

동측 쇄골의 내측 및 외측 동시 골절: 이중 쇄골 골절 - 증례 보고 -

박경준 · 손훈상 · 백경영

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쇄골 골절은 임상에서 흔히 접할 수 있는 상지 손상의 하나이나, 동측 쇄골의 내측, 외측 혹은 간부 골절이 동시에 일어나는 경우는 매우 드물다. 현재까지 전세계적으로 7예가 보고되고 있으나, 국내에서는 보고된 바가 없다. 이에 저자들은 낙상 후 발생한 쇄골 외측 골절과 동반된 쇄골 내측 골절 1예를 경험하였기에 문헌 고찰과 함께 손상 기전과 진단 및 치료에 대해 보고하고자 한다.

색인 단어: 쇄골 내측 골절, 쇄골 외측 골절, 이중 쇄골 골절

Simultaneous Fractures of the Ipsilateral Distal and Proximal Clavicle: Double Clavicle Fracture - A Case Report -

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Clavicular fracture is common injury in the upper extremity, but ipsilateral proximal, distal or middle-third clavicular fractures which occur simultaneously are an extremely rare. Seven cases have been reported in the English and Japanese literatures, but it has never been reported in Korea. We report a case of ipsilateral proximal and distal clavicular fracture caused by fall from height and describe its presumed mechanism, diagnosis, treatment with a review of literatures.

Key Words: Proximal clavicle fracture, Distal clavicle fracture, Double clavicle fracture

The clavicle is one of the most commonly fractured bones, accounting for about 5% of all fractures and comprising 44% of all shoulder girdle injuries²⁾. Among these, a clavicle shaft fracture accounts for the majority of fractures, followed by a distal clavicle fracture, and a proximal end fracture is rare. However, simultaneous ipsilateral fractures of the proximal, distal or middle-third clavicle are extremely rare; only seven cases have been reported in the English and Japanese literatures^{3~8,10)}. We report a case of an ipsilateral distal and proximal

clavicle fracture caused by a fall and describe its presumed mechanism, diagnosis, and treatment, accompanied by a review of the literature.

CASE REPORT

A 33-year-old male who fell from a bridge in a drunken state was admitted to the emergency room. He was unconscious when he arrived at our hospital. A physical examination revealed ecchymosis and swelling

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around the left shoulder and chest (Fig. 1). He was diagnosed with an epidural hemorrhage and underwent emergency surgery. A plain radiograph revealed an extra-articular fracture of the distal clavicle which was classified to Neer type II with inferior bone fragment (Fig. 2). A computed tomography (CT) scan demonstrated an intra-articular fracture of the proximal clavicle, Craig classification type III, with two displaced fragments that were separated into superior and inferior fragments (Fig. 3)⁹⁾.

An open reduction and internal fixation was performed 13 days after the trauma. A 15-cm transverse incision was made from the acromioclavicular joint to the sternoclavicular joint parallel with the clavicle, and soft tissue was dissected until both fracture sites were encountered. The distal clavicle fracture was reduced and fixed using an AO hook plate (LCP clavicle hook plate, Synthes[®], Switzerland). The proximal clavicle fracture was of the intra-articular type, and superior and in-

ferior fragments were separated by a transverse fracture line. Fracture fragments were fixed using the lag-screw technique, and, later, a 3.5-mm LCP reconstruction plate (Synthes[®], Switzerland) was applied to the anterior aspect of the clavicle. The two plates were placed to overlap each other to prevent the stress concentration between them (Fig. 4).

The patient was given an arm sling and allowed to perform range-of-motion exercises of the elbow and wrist and pendulum exercises of the shoulder joint. At 4 weeks after the operation, the patient had nearly full range of motion of the shoulder: 180° forward flexion and abduction, and 70° external and internal rotation. At 5 months after the operation, radiographs revealed that a callus had formed on both fracture sites, and the patient had no symptoms or limitations on daily activities (Fig. 5).



Fig. 1. Photograph of the patient's left shoulder. The subcutaneous hemorrhage and swelling were noted on left shoulder and chest.



Fig. 3. A computed tomography (CT) scan showed an intra-articular fracture of the proximal clavicle with two superior and inferior displaced fragments.



Fig. 2. Anteroposterior radiograph revealed a distal clavicle fracture with inferior fragment.

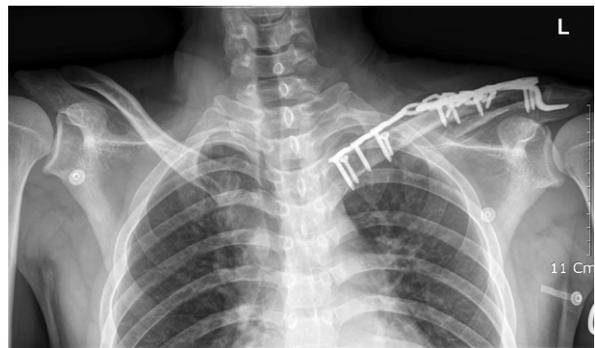


Fig. 4. Immediate postoperative radiograph.



Fig. 5. Anteroposterior view of the clavicle 5 months after operation.

DISCUSSION

Among all clavicular fractures, 69% occur in the middle-third, 28% at the distal end, and the remaining 3% at the proximal end⁹⁾. Although ipsilateral proximal and distal clavicle fractures can be classified as segmental fractures according to the number of fracture fragments, several studies have described a “double clavicle fracture”^{3,5,7,8,10)}. The double clavicle fracture is an even rarer injury; indeed, only four cases have been reported in the English literature^{3,4,6,8)}. One case was fractures of the middle and distal clavicle³⁾ and the other case was the proximal and distal clavicular fractures with a extra-articular fracture⁴⁾. Two cases were middle-third clavicle fractures in children, with a proximal clavicular physis injury^{6,8)}. On the other hand, three cases of fractures of the middle and distal clavicle have been reported in Japan^{5,7,10)}. However, in our unusual case, the fractures occurred simultaneously in the distal portion and proximal end of the clavicle, involving the articular surface of the sternoclavicular joint; such a case has not previously been reported.

Two separate mechanisms produce clavicular fractures. One is direct force on the point of the shoulder girdle due to a fall⁹⁾. The other is an indirect force, which may give rise to clavicle fractures by the shearing force delivered from the humerus to the sternum via the shoulder joint and the clavicle when patients fall on their out-stretched arms¹⁾. Although a definite mechanism for simultaneous fractures of the proximal and distal clavicle has not been clearly defined, it seems that either separate or sequential forces result in such

fractures. In our case, we presumed that direct force on the shoulder joint led to the distal clavicle fracture, especially considering the head injury. The proximal clavicle fracture was less likely to be caused by direct force, given its relationship with surrounding structures. The mechanism of injury to the proximal clavicle is similar to that of injury to the sternoclavicular joint. A proximal clavicle fracture can occur when either direct or indirect force is applied, either on the anterolateral or posterolateral aspect of the shoulder joint³⁾. Therefore, in this case, we supposed that direct force applied to the shoulder joint resulted in the distal clavicle fracture, and then the sequential blow was transferred to the medial aspect of the clavicle, which caused the proximal clavicle fracture.

Fractures of the proximal clavicle are difficult to visualize because overlying structures in the chest obscure the view of the proximal end. For rare proximal fractures, particularly those that extend into the sternoclavicular joint, a Hobb’s view or a serendipity view may be helpful to access the fractures and identify their relationship to the sternoclavicular joint. However, proximal fractures require a computed tomography scan for adequate visualization. A proximal clavicular fracture combined with a distal one can be overlooked, and two studies have reported that proximal fractures in a double clavicle fracture were initially missed^{4,6)}. Therefore, a careful analysis is required when several signs of a suspected fracture of the proximal clavicle are presented, including tenderness, swelling, and subcutaneous hemorrhage on the anterior chest. A distal and proximal clavicle fracture can be treated either nonoperatively or operatively. Although proximal clavicular fractures heal well with nonoperative treatment, we believe that more active treatment through a surgical intervention should be considered in cases of a segmental fracture, considering that the clavicle forms one of the struts of the suspension ring of the shoulder girdle. In this case, plating with lag screws was applied to the proximal clavicular fracture in order to protect bending and torsional force to the clavicle. However, lag screws without plating for proximal clavicular fracture could be an alternative to the open plating so as to prevent worrisome problem, such as extensive soft tissue disruption and nonunion.

A concurrent distal and proximal clavicle fracture is a

rare injury and may be difficult to diagnose. Therefore, when a distal clavicle fracture is diagnosed, a close physical examination and radiographic evaluation of the proximal clavicle fracture is necessary to prevent late complications such as a nonunion.

REFERENCES

- 1) **Allman FL Jr:** Fractures and ligamentous injuries of the clavicle and its articulation. *J Bone Joint Surg Am*, **49:** 774-784, 1967.
- 2) **Basamania CJ, Rockwood CA:** Fractures of the clavicle. In: Rockwood CA ed. *The shoulder*. 4th ed. Philadelphia, WB Saunders: 428-482, 2008.
- 3) **Hagino T, Ono T, Hamada Y:** Unusual double clavicle fracture complicated by ipsilateral scapular neck fracture. *J Orthop Sci*, **7:** 417-419, 2002.
- 4) **Heywood R, Clasper J:** An unusual case of segmental clavicle fracture. *J R Army Med Corps*, **151:** 93-94, 2005.
- 5) **Itoh Y, Gotoh T, Kamo K, et al:** Treatment of double fractures of the clavicle. *Seikeisaigaigeka (Orthop Surg Traumatol)*, **37:** 479-483, 1994.
- 6) **Lemire L, Rosman M:** Sternoclavicular epiphyseal separation with adjacent clavicular fracture. *J Pediatr Orthop*, **4:** 118-120, 1984.
- 7) **Nakai T, Nakagawa T, Muneyasu H, et al:** Double fracture of clavicle. *Kossetsu*, **16:** 163-166, 1994.
- 8) **O'Neill PJ, Cosgarea AJ, McFarland EG:** Unusual double clavicle fracture in a lacrosse player. *Clin J Sport Med*, **10:** 69-71, 2000.
- 9) **Robinson CM:** Fractures of the clavicle in the adult. Epidemiology and classification. *J Bone Joint Surg Br*, **80:** 476-484, 1998.
- 10) **Takeda N, Aya H, Fujita H:** Double fracture of clavicle. *Seikeigeka (Orthop Surg)*, **43:** 1261-1264, 1992.