the spine to restore scapula-thoracic motion is necessary<sup>[2,3,10]</sup>. Curtis *et al*<sup>[8]</sup> reported a case of delayed scapular spine fracture union 7 months post-injury which healed 6 months following successful treatment by transcutaneous electrical bone growth stimulation. However, many others have published positive results with surgical fixation of lateral spine non-unions<sup>[1,9]</sup>. Differences in healing times after surgical fixation of scapular non-union have also been published by others. Bohm reported<sup>[9]</sup> bone healing at 9 weeks postoperatively by CT with minimally invasive lag screw technique fixation. Recently, Copuroglu *et al*<sup>[1]</sup> treated a scapular spine non-union by plate fixation and reported limited healing of the non-union at 6 months postoperatively by conventional radiographic control, with complete healing at 2 years by CT control. No algorithm for non union of scapular fractures has been developed according to the chronicity of the lesion. In our case of scapular non-union, we opted for surgical treatment due to the protracted 2-year period of the non-union with progressive dysfunction of the scapulothoracic biomechanics, in order to achieve early healing of the fracture and to avoid progressive secondary lesions such as rotator cuff tearing and posttraumatic frozen shoulder.

Our approach of open reduction, plate fixation and bone grafting resulted in complete healing of the non-union site at 3 months, concomitant with resolution of the patient's impingement symptoms and rotator cuff weakness.

This case emphasizes that attention to scapulathoracic function must be a priority in patients with subacromial pathology symptoms and a history of shoulder or thoracic trauma. Although fractures of the scapular spine typically heal after conservative treatment, non-union should be suspected when misdiagnosed or in cases where initial treatment has been delayed among patients who complain of chronic subacromial symptoms. This report provides evidence that excellent clinical outcomes can be obtained even in such cases.

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## COMPLIANCE WITH ETHICAL STANDARDS

### Patient Consent

Informed consent was obtained from the patient prior to their inclusion in the study.

### Ethical Approval

This research was approved by the local ethics committee of the hospital. All procedures performed in the course of the study followed the guidelines for human research specified in the Declaration of Helsinki.

## Ethical statement

1. This Manuscript has not been published previously or submitted simultaneously to another journal.
2. No data has been fabricated or manipulated to support our conclusions.
3. No data, text or theories by others are presented in this manuscript as ours (author and co-authors). All data and text used in this manuscript taken from other authors of previous publications is well indicated.
4. Previous Consent has been received from all authors involved in this manuscript to submit it to this journal, as well from the institution where this work has been carried out.
5. All mention authors have contributed sufficiently in this work.
6. All mention authors agree and were previously advised about the specific authorship group of each one of them, as it appears in the submitted article.
7. No modifications of the order of authors would be request.

## REFERENCES

1. Copuroglu C, Tan L, Copuroglu E, Ciftdemir M, Ozcan M. Pseudo-arthritis of the spine of the scapula: a case report with a delayed diagnosis. *Strat Traum Limb Recon* 2014; **3**: 173-177. [PMID: 25540121]; [DOI: 10.1007/s11751-014-0210-2]
2. Thompson DA, Flynn TC, Miller PW, Fischer RP. The significance of scapular fractures. *J Trauma* 1985; **10**: 974-977. [PMID: 4046086]
3. Stephens NG, Morgan AS, Corvo P, Bernstein B A. Significance of scapular fracture in the blunt-trauma patient? *Ann Emerg Med* 1995; **4**: 439-442. [PMID: 7574125]
4. Al-Sadek TA, Niklev D, Al-Sadek A, AL-Sadek L. Scapular fractures in blunt chest trauma—self-experience study. *Open Access Maced J Med Sci* 2016; **4**: 688-691. [PMID: 28028415]; [DOI: 10.3889/oamjms.2016.135]
5. Kibler WB. The scapula in rotator cuff disease. *Med Sport Sci. Basel, Karger* 2012; **57**: 27-40. [PMID: 21986043]; [DOI: 10.1159/000328877]
6. Ogawa K, Naniwa T. Fractures of the acromion and the lateral scapular spine. *J Shoulder Elbow Surg* 1997; **6**(6): 544-548. [PMID: 9437604]
7. Schofer MD, Sehart AC, Timmesfeld N, Störmer, S, Kortmann HR. Fractures of the scapula: Long-term results after conservative treatment. *Acrh Orthop Trauma Surg* 2009; **129**(11): 1511-1519. [PMID: 19306009]; [DOI: 10.1007/s00402-009-0855-3]
8. Curtis C, Sharma V, Micheli L. Delayed union of a scapular fracture—an unusual cause of persistent shoulder pain. *Medicine and science in sports and exercise* 2007; **39**(12): 2095-2098. [PMID: 18046179]; [DOI: 10.1249/mss.0b013e318156e8ec]
9. Böhm P. Pseudarthrosis of the spine of the scapula—case report of a minimally invasive osteosynthesis technique. *Acta Orthop Scand* 1998; **69**(6): 645-647. [PMID: 9930116]
10. Lambert S, Kellam J F, Jaeger M, Madsen JE, Babst R, Andermahr J, Audigé L. Focussed classification of scapula fractures: failure of the lateral scapula suspension system. *Injury* 2013; **44**(11):1507-1513. [PMID: 23570705]; [DOI: 10.1016/j.injury.2013.03.001]

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