

## A case of acromioclavicular dislocation without coracoclavicular ligament rupture accompanied by coracoid process fracture

### *Bir olguda korakoklaviküler ligamanların sağlam kaldığı akromiyoklaviküler eklem çıkığı ve korakoid çıkıntı kırığı*

Taner GUNES,<sup>1</sup> Mehmet DEMIRHAN,<sup>2</sup> Ata Can ATALAR,<sup>2</sup> Okan SOYHAN<sup>3</sup>

<sup>1</sup>Gaziosmanpaşa University, School of Medicine, Department of Orthopaedics and Traumatology;

<sup>2</sup>Istanbul University, Istanbul Medical Faculty, Department of Orthopaedics and Traumatology

<sup>3</sup>VKV Amerikan Hospital, Department of Orthopaedics and Traumatology

Korakoklaviküler ligamanların sağlam kaldığı eşzamanlı akromiyoklaviküler eklem çıkığı ve korakoid çıkıntı kırığı nadirdir. Bu olgularda cerrahi ve cerrahi dışı tedaviler kullanılmıştır. Bu yazıda, düşme sonucu sağ omuzda tip 3 akromiyoklaviküler çıkıkla birlikte korakoid çıkıntı kırığı gelişen 30 yaşındaki erkek hasta sunuldu. Hastaya her iki patolojiye yönelik cerrahi tedavi uygulandı. Açık redüksiyon sonrasında akromiyoklaviküler eklem bir adet Knowles çivisi ile, korakoid çıkıntı ise 4.0 mm malleol vidası ile tespit edildi. Ameliyat sonrası birinci haftada aktif-yardımlı omuz rehabilitasyonuna başlandı. Üçüncü haftada omuz-kol askısı ile büro işine dönebilen hasta, beşinci haftada omzunu ağrısız, aktif ve tam hareket ettirebiliyordu. Ameliyat sonrası yedinci ayda, akromiyoklaviküler eklemdeki Knowles çivisi lokal anestezi altında çıkarıldı. Ameliyat sonrası birinci yılda, hasta tüm omuz fonksiyonlarını ağrısız olarak yerine getirebiliyordu; grafilerinde heterotopik ossifikasyon gibi herhangi bir soruna rastlanmadı.

**Anahtar sözcükler:** Akromiyoklaviküler eklem/yaralanma/cerrahi; çıkık; ligaman/yaralanma; yırtık; skapula/yaralanma; omuz kırığı.

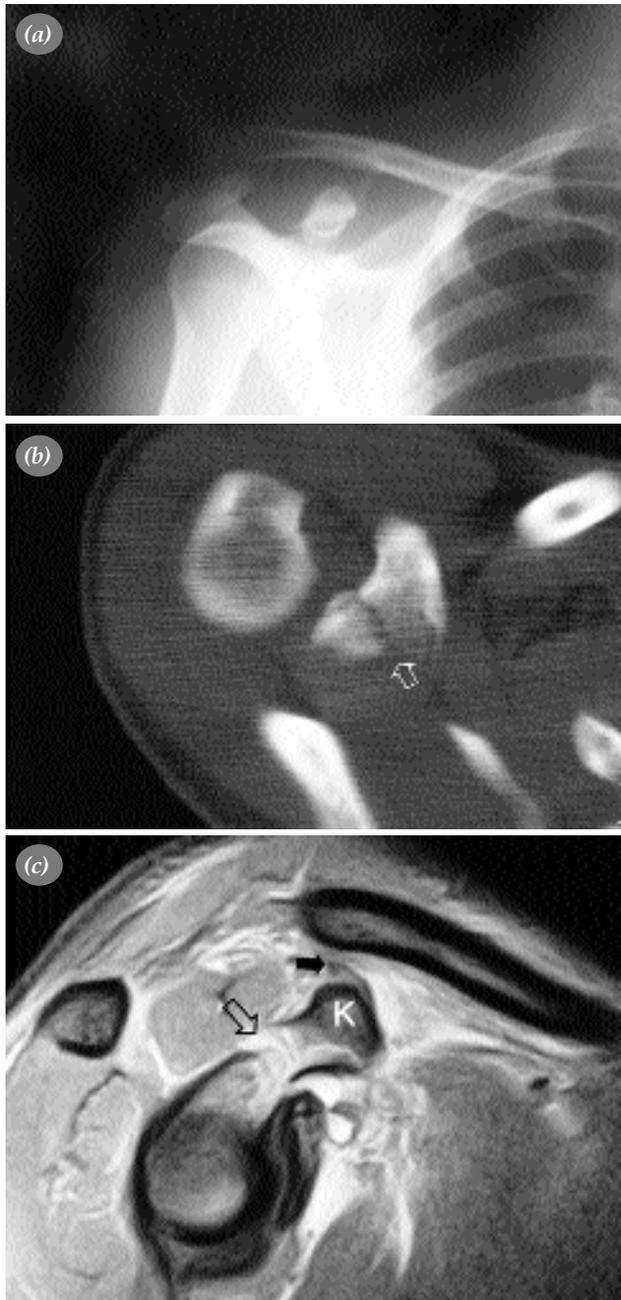
Acromioclavicular joint dislocation with intact coracoclavicular ligaments accompanied by fracture of the coracoid process is a rare injury. The patients are treated with conservative and/or surgical methods. A 30-year-old male patient developed type 3 acromioclavicular dislocation and coracoid process fracture due to a fall in the right shoulder. Both injuries were treated surgically. Following open reduction, the acromioclavicular joint was fixed with a Knowles pin, and the coracoid process was fixed with a 4.0-mm malleolar screw. Active-assisted rehabilitation of the shoulder was initiated a week after surgery. The patient returned to office work with a long arm splint at three weeks. Pain-free, active, and complete shoulder movements were seen in the fifth week. The Knowles pin in the acromioclavicular joint was removed under local anesthesia seven months postoperatively. A year after surgery, he resumed full shoulder functions without pain and there were no signs of complications such as heterotopic ossification.

**Key words:** Acromioclavicular joint/injuries/surgery; dislocations; ligaments/injuries; rupture; scapula/injuries; shoulder fractures.

Acromioclavicular (AC) joint dislocation is usually associated with midsubstance rupture of the coracoid ligaments. AC joint dislocation with intact coracoclavicular (CC) ligaments and avul-

sion through the base of the coracoid is a rare injury. In the management of this injury, conservative and surgical treatment were performed in previous published cases.<sup>[1-7]</sup>

We present an adult patient who was managed surgically due to type 3 AC dislocation associated with a fracture of coracoid process and review of the literature.

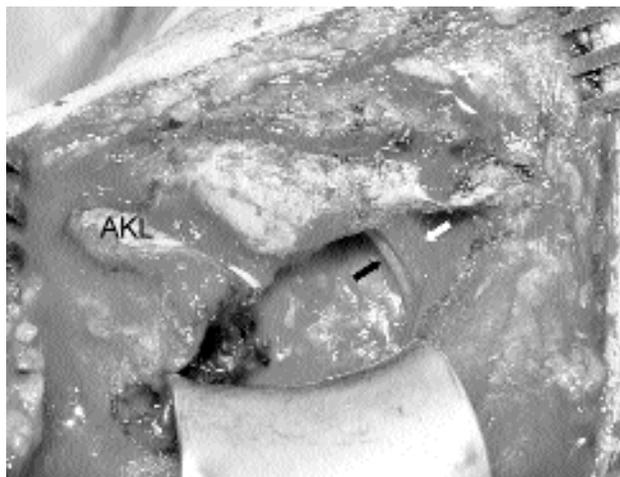


**Figure 1.** (a). The type 3 AC dislocation and fracture of the coracoid process can be seen in preoperative anteroposterior plain film of the right shoulder. The distance between clavicle and coracoid process is normal. (b). Computed tomography scan. The fracture line goes to base of the coracoid process. (c). Fracture line (empty arrow) of coracoid process (K) and intact CC ligaments (filled arrow) can be seen in magnetic resonance image.

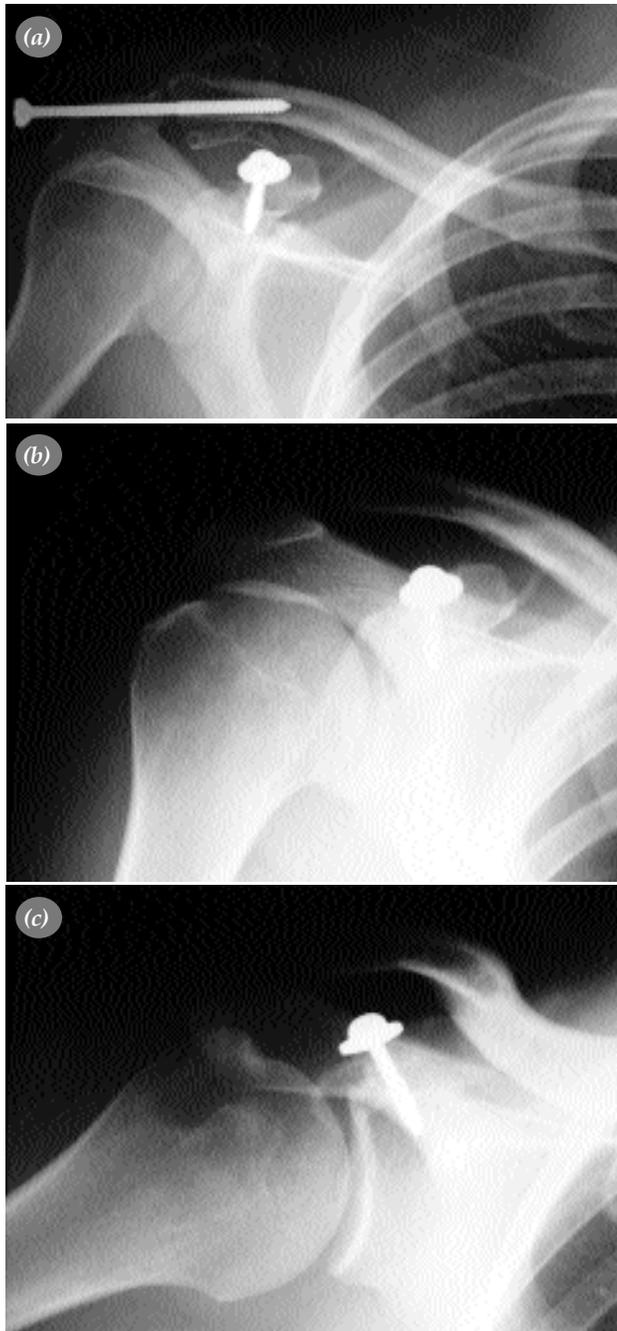
## Case report

A 30-year-old man was fallen directly on the right shoulder from two meters. Physical examination revealed prominence of the lateral portion of the clavicle, abrasion at the same area, diffuse tenderness around shoulder joint, local tenderness over the coracoid process with palpation and decreased movement of the shoulder due to pain. There were no concomitant injury and neurovascular injury. Anteroposterior plain film and computed tomography (CT) scan of the shoulder showed a type 3 AC joint dislocation and a displaced fracture of the coracoid process and not widening of the CC distance (Fig. 1a,b). The CC ligaments were seen intact on preoperative magnetic resonance image (Fig. 1c). At the operation, the CC ligament was intact (Fig. 2). The coracoid process was displaced and unstable. Open reduction and internal fixation of the AC joint were performed using a knowless pin and the coracoid process was secured with a 4.0-mm malleolar screw and washer (Fig. 3a).

A regimen of active-assisted shoulder motion exercises was started at 1st week postoperatively and 3 weeks later, the patient returned work in his office with sling. At the 5th postoperative week, full activity without restriction was permitted. At the 7th postoperative month, knowless pin which is at the AC joint was removed under local anesthesia (Fig. 3b,c).



**Figure 2.** Intraoperative dissection. The acromioclavicular ligament disruption and intact coracoclavicular ligaments is seen. AKL: acromioclavicular ligament. black arrow : trapezoid ligament, white arrow: conoid ligament.



**Figure 3.** (a) Postoperative X-ray view. AC joint was fixed using Knowles pin and washer. Coracoid process was secured using 4.0-mm malleolar screw and washer. (b-c) X-Rays of the shoulder at first postoperative year after removal of the Knowles pin.

The patient was seen one year after the operation and he had normal shoulder function without pain and there was no abnormality in x-ray such as heterotrophic ossification.

## Discussion

AC dislocation is a common injury following shoulder trauma. The usual mechanism of injury is cephalad to caudad force on the acromion caused by a direct blow or fall on to the shoulder. First, the AC ligaments are torn and then the deltoid and trapezius muscle attachments to the clavicle tear secondarily. Tearing of the CC ligament completes the injury. Consequently, dislocation of the AC joint occurs.

A fracture of coracoid process usually occurs in the base of the coracoid process at the junction between the coracoid process and the scapular body. Isolated fracture of the coracoid process is infrequent and occurs due to direct trauma or strong pull of coracobrachialis, short head of biceps, and pectoralis minor muscles.<sup>[1,7]</sup> Ogawa et al. classified coracoid fractures (either isolated or combined): type 1 fracture locates behind CC ligaments and type 2 fracture is in front of the ligaments.<sup>[5]</sup>

Combined AC dislocation with CC ligament disruption and coracoid process fracture may occur. This injury is extremely rare and there are two cases reported in the world literature.<sup>[8,9]</sup> This injury occurs with two separate mechanisms. One of the mechanisms of injury is direct blow or fall on to shoulder cephalad to caudad direction and other is immediately forcible pull of coracobrachialis, short head of biceps brachii, and pectoralis minor muscles, which would avulse the coracoid process.<sup>[8,9]</sup>

In young patients who are under the age of 15-17 years, AC dislocation associated with avulsion fracture of the coracoid process can be seen. Prior to closure of the physis of the coracoid process, the coracoclavicular ligaments are often stronger than the epiphyseal plate. Therefore, the epiphyseal plate of the coracoid process is avulsed by dislocation of AC joint and strong ligaments. Sometimes, unfused physis of the coracoid process can be misdiagnosed as a fracture.<sup>[2,10]</sup>

In combined injury, the coracoid process breaks instead of the usual tearing of the CC ligaments during dislocation of the AC joint. AC dislocation associated with a fracture of coracoid process usually occurs in patients in the second or third decade of life.<sup>[2]</sup> In combined AC dislocation with intact CC ligaments and coracoid process fracture, a fracture

of the coracoid process usually associates with type 3 AC dislocation as in our patient. Besides, one case who has type 1 AC dislocation combined with physal avulsion of the coracoid process<sup>[11]</sup> and one case who has type 5 AC dislocation combined with fracture of the coracoid process<sup>[12]</sup> have been published. Recently, Rockwood's classification for AC dislocation has been modified and this combined injury has been classified as type 3 variant.<sup>[6]</sup>

In a case with combined injury, a fractured coracoid process is easily overlooked when the attention is directed toward the more obvious AC separation.<sup>[1]</sup> An axillary view or 30-degree cephalad view of the shoulder are recommended for visualisation of the coracoid.<sup>[1,4]</sup> Moreover, tomograms may be needed to confirm the diagnosis.<sup>[1,4,13]</sup> We recommend that routine anteroposterior, oblique, outlet and axillary view of the shoulder region should be achieved in patients with AC joint separation and also injured shoulder. It is recommended that the distance between coracoid and clavicle on direct radiography can be performed to evaluation of the CC ligaments.<sup>[8,9]</sup> These ligaments can be visualized on magnetic resonance examination. Also, we think that the preoperative CT scan is important for diagnosis and evaluation of the degree of the displacement of the fracture of coracoid process.

Although both surgical<sup>[5,7]</sup> and conservative<sup>[1-5]</sup> treatment for this combined injury had been applied in previous published cases and results were seen similar with both treatment methods in long term follow-up,<sup>[6]</sup> the number of cases treated surgically is lower than treated conservatively. Ogawa et al. classified coracoid fractures (either isolated or combined): type 1 fracture locates behind CC ligaments and type 2 fracture is in front of the ligaments.<sup>[9]</sup> These authors suggested that type 1 fractures require operative treatment to begin physiotherapy early and operative treatment is not necessary for the type 2 fractures. Some authors recommend conservative treatment and immobilisation for 4-6 weeks in sling and then shoulder rehabilitation are recommended for the conservative management.<sup>[1-5]</sup> In some cases who were managed by conservative treatment, cosmetic complaints and pain were observed.<sup>[1,4,6]</sup> In a case, who was operated by Wilber et al. due to com-

bined injury, pain and decreased range-of-motion due to failed physiotherapy were observed postoperatively.<sup>[7]</sup>

In our case, because the rigid stability was achieved, we started active-assisted shoulder exercises on first week postoperatively and the patient returned to work in short-term (at 3rd weeks postoperatively). We achieved painless, active, strong and mobile shoulder at the 5th postoperative week. In conclusion, we suggest that early recovery to normal life is possible with surgical treatment in patients with AC dislocation combined with coracoid fracture.

## References

1. Bernard TN Jr, Brunet ME, Haddad RJ Jr. Fractured coracoid process in acromioclavicular dislocations. Report of four cases and review of the literature. *Clin Orthop Relat Res* 1983;(175):227-32.
2. Carr AJ, Broughton NS. Acromioclavicular dislocation associated with fracture of the coracoid process. *J Trauma* 1989; 29:125-6.
3. Lasda NA, Murray DG. Fracture separation of the coracoid process associated with acromioclavicular dislocation: conservative treatment-a case report and review of the literature. *Clin Orthop Relat Res* 1978;(134):222-4.
4. Montgomery SP, Loyd RD. Avulsion fracture of the coracoid epiphysis with acromioclavicular separation. Report of two cases in adolescents and review of the literature. *J Bone Joint Surg [Am]* 1977;59:963-5.
5. Ogawa K, Yoshida A, Takahashi M, Ui M. Fractures of the coracoid process. *J Bone Joint Surg [Br]* 1997;79:17-9.
6. Rockwood CA, Williams GR, Young DC. Disorders of the acromioclavicular joint. In: Rockwood CA, Matsen FA III, editors. *The shoulder*. Vol. 1, 2nd ed. Philadelphia: W. B. Saunders; 1998. p. 483-553.
7. Wilber MC, Evans EB. Fractures of the scapula. An analysis of forty cases and a review of the literature. *J Bone Joint Surg [Am]* 1977;59:358-62.
8. Wang KC, Hsu KY, Shih CH. Coracoid process fracture combined with acromioclavicular dislocation and coracoclavicular ligament rupture. A case report and review of the literature. *Clin Orthop Relat Res* 1994;(300):120-2.
9. Wilson KM, Colwill JC. Combined acromioclavicular dislocation with coracoclavicular ligament disruption and coracoid process fracture. *Am J Sports Med* 1989;17:697-8.
10. Kim SJ, Kim JS, Kim HJ, Yu HW. Bilateral unfused coracoid process: report of a case. *J Korean Med Sci* 1998;13: 563-5.
11. Holst AK, Christiansen JV. Epiphyseal separation of the coracoid process without acromioclavicular dislocation. *Skeletal Radiol* 1998;27:461-2.
12. Horner BM, Venu KM, Smith MA. A unique case of complex shoulder injury. *Injury Extra* 2004;35:3-5.
13. McAdams TR, Blevins FT, Martin TP, DeCoster TA. The role of plain films and computed tomography in the evaluation of scapular neck fractures. *J Orthop Trauma* 2002;16:7-11.