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ABOUT COVER

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Fracture of the scapular neck combined with rotator cuff tear: A case report

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Abstract

BACKGROUND

Scapular fracture has a low incidence rate, accounting for 0.4%-0.9% of all fractures, and scapular neck fractures are extremely rare, comprising approximately 7%-25% of all scapular fractures. Scapular neck fractures are often studied as case reports mostly accompanied by other injuries, thus leading to confusion. All previous cases of scapular neck fractures are not associated with rotator cuff injuries.

CASE SUMMARY

A 62-year-old man was admitted to our emergency department 6 h after his right shoulder and back were impacted by heavy objects. The patient presented chest tightness and shortness of breath. Chest computed tomography (CT) showed pneumothorax, multiple rib fractures, and right scapula fractures. Three-dimensional CT reconstruction of the right shoulder joint showed a trans-spinous scapular neck fracture with a glenohumeral joint dislocation. Rotator cuff injury was suspected because the patient had a glenohumeral joint dislocation and was then confirmed by shoulder magnetic resonance imaging. A staged surgery was performed, including open reduction and internal fixation of the right scapula fracture and repairing of rotator cuff by right shoulder arthroscopy. At the 5-mo follow-up, the fracture line was blurred and the shoulder joint function was good.

CONCLUSION

Fracture of the scapular neck combined with rotator cuff tear is rare and the rotator cuff injury should not be ignored in clinical work. Stable internal fixation combined with secondary arthroscopic repair of rotator cuff tear can achieve good results.

Key Words: Scapular fractures; Scapular neck fractures; Rotator cuff tear; Glenohumeral dislocation; Case report

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Core Tip: We describe a patient diagnosed with fracture of the scapular neck combined with rotator cuff tear. Scapular fracture has a low incidence rate and scapular neck fractures are extremely rare. Fracture of the scapular neck combined with rotator cuff tear has not been reported previously. Rotator cuff tear should not be ignored in clinical work when treating this type of fracture. Stable internal fixation combined with secondary arthroscopic repair of rotator cuff tear can achieve good results.

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INTRODUCTION

Fractures of the scapula are relatively rare and account for less than 1% of all fractures and 3%-5% of shoulder girdle fractures^[1]. Most scapular fractures occur in the body, and acceptable results from conservative treatment have been achieved. Fractures of the scapular neck are rare, accounting for approximately 7%-25% of all scapula fractures^[2-4], and is accompanied by complex anatomical structures, confusion in diagnosis, and controversial treatment^[4-7]. Bartoníček *et al*^[3,8] summarized reports and added their own cases to describe the diagnosis, classification, and treatment of scapular neck fractures and recommended surgical treatment for displaced scapular neck fractures.

All previous cases of scapular neck fractures are not associated with rotator cuff injuries. Here, we report an extremely rare scapular neck case with rotator cuff injury and biceps interposition, analyze the injury mechanism, present radiographic images, and describe the treatment and follow-up procedures.

CASE PRESENTATION

Chief complaints

A 62-year-old man was admitted to our emergency department 6 h after his right shoulder and back were impacted by heavy objects.

History of present illness

The patient presented chest tightness and shortness of breath. Chest computed tomography (CT) was performed in the emergency department. He experienced pneumohemothorax, multiple rib fractures, and right scapula fractures. Hence, thoracic closed drainage was performed, and his right hand was suspended by a sling. After the patient's vital signs became stable, he was transferred to our department.

History of past illness

The patient denied any previous medical history of the right shoulder and surgery.

Physical examination

Physical examination revealed tenderness in the right shoulder, limited movement of the right shoulder, and no numbness, limitation of finger movement, or signs of vascular injury.

Laboratory examinations

His hemoglobin was 98 g/L.

Imaging examinations

Given the confirmed right scapular fracture by previous emergency CT, no right shoulder X-ray was performed. Three-dimensional (3D) CT reconstruction of the right

shoulder joint (Figure 1) showed a trans-spinous scapular neck fracture with a glenohumeral joint dislocation.

Rotator cuff injury was suspected because the patient had a glenohumeral joint dislocation. Hence, magnetic resonance imaging (MRI) of the right shoulder was performed before surgery (Figure 2), which showed full-thickness tears of the supraspinatus, subscapularis tendons off their respective footprints, and the tendon of long head biceps incarcerated in the glenohumeral joint.

FINAL DIAGNOSIS

Based on the history and preoperative imaging examination, this patient was diagnosed with fracture of the scapular neck combined with rotator cuff tear.

TREATMENT

We made a staged surgical plan. The patient underwent open reduction and internal fixation of the right scapula fracture 13 d after the injury. After receiving general anesthesia, the patient was placed in the left semi-prone position, and the right upper limb was abducted at 90°. The scapula was approached by an L-shaped Judet incision, which distally extended from the posterior edge of acromion along the spine and curved along the medial scapular border to the inferior angle. Periosteocutaneous flaps were raised, and the infraspinatus, teres minor, and deltoid muscles were elevated from posterior scapula body to subsequently expose the scapular spine and body. The scapula spine was severely comminuted. A 3.5 mm locking plate was applied, and a 2.7 mm reconstruction plate was used to enhance the fixation strength. The lateral border of the scapula was fixed with two 2.7 mm reconstruction plates. Postoperative X-ray and CT showed that anatomical reduction was achieved, and the internal fixation position was stable. However, the glenohumeral joint was still dislocated (Figure 3).

Five days after the first stage operation, the patient underwent right shoulder arthroscopy under general anesthesia. Intraoperative investigations confirmed a full-thickness tear of the supraspinatus tendon, subscapularis tendons off their respective footprints, and incarcerated tendon of long head biceps in the glenohumeral joint. The bicep long head tendon was cut and re-fixed in the intertubercular sulcus, and the rotator cuff was repaired with an anchor screw. Postoperative X-ray confirmed concentric reduction of the humeral head within the glenoid concavity (Figure 4).

OUTCOME AND FOLLOW-UP

The patient started passive functional exercise immediately after the operation. Active functional exercise was allowed 6 wk post-operation. At the 5-mo follow-up, a small translucent shadow was observed on the lateral margin, and the fracture line was blurred (Figure 5). The shoulder joint activity was completely non-painful, and the function was good. Constant score was 90.

DISCUSSION

Scapular fractures have a low incidence rate, and scapular neck fractures are even rare, accounting for approximately 7%-25% of all scapular fractures^[2-4]. The difference in the incidence rate may be due to the confusion of diagnosis and classification^[3] as most scapular neck fractures are diagnosed and classified by X-ray^[2,4,9-11] and subject to conservative treatment. Hence, these cases cannot be verified intra-operatively. For the diagnosis and classification of fractures with such complex shapes, X-ray is insufficient and will lead to misdiagnosis. CT with 3D reconstruction is necessary for the accurate diagnosis and classification of scapular fractures^[8,12,13]. Bartoníček *et al*^[3] treated and analyzed 17 cases of scapular neck fractures and concluded that scapular fractures can be summarized into three types, namely, anatomical, surgical, and trans-spinous neck fractures. Our case belongs to a trans-spinous neck fracture. However, none of the previously reported scapular neck fracture cases is combined with rotator cuff injury.

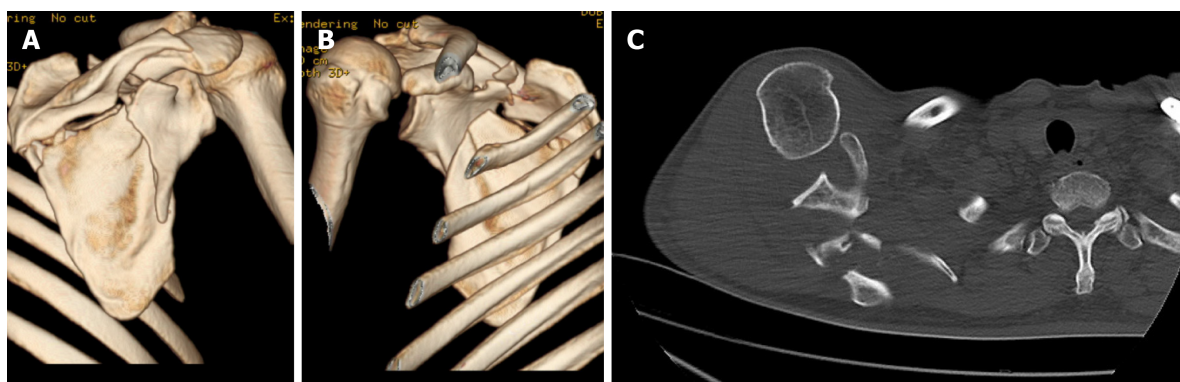


Figure 1 Computed tomography of the right shoulder joint. A: Posterior view of three-dimensional (3D) reconstruction; B: Anterior view of 3D reconstruction; C: Axial computed tomography image showing trans-spinous scapular neck fracture accompanied with glenohumeral joint dislocation.

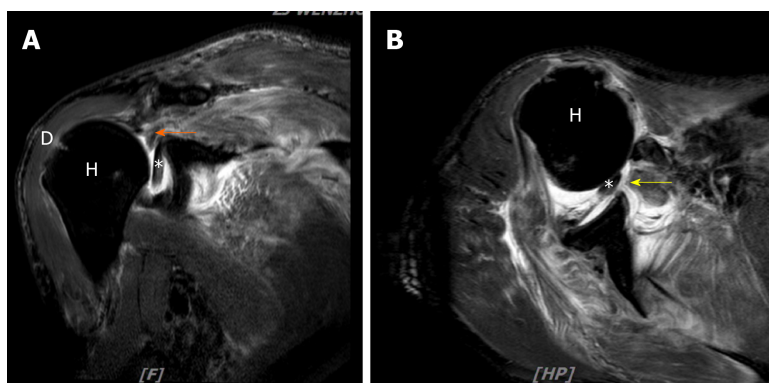


Figure 2 Magnetic resonance imaging of the right shoulder. A: Coronal T2 fat-suppressed image; B: Axial T2 fat-suppressed image showing a full-thickness tear of supraspinatus, infraspinatus subscapularis tendons, and interposition of long head bicep tendon. The orange arrow indicates supraspinatus tendon, and the yellow arrow indicates subscapularis tendons. H: Humeral head; D: Deltoid muscle; Asterisk: Long head bicep tendon.

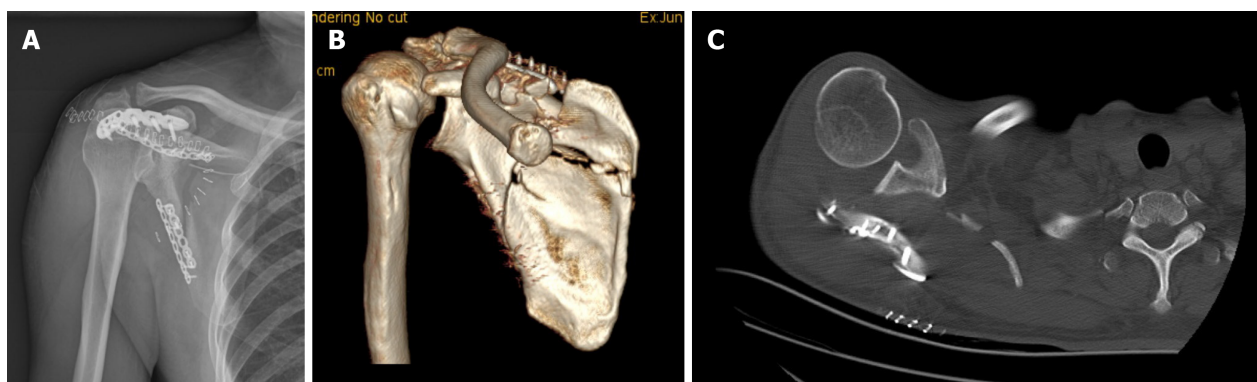


Figure 3 Dislocation of the glenohumeral joint after open reduction and internal fixation of the scapular neck fracture. A: Anterior-posterior X-ray; B: Three-dimensional reconstruction; C: Axial computed tomography image showing anatomical reduction of the scapula and glenohumeral joint dislocation.

To our knowledge, this study is the first reported case of scapular neck fracture with rotator cuff injury.

The injury mechanism of trans-spinous scapular neck fracture is high-energy trauma that directly hits the scapula from behind, thus causing the breakage of both pillars of the scapula, including the lateral border of the scapular body and the scapular spine^[3]. In our case, the patient also hit his right back and chest with a falling heavy object. This condition can also be verified from the patient's chief complaint and accompanying pneumothorax and multiple rib fractures. We speculate that the energy continued to act upon the proximal humerus, further tearing the rotator cuff and leading to the long bicep tendon being stuck into the glenohumeral joint. The upward



Figure 4 Anterior-posterior X-ray image showing glenohumeral reduction. The rotator cuff repair was performed with poly-ether-ether-ketone suture anchors. Hence, no apparent results were observed in the X-ray.



Figure 5 Anterior-posterior X-ray image showing a small translucent shadow on the lateral margin and that the fracture line is blurred.

pulling force of the deltoid muscle caused the dislocation of the glenohumeral joint^[14,15]. This type of fracture is characterized by the comminution of the lateral border of scapular body and intercalar fragments in the infraspinous fossa. Therefore, Bartoníček *et al*^[3] speculated that this fracture type is a pre-stage of comminuted fractures of the scapular body. The tear of traumatic rotator cuff is typically large and involves the subscapularis^[16]. Our case presents the characteristics of trans-spinous scapular neck fractures and rotator cuff tear as reported in the literature.

With the growing understanding of scapular neck fractures and the development of internal fixation, this type of fracture has become increasingly inclined to surgery from the previous conservative treatment. The stable internal fixation is the basis for early functional exercise and reducing complications^[3], and our choice of scapula spine and lateral border double-steel plate fixation technology provides sufficient fixation strength. Strong surgical indications were observed for traumatic rotator cuff tear, and arthroscopic repair is the first choice^[17]. The anatomical reduction of the scapula with internal fixation at the first stage operation provides the cornerstone for the soft tissue repair of the rotator cuff at the second stage.

Rotator cuff tears are common in shoulder dislocations and fractures of the proximal humerus, and this condition has received attention. However, scapular fractures are not commonly accompanied by rotator cuff tear, especially, by biceps interposition simultaneously. Wyatt *et al*^[15] reported a rare anterior superior dislocation of the humeral head and found that this dislocation pattern requires a unique combination of injuries, including a massive rotator cuff injury that resulted in the mobilization of the humeral head and a lack of a superior boundary and the incarceration of bicep tendon in the glenohumeral joint. The rotator cuff tear characteristics and dislocation in our case are identical to their case. In clinical practice, when we encounter patients with scapular neck fractures, we must not ignore the possibility of soft tissue damage. With this unique humeral head dislocation, we must consider rotator cuff tear and biceps interposition. And the necessity of taking MRI should be suggested in case of soft tissue damage.

We generally achieved satisfactory results for this rare case of scapular neck fracture

with rotator cuff tear and biceps interposition through stable internal fixation combined with secondary arthroscopic repair of rotator cuff tear. Scapular neck fracture may be accompanied by rotator cuff injury, which should not be ignored in clinical work.

CONCLUSION

Fracture of the scapular neck combined with rotator cuff tear is rare. In clinical practice, when we encounter patients with scapular neck fractures, especially with this unique humeral head dislocation, we must consider rotator cuff injury. MRI is essential for diagnosis. Stable internal fixation combined with secondary arthroscopic repair of rotator cuff tear can achieve good results.

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