

견봉쇄골 탈구와 동반된 오구돌기 골절 - 2예 보고 -

국립경찰병원 정형외과

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Acromioclavicular Separation with the Fracture of the Coracoid Process - 2 Cases report -

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The acromioclavicular separation (AC separation) is a common injury, which is often accompanied by the rupture of the coracoclavicular ligament (CC ligament) in severe occasions. In rare forms of AC separation, the fracture of the coracoid process would occur rather than the rupture of the CC ligament. Only 31 cases of such injury have been reported in the English literature. We present 2 additional cases with literature review. The fracture of the coracoid process is not readily seen on anteroposterior shoulder radiograms. Severe AC separation without widening of CC distance on anteroposterior shoulder radiogram heralds the fracture of the coracoid process.

Key Words: Acromioclavicular separation, Coracoclavicular distance, Fracture of the coracoid process

Introduction

The acromioclavicular separation (AC separation) is a common injury. In severe forms of AC separation, the coracoclavicular ligament (CC ligament) which con-

tributes to the vertical stability of AC joint is often ruptured, and operative management is recommended^{2,4,14)}. In these types of AC separation, the widened distance between the clavicle and the coracoid process (CC distance) in simple x-rays

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implies the rupture of the CC ligament. This widening of CC distance is usually referenced for the severity of the AC separation as in Rockwood classification of AC separation, and is considered as an important factor in AC separation¹²⁾.

If the upward migration of the lateral part of the clavicle caused by the AC separation, or possibly by distal clavicle fracture occurring lateral to the insertion of the CC ligament on the clavicle results not in the rupture of the CC ligament, but in the avulsion of the coracoid process, the fracture of the coracoid process will accompany the AC separation. These severe forms of AC separation are often missed because the CC distance is not widened^{1,3,7,13)}. There are only 31 reported cases of this type of AC separation with fracture of the coracoid process in English literature^{1-4,6-19)}.

We present 2 cases of the acromioclavicular separation with the fracture of the coracoid process with literature review.

Case 1

A fifty-seven-year-old man suffered from trauma on his left shoulder in a bicycle accident. He complained of extreme pain, and the range of shoulder motion was much restricted. On physical examination, the distal clavicle was prominent, and palpation of the AC joint caused severe pain. There was no abrasion wound around his shoulder. There was no evidence of associated neurovascular deficit. With the clinical diagnosis of AC separation, a standard AP view and weight bearing AP view of the shoulder were ordered. The AC joint was completely dislocated, but the CC distance

appeared normal, the same to the contralateral side (Fig. 1-A). On axillary view of the shoulder, the fracture of the base of the coracoid was identified (Fig. 1-B). On computed tomography (CT) (Fig. 1-C) and magnetic resonance imaging (MRI) (Fig. 1-D) of the shoulder, the involvement of the articulating surface of the glenoid or any further injury such as rotator cuff tear, labral tear was excluded. On the above imaging studies, the displacement of the fractured coracoid process was estimated less than 3 mm, and only conservative management for the fracture of the coracoid process was planned. For the AC separation, percutaneous pinning with 2 Steinmann pins under fluoroscopic guidance provided accurate reduction and stability of the AC joint (Fig. 1-E). Sling and Swathe was applied postoperatively. The pendulum exercise was permitted at postoperative 2 weeks. At postoperative 4 weeks, abduction of the shoulder reached 90 degrees. A minor pin site infection was successfully treated by pin removal and antibiotic therapy at 8 weeks. At postoperative 6 months, he had normal painless shoulder movement of 170 of forward elevation, 160 of abduction, 80 of external rotation, the 8th thoracic vertebra of internal rotation. Final follow-up radiograph showed the displacement of the coracoid process was less than 3 mm (Fig. 1-F). Palpation of the coracoid process caused no pain, and he complained of no discomfort in activities of daily living.

Case 2

A fifty-year-old man in drunken state visited emergency room after slipping

down from stairs. He complained of severe pain in his left shoulder and was unable to lift the arm. The lateral end of the clavicle was prominent and tender on



Fig. 3. Case (A) The radiograph shows acromioclavicular joint separation without coracoclavicular widening. (B) Axillary radiograph shows transverse fracture line with mild displacement at the base of the coracoid process. (C) The CT scan shows coracoid base fracture without glenoid involvement. (D) The MRI excludes rotator cuff tear or glenoid labral tear. (E) Closed reduction and percutaneous pinning with 2 Steinman pins is performed for the acromioclavicular separation. (F) Follow up radiograph at postoperative 6 months shows minimal displacement of the coracoid process.

palpation. There was no associated neurovascular deficit. Under the clinical impression of AC separation, standard AP view and weight bearing AP view of the shoulder were ordered, and it revealed only mild AC separation and fracture of the coracoid process. Involvement of the glenoid was excluded by CT. The arm was supported by a commercial Kenny-Howard sling, and conservative management was tried. After 4 weeks of immobilization, gentle passive range of motion exercise was permitted. Four months later, he had normal painless shoulder movement without unattractive deformity. Minimal local tenderness over the coracoid process was present on deep pressure, but caused no disability.

Discussion

Through literature review revealed 31 cases of acromioclavicular separation with coracoid process fracture from 1943 to 1994^{1-4, 6-10, 13-19)}. Ogawa et al. reported 67 cases of coracoid fracture, in which 39 cases of the acromioclavicular dislocation was associated¹¹⁾, while Park et al. documented 3 cases of coracoid fracture accompanying acromioclavicular dislocation¹²⁾. The addition of the present 2 cases brings the total number of reported cases in the reviewed literature to 75. Demographic analyses were done only for the available data. There were 27 males and 4 females in 31 gender-identifiable persons of 73 cases. This injury is usually reported to occur in the second or third decade of life. Of the 28 age-identifiable reported cases, 22 cases (78 %) were in their second or third decade, 3 cases were in their fifth decade, and the other 3 cases were in

fourth, sixth, seventh decade respectively. In 25 cases with side information, 11(44%) injuries were right, and the other 14 injuries(56%) were left. The mechanism of injury was sports in 14, motor vehicle accident in 12, and direct trauma in 5.

Sixteen patients were treated conservatively with sling, shoulder immobilizer, or plaster splint, while 15 patients were managed surgically by various methods, such as AC joint wiring, AC joint fixation with pins, and coracoid fixation with or without coracoclavicular fixation. The outcome of both conservative and operative management was generally good with painless, full-range-of-motion of the shoulder and acceptable deformity, while only two cases (one in conservative and one in operative group) complained of pain or cosmetic problem. There were 2 cases of triple injury consisting AC dislocation, CC ligament rupture, and coracoid fracture.

The AC joint is surrounded by a capsule reinforced by AC ligaments, the superior part of which is the strongest, and stabilize the joint in an anteroposterior direction (the horizontal plane). The CC ligament is composed of conoid and the trapezoid ligament, and is the main stabilizer for superoinferior direction^{1,12)}. The strong CC ligament, rather than rupture, may avulse the coracoid process near its base and with disruption of the acromioclavicular joint may allow complete dislocation of the clavicle⁸⁾. Ogawa et al. classified the fracture of the coracoid process into type I and II; type I at the base of the coracoid process or behind the CC ligament, and type II at the tip of the coracoid process or in front of the CC ligament. A type II fracture does not disturb the scapuloclav-

icular connection, but a type I fracture usually does. The common associated injury such as AC separation, fracture of the scapular spine or the acromion or the fracture of the lateral end of the clavicle completes the destabilization of both the coracoid fracture and the scapuloclavicular connection¹¹⁾.

The peak incidence of this type of injury was observed in second and third decade of age^{1-3,10,13)}, our 2 cases, however, were in their fifties. The epiphyseal plate of the coracoid process is near its base, and normally closes between 15 and 18 years of age⁴⁾. Therefore, an unfused epiphysis may be mistaken for a fracture in children up to the age of 15 years. Before the closure of the epiphyseal plate, the CC ligaments are often stronger than the epiphyseal plate, and an insult may injure the epiphyseal plate rather than the rupture of the CC ligament⁴⁾. These anatomical and developmental aspect of the coracoid process account for age related incidence of the fracture of the coracoid process. In adults with complete AC dislocation, the coracoclavicular ligaments usually tear, while the coracoid remains intact. However, the force of dislocation can occasionally avulse the coracoid process, keeping the ligaments intact^{9-10,13)}. So, the fractures of the coracoid process accompanying AC separation in old persons should be included in differential diagnosis, though.

The fracture of the coracoid process is not readily identifiable on a routine anteroposterior radiogram, which can be explained by its unique projection^{1,2,7,8,14,15)}. Protass et al. recommended a 30 to 35 degree cephalad radiograph or tomogram with the patient supine to avoid the over-

lapping of the bony shadows¹³⁾. In ordinary clinical practice, however, anteroposterior, lateral, and axillary view radiograms of the shoulder joint are usually ordered for the patients complaining shoulder discomfort. Weight bearing AP view might be considered to exclude the AC separation in a certain situation. The fracture of the coracoid process is more easily seen in the axillary view. The abduction of the affected arm for the axillary radiogram, however, may cause the fractured coracoid process to displace via the intact CC ligament, and should be done carefully. The CT and MRI test, very popular nowadays, may facilitate the exact evaluation of the fracture, which guides the appropriate management plan.

For the AC separation, the severity of the displacement determines the management plan. For the fracture of the coracoid process, a conservative management usually yielded successful clinical outcome if it were not for the involvement of the glenoid, severe displacement, or associated injury such as scapulothoracic disconnection. Literature review revealed that in most of the cases the operative management had no benefit over conservative management in the aspect of functions of shoulder, pain, and cosmetic appearance^{2-6,9,10)}. In both cases of the current study, nonoperative management yielded satisfactory clinical outcome.

We presented 2 cases of the separation of the AC joint with the fracture of the coracoid process. The AC separation was managed by percutaneous AC joint pinning in one, and by sling and swathe in the other, and the fractures of the coracoid process were managed conservatively. We conclude that clinicians must be aware

of this unusual injury with high index of suspicion, especially when there is severe AC separation without the widening of CC distance.

REFERENCES

- 1) **Barentsz JH, Driessen AP:** *Fracture of the coracoid process of the scapula with acromioclavicular separation.* *Acta Orthop Belg*, 55: 499-503, 1989.
- 2) **Bernard TN, Brunet ME, Haddad RJ:** *Fractured coracoid process in acromioclavicular dislocations.* *Clin Orthop Relat Res*, 55: 499-503, 1983.
- 3) **Carr AJ, Broughton NS:** *Acromioclavicular dislocation associated with fracture of the coracoid process.* *J Trauma*, 29: 125-126, 1989.
- 4) **Combailia A, Arandes JM, Alemany X, Ramon R:** *Acromioclavicular dislocation with epiphyseal separation of the coracoid process.* *J Trauma*, 38: 812-814, 1995.
- 5) **Eyres KS, Brooks A, Stanley D:** *Fractures of the coracoid process.* *J Bone Joint Surg Br*, 77: 425-428, 1995.
- 6) **Herrero TM, Merchan CR, Martinez LM:** *Fractures of the coracoid process.* *J Trauma*, 30: 1597-1599, 1990.
- 7) **Ishizuki M, Yamaura I, Isobe Y, Furuya K, Tanabe K:** *Avulsion Fracture of the superior border of the scapula.* *J Bone Joint Surg Am*, 63: 820-822, 1981.
- 8) **Kumar A:** *Management of coracoid process fracture with acromioclavicular joint dislocation.* *Orthopedics*, 13: 770-771, 1990.
- 9) **Lasda NA, Murray DG:** *Fracture separation of the coracoid process associated with acromioclavicular dislocation: Conservative treatment.* *Clin Orthop Relat Res*, 134: 222-224, 1977.
- 10) **Montgomery SP, Loyd RD:** *Avulsion fracture of the coracoid epiphysis with acromioclavicular separation.* *J Bone Joint Surg Am*, 59: 963-965, 1977.
- 11) **Ogawa K, Yoshida A, Takahashi M, Ui M:** *Fractures of the coracoid process.* *J Bone Joint Surg Br*, 79: 17-19, 1997.
- 12) **Park JY, Kim GN, Min BS, Yoo MJ:** *Modified Phemister operation for acromioclavicular dislocation.* *J Korean Society Fractures*, 14: 456-462, 2001.
- 13) **Protass JJ, Stampfli FV, Osmer JC:** *Coracoid process fracture diagnosis in acromioclavicular separation.* *Diag Radiology*, 116: 61-64, 1975.
- 14) **Smith DM:** *Coracoid fracture associated with acromioclavicular dislocation.* *Clin Orthop Relat Res*, 108: 165-167, 1975.
- 15) **Urist MR:** *Complete dislocation of the acromioclavicular joint.* *J Bone Joint Surg Am*, 45: 1750-1753, 1963.
- 16) **Wang KC, Hsu KY, Shih CH:** *Coracoid process fracture combined with acromioclavicular dislocation and coracoclavicular ligament rupture.* *Clin Orthop Relat Res*, 300: 120-122, 1994.
- 17) **Wilber MC, Evans EB:** *Fractures of the scapula.* *J Bone Joint Surg Am*, 59: 358, 1977.
- 18) **Wilson KM, Colwill JC:** *Combined acromioclavicular dislocation with coracoclavicular ligament disruption and coracoid process fracture.* *Am J Sports Med*, 17: 697-698, 1989.
- 19) **Zettas JP, Muchnic PD:** *Fractures of the coracoid process base in acute acromioclavicular separation.* *Orthop Rev*, 5: 77, 1976.

초 록

견봉쇄골 관절 탈구는 흔한 손상으로 심한 경우 대개 오구쇄골 인대의 파열이 동반된다. 견봉쇄골 관절 탈구에 드물게 오구쇄골 인대의 파열 없이 오구돌기 골절이 동반될 수 있다. 지금까지 31례만이 보고된 상기 손상을 저자들은 두 증례에서 경험하였기에 문헌 고찰과 함께 보고하고자 한다. 오구돌기 골절은 일반적으로 시행하는 전후방 방사선 촬영에서는 발견하기 쉽지 않다. 고도의 견봉쇄골 관절 탈구가 있으면서 오구쇄골 간격이 늘어나지 않은 경우 오구돌기의 골절을 의심할 수 있다.

색인 단어: 견봉쇄골 관절 탈구, 오구쇄골 간격, 오구돌기 골절