

Novel technique for a symptomatic subscapularis herniation through a scapular defect

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Author contributions: All the authors contributed to the paper.

Institutional review board statement: The case report study met the criteria for IRB exemption.

Informed consent statement: Verbal consent was obtained from the patient prior to manuscript writing.

Conflict-of-interest statement: Authors have no conflict of interest to declare.

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Manuscript source: Unsolicited manuscript

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Received: August 8, 2016

Peer-review started: August 10, 2016

First decision: September 12, 2016

Revised: September 22, 2016

Accepted: November 21, 2016

Article in press: November 22, 2016

Published online: February 18, 2017

Abstract

Fractures of the scapula are rare and have been reported to account for only 1% of all fractures and 3%-5% of upper extremity fractures. Several studies have reported successful outcomes with non-operative treatment of scapula fractures. Although non-operative treatments are successful in a very high percentage of patients, very few cases of non-union of scapular body fractures have been reported. In our review of the literature, we found two case reports of scapular body fractures developed into non-unions. In both of these cases, open reduction and internal fixation with reconstruction plates and bone graft was successful at eliminating pain and restoring function. This is a case report of a patient with a symptomatic, extra-articular scapular body defect from a non-union that was treated successfully with an acellular dermal extracellular matrix and bone graft using a novel technique

Key words: Scapular fractures; Mesh repair; Non-union; Bone graft; Acellular dermal extracellular matrix

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Core tip: Scapular fracture complicated by non-union requiring surgical intervention is extremely rare and seldom reported in the literature. This study demonstrates successful surgical treatment of a symptomatic scapular body defect using a novel technique that has never been described for this condition.

Gräu L, Chen K, Alhandi AA, Goldberg B. Novel technique for a symptomatic subscapularis herniation through a scapular defect. *World J Orthop* 2017; 8(2): 208-211 Available from: URL: <http://www.wjgnet.com/2218-5836/full/v8/i2/208.htm> DOI: <http://dx.doi.org/10.5312/wjo.v8.i2.208>

INTRODUCTION

Several studies have reported successful outcomes with non-operative treatment of scapula fractures^[1-3]. In reviewing the literature, we found only two case reports of scapular body fractures that developed into non-unions^[4,5]. In both of these cases, open reduction and internal fixation with reconstruction plates and bone graft was successful at eliminating pain and restoring function. This is a case report of a patient with symptomatic, extra-articular scapular body defect from a non-union, which was treated successfully with acellular dermal extracellular matrix and bone graft using a novel technique.

CASE REPORT

Presentation

A 52-year-old female sustained a right scapular body and right clavicle fracture in a motorcycle accident 14 mo prior to presenting to our clinic. She was treated non-operatively for the scapular body fracture and with open reduction and internal fixation of the clavicle fracture at an outside hospital. The patient complained that she continued to have constant, posterior shoulder pain along her right scapula after the accident. She came to our clinic because her pain was preventing her from sleeping at night and affecting her activities of daily living. A computed tomography (CT) scan showed a 4 cm × 2 cm elliptical defect of the inferior scapular body with herniation of the subscapularis muscle through the defect (Figures 1 and 2).

Physical exam

On physical exam the patient had tenderness to palpation over the inferior aspect of the scapular body on her right side. Her range of motion was intact with forward flexion of 180 degrees, abduction of 180 degrees, internal rotation of 90 degrees and external rotation of 55 degrees. She was neurologically intact in the axillary, median and ulnar nerve distributions. Her strength was 5/5 in all planes of motion in her upper extremity.

Surgery

After the nonunion site was marked (Figure 3), an oblique 10 cm incision was made just inferior to the scapular spine running from medial to lateral (Figure 4). A portion of the deltoid was incised in a longitudinal manner to help expose the scapular spine. The infraspinatus muscle was peeled off to expose the nonunion site that was approximately 4 cm in length and 2 cm in width (Figure 5). A herniation of the subscapularis muscle through the defect was noted.

Several drill holes around the edge of the defect were made circumferentially with K-wires and two #2 FiberWires were passed through each of these holes. An Arthroflex jacket (Arthrex, Naples, Florida), which is an acellular dermal extracellular matrix, was sewn into the undersurface of the scapula using #2 FiberWires. Approximately 7 cc of Graft-on bone product was placed on top of the jacket into the defect. The jacket

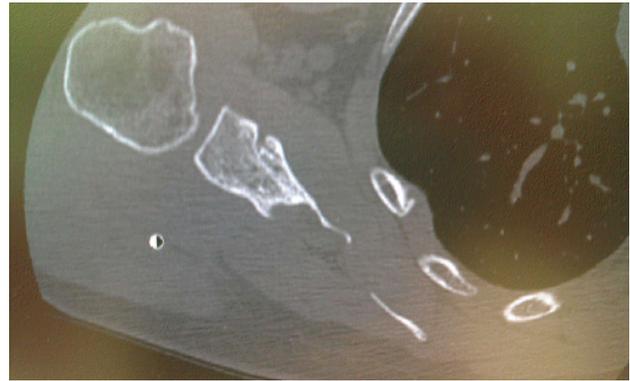


Figure 1 Axial computed tomography showing defect of scapular body.



Figure 2 Coronal computed tomography showing defect of scapular body.

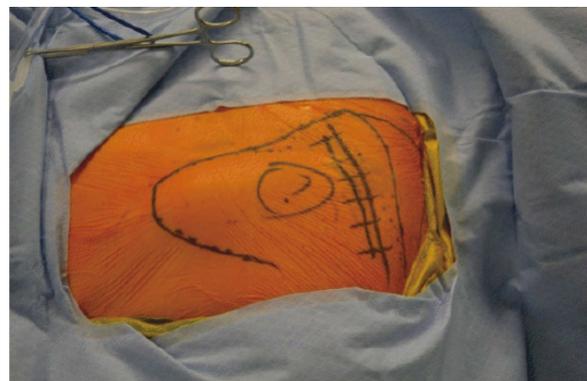


Figure 3 Borders of scapula, scapular spine, incision site (dashed line) and area over defect were marked.

was then folded onto the Grafton and sewn onto the posterior aspect of the scapular creating a pouch and barrier between the anterior and posterior aspects of the scapula (Figure 6). The infraspinatus was then attached back to its origin using O Vicryl and repair the deltoid muscle was performed with O Vicryl sutures in a figure of eight fashion. The dermis and epidermis was closed in standard fashion and dressings were applied. There were no complications postoperatively.

Outcome

At 2 wk follow up, the patient could sleep through the

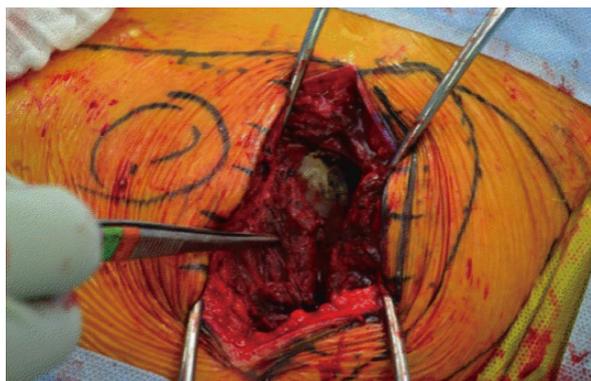


Figure 4 The 10 cm incision made just inferior to scapula spine, running from medial to lateral.



Figure 5 The 4 cm x 2 cm scapular defect exposed.

night, which she could not do prior to the operation. At her two month follow up visit the patient no longer complained of any right shoulder pain. She was also able to get back to doing activities such working out and riding her motorcycle. Her range of motion, strength, and sensation of the right shoulder were fully intact.

DISCUSSION

In our review of the literature, we found two case reports on scapular nonunion, Gupta *et al*^[5] and Ferraz *et al*^[4] both had excellent results with open reduction and internal fixation using reconstruction plates and bone graft. In both cases the patients had a fracture pattern that was unstable and causing functional limitations. Ferraz *et al*^[4] reported that their patient had pain and decreased range of motion of the shoulder joint secondary to intra-articular involvement of the fracture and cartilage damage. In the case reported by Gupta *et al*^[5] the patient had a transverse comminuted fracture with displacement and overlap of the fracture fragments that was causing winging with forward flexion and decreased range of motion.

Non-union is rare in patients treated conservatively for scapular body fractures and it is perhaps even rarer for these to be symptomatic. Persistent pain following injury requires further work up and possible surgical

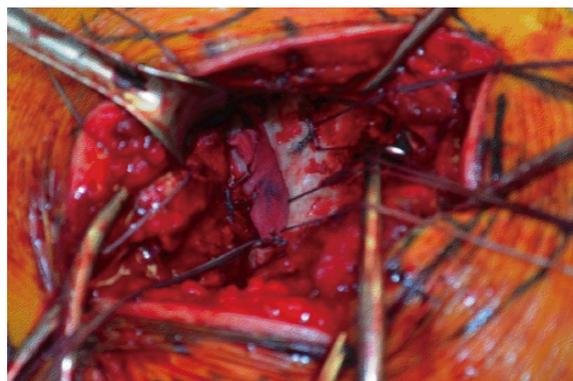


Figure 6 The dermal jacket is sewn into the defect.

intervention.

Herniation of the subscapularis muscle through the scapular defect was likely the cause of our patient's pain. This could be seen on the pre-operative CT scan (Figures 1 and 2). The patient had excellent preoperative function because the defect was not unstable and the scapula remained functioning as a unit and there was no involvement of the joint. For these reasons the authors believed that mechanical stabilization with plates and screws was not necessary. Similar to mesh that is used for intestinal herniation in general surgery the use of the extracellular dermal matrix with bone graft was successful at preventing herniation of the subscapularis, which was likely the patient's source of pain. This was confirmed by the success of our surgery in providing relief for the patient as early as 2 wk after the procedure and at later follow-up. We believe this to be rare case of scapular nonunion with a unique etiology for pain that was treated with a novel technique.

COMMENTS

Case characteristics

A 52-year-old women, 14 mo status post non-operative treatment of scapular fracture, presented with constant pain that interrupted her sleep and daily activities.

Clinical diagnosis

Intact range of motion and neurovascular exam, with tenderness to palpation over the inferior aspect of the scapular body on her right side.

Differential diagnosis

Subscapularis herniation, painful scapula non-union, rotator cuff pathology, and scapula dyskinesia.

Laboratory diagnosis

Within normal limits.

Imaging diagnosis

Computed tomography scan showed a 4 cm x 2 cm elliptical defect of the inferior scapular body with herniation of the subscapularis muscle through the defect.

Pathological diagnosis

Pathological samples were not taken.

Treatment

Surgical intervention by acellular dermal extracellular matrix and bone graft.

Related reports

Other reports in the literature have mentioned decreased range of motion associated with the injury. The lack of decreased range of motion does not exclude the injury.

Term explanation

Scapular fracture healed in non-union are not a common result of non-operative treatment.

Experiences and lessons

The use of the extracellular dermal matrix with bone graft was successful at preventing herniation of the subscapularis and alleviating the patient's symptoms.

Peer-review

It is a well-written case.

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P- Reviewer: Shrestha BM, Sun ZR, Yu BQ **S- Editor:** Qiu S
L- Editor: A **E- Editor:** Lu YJ





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