JSES Open Access 2 (2018) 169–173

Contents lists available at ScienceDirect

JSES Open Access

journal homepage: www.elsevier.com/locate/jses

Delayed surgery for displaced fracture of the anatomic neck and spine of the scapula: a case report and literature review

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ARTICLE INFO

Keywords:
Scapula fracture
Anatomic neck
Scapular spine
Muscle contusion
Long-term follow-up
Magnetic resonance imaging (MRI)

Scapular fractures constitute only 0.4% to 0.9% of all fractures and approximately 3% to 5% of all fractures of the shoulder girdle.[3] Fractures of the scapular neck account for 7% to 25% of scapular fractures.[1,6,13] Although anatomic neck fractures (ANFs) of the scapula have been documented, the existence of ANF is controversial.[4,15] Bartoníček et al[4] verified the existence of ANF by reporting 4 published cases of radiographically confirmed ANF and 2 of their own cases. Because the ANF fragment has no ligamentous connection with the scapular body and clavicle, it is fundamentally unstable and often requires surgery.[2] We report a patient with an ANF without typical valgus displacement associated with a displaced scapular spine fracture that was reduced and fixed 7 weeks after the injury occurred.

Case report

A 51-year-old right-hand-dominant healthy male laborer sustained an injury to his left shoulder when a heavy wooden branch fell on him. He was diagnosed with ANF and coracoid fracture that were initially treated at an orthopedic clinic with an arm sling for 4 weeks, after which pendulum exercise was commenced. A displaced scapular spine fracture that had been overlooked was discovered 5 weeks after the fracture, and the patient was referred to our hospital. He had no relevant family or medical history.

On physical examination, the patient's left fingers were edematous. The skin over and below the scapular spine had a healed laceration and scratches. There were no neurologic deficits in the left shoulder or arm. Contractions of the deltoid and infraspinatus (ISP) muscles were palpable, although muscle strength could not be determined due to pain. Active range of motion (ROM) of the left shoulder was 10° total elevation, 5° external rotation, and internal rotation to L4 (active ROM of the right shoulder was 135°, 40°, and T7, respectively), and passive ROM of the left shoulder in these directions was 90°, 15°, and L1, respectively.

Radiographs showed an ANF with a long spike of the lateral scapular border that had a 1-cm inferior displacement, a coracoid fracture, an inferiorly displaced scapular spine fracture, and subluxation of the acromioclavicular joint. Computed tomography (CT) revealed callus formation at the ANF and coracoid fracture (Fig. 1). Magnetic resonance imaging (MRI) demonstrated typical findings of subacute muscle contusions in the supraspinatus (SSP), ISP, and posterior half of the deltoid muscles (Fig. 2).[8]

At 7 weeks after the accident, we performed open reduction and internal fixation of the fractures under general anesthesia to smooth the SSP gliding floor. The patient was placed semiprone, and the left arm was abducted by 90°. A vertical incision was made from the posterior border of the clavicle to the middle of the lateral scapular border. After the fascia was cut along the posterior border of the deltoid, the deltoid was retracted superolaterally.

The fracture lines of the lateral scapular border were released through the interval between the teres major and teres minor. The deltoid was then split distally from the fracture site of the scapular spine. The upper fracture line was released after developing the interval between the ISP and teres minor and retracting the ISP inferiorly.

The glenoid fragment was reduced and fixed with 2 wire loops, although the reduction was incomplete. The fracture of the scapular spine was easily reduced by resecting the fibrous tissue and primitive callus occupying the fracture site and was fixed with a reconstruction plate, screws, and transosseous wire loops. The coracoid fracture was stable and was left untouched (Fig. 3).

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https://doi.org/10.1016/j.jses.2018.06.001

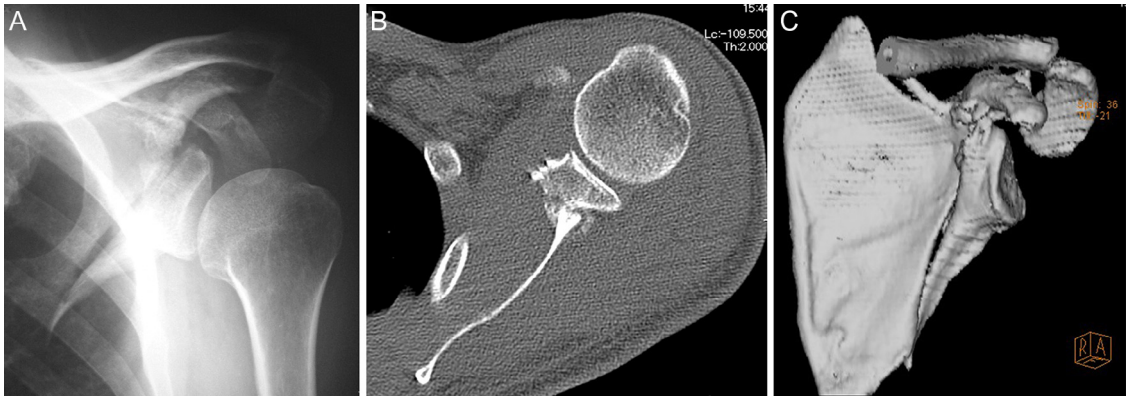

Figure 1 Radiography and computed tomography scan at the first visit. (**A**) Radiography revealed an anatomic neck fracture with a long spike of the lateral scapular border. The fragment was displaced 1 cm inferiorly, and there was an inferiorly displaced lateral scapular spine fracture. (**B**) Computed tomography showed the typical fracture line at the anatomic neck with callus formation. (**C**) Three-dimensional computed tomography detected a coracoid fracture with a long spike of the superior scapular border with callus formation, an anatomic neck fracture without any rotation or angulation, subluxation of the acromioclavicular join, and an inferiorly displaced lateral scapular spine fracture without any callus formation.

Passive ROM exercises were begun on postoperative day 4 after protecting the shoulder using a sling, because rigid fixation had been achieved. Active ROM exercises were initiated at 5 weeks, and stretching and muscle strengthening exercises were introduced as a home program at 2 months postoperatively for 4 months. At 6 months, the active ROM for total elevation, external rotation, internal rotation, and horizontal adduction were 120°, 10°, T11, and 120°, respectively.

The patient had no pain with any movement, but muscle strength on the manual muscle test was 4+ for flexion and abduction and 3+ for external rotation (Fig. 4). At that time, the patient returned to his previous job but continued to tire easily. At 15 months postoperatively, the plate was removed because bone union had been completed and there was persistent tenderness around the plate (Fig. 5).

At the time of the final follow-up at 12 years postoperatively, active ROM limitations of the left shoulder compared with the right shoulder were 5°, 5°, 2 vertebrae, and 15° for total elevation, external rotation, internal rotation, and horizontal adduction, respectively, and the manual muscle test score was 5 for adduction, flexion and internal rotation, and 4 for external rotation. The Disabilities of the Arm, Shoulder and Hand score was 4.2,[16] and the Constant score ratio compared with the right shoulder was 95%.[11] MRI showed that the upper half of the ISP was atrophic, with obvious fatty infiltration and replacement of the medial portion with degenerative tissue (Fig. 6).[8] There were no clinical or imaging signs of osteoarthritis.

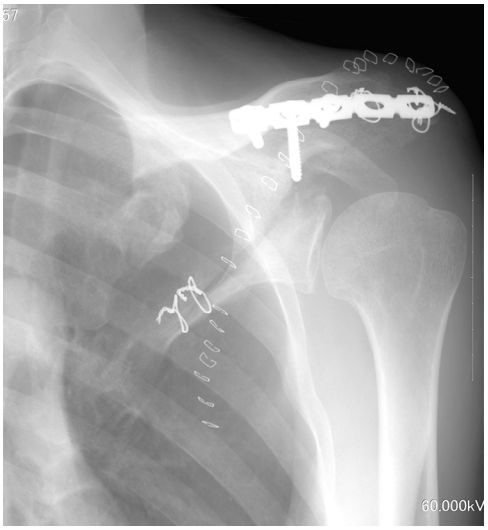

Figure 3 Radiography performed 1 week postoperatively shows fracture fixation with the wire loops for the anatomic neck fracture and a reconstruction plate and screws for the spine fracture, with the lateral end fixed with 3 transosseous wire loops to prevent impingement of the rotator cuff by the screw tip.

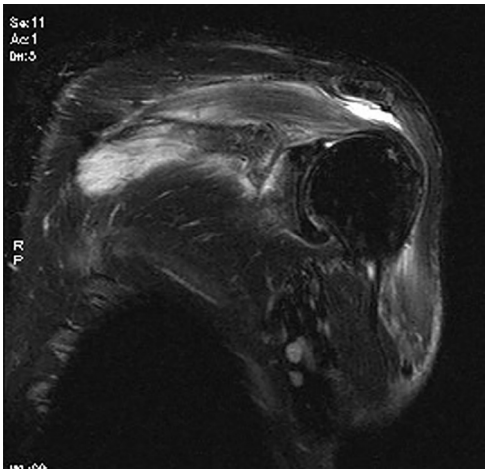

Figure 2 Coronal T2-weighted, fat-suppressed magnetic resonance images demonstrate feathery edema in the supraspinatus, infraspinatus, and posterior half of the deltoid muscle as well as a heterogeneous mass in the proximal part of the infraspinatus.

Discussion

Historically, ANF of the scapula has been recognized as a type of scapular neck fracture. Fractures of the surgical and anatomic necks of the scapula were described in detail in 1849.[5] Over the subsequent decades, only a few cases of ANF were demonstrated by anatomic dissection or radiography, although some authors described ANFs with or without drawings.[6,12] In 1916, Hitzrot and Bolling[15] then stated that they doubted the existence of this type of fracture, because they could find no ANF in their own cases and could not find any case of ANF proven by radiography in the literature.