

FRACTURE OF THE CLAVICLE

Epidemiology

1. Clavicle fractures represent up to 5% of all adult fractures and up to 44% of all shoulder girdle fractures
2. 50% are displaced
3. 75% are in the middle third; 3% medial third and 22% lateral third
4. I bone to ossify; 5th week of IUL
5. Late secondary ossification to heal: Medial at 20 years
6. An association between significant shortening (15–20 mm) of the clavicle and symptomatic malunion also has been reported

Classification [Craig]

Group I: Middle 1/3: Displacement <2 cm or >2 cm

II: Distal 1/3: [Robinsons classification]: 85%

Type I #: Lateral to ligament (Minimal displacement): Stable

II : Medial to ligament (Displacement): can be unstable

III : Intra-articular fracture

IV : Ligaments attached to the periosteal sleeve with displacement of #

III: Proximal 1/3: Minimal displacement

Significant displacement

Intra-articular

epiphyseal separation

Assessment

1. Mechanism of injury
2. Look for chest injury; neurovascular status, skin condition

Treatment

Indications for surgery

1. Open fractures
2. Painful Non-union
3. Associated brachial plexus injury/subclavian artery
4. Floating shoulder
5. Impending skin necrosis

Treatment

Majority: Broad arm sling for 4-6 weeks

1. When indicated: ORIF 3.5 DCP plate or Newer contoured plate

Role of Hagie pin

2. Technical aspects:

Beech chair position

Superior incision and elevate as a single flap right to the bone

Superior placement of the plate

6 cortices fixation on each side

Return to prior activities at 3 months

Contoured plate



Hagie intramedullary pin



Complications

Non-union

Meta-analysis revealed that primary operative fixation does provide more rapid return of function and minimizes early residual disability following displaced clavicle fracture in young population.

Prevalence of symptomatic malunion and nonunion 20% in the non-operative group versus 1.5% in the operative group. The commonest complication in the operative group was hardware irritation (from an implanted plate or prominent pin) that resulted in hardware removal. 15% in the non-operative group developed a nonunion, and the number needed to treat for one person to benefit from operative treatment in relation to nonunion was 7.6.

Malunion

Symptomatic malunion 8.5% in the non-operative group versus 0% in the operative group.

The technique described by Mc Kee et al. (2004) suggests an osteotomy through the original fracture plane.

The original fracture plane is usually identifiable because of the typical pattern of the fracture ends relative to each other. The osteotomy is performed through this plane. If the original fracture cannot be easily recognized, an oblique sliding osteotomy can be performed. In both ends of the bone, the medullary canal is opened to hopefully restore blood supply to the osteotomy site. The length and alignment is restored with the opposite side as a reference for length measurement.

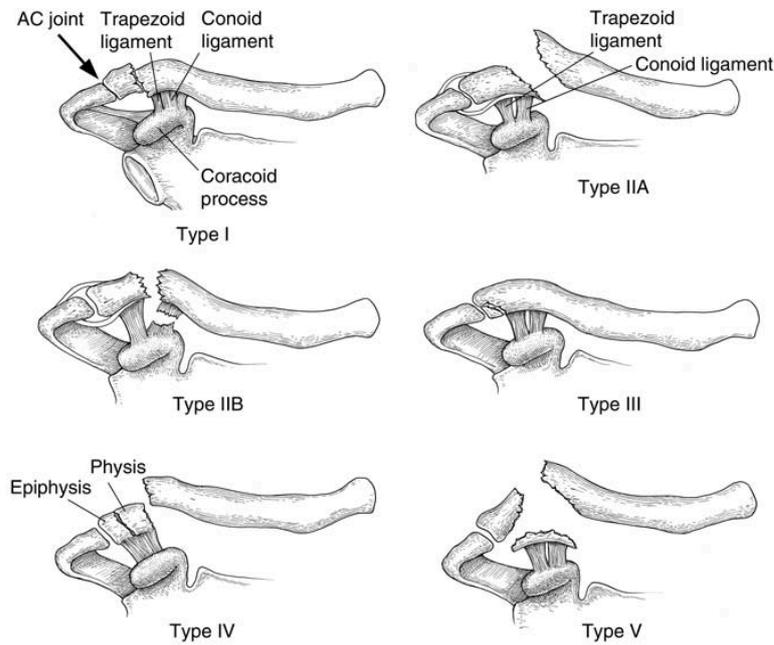
If the “old fracture ends” can be recognized, these can also be used as a guide to restore length. Now the ends are fixated by means of either a pelvic reconstruction plate or a precontoured clavicle plate and compression is applied over the osteotomy. The plate is positioned most of the time on the postero-superior surface of the clavicle, especially precontoured plates.

Lateral third clavicle fractures

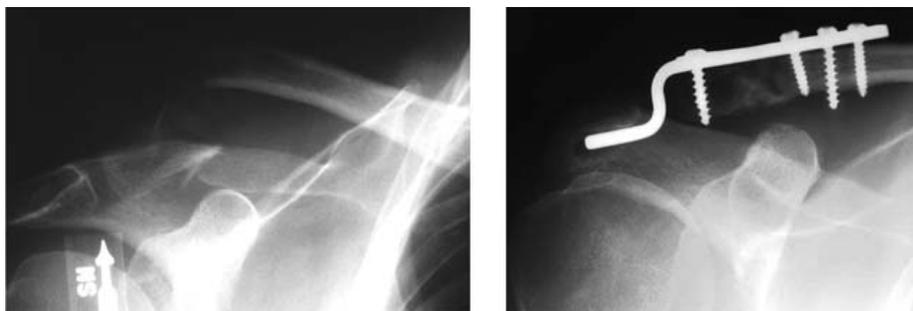
Traditionally lateral third clavicle fractures heal without difficulty. However, radiographic nonunion after distal clavicle fracture has been reported in 10% to 44% of patients.

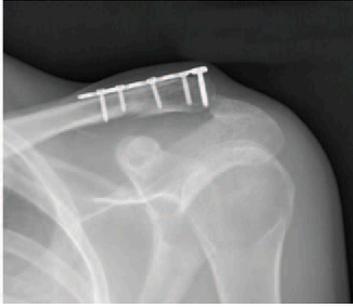
Type II distal clavicle fractures, which involve displacement, are associated with the

highest incidence of nonunion and malunion. Several studies have questioned the clinical relevance of distal clavicle nonunion and malunion.



The decision whether to operate may be influenced by the amount of fracture displacement and the individual demands of the patient. Surgical options to achieve bony union include transacromial wire fixation, a modified Weaver-Dunn procedure, use of a tension band, screw fixation, plating, and arthroscopy. Each technique has advantages and disadvantages; insufficient evidence exists to demonstrate that any one technique consistently provides the best results.





For patients with displacement [type II], may require surgical treatment but counsel them that the current evidence suggests equivalent outcomes between surgical and nonsurgical.

Floating shoulder

Floating shoulder is a rare injury pattern consisting of ipsilateral clavicle and glenoid neck fractures. This injury initially was considered inherently unstable, because the glenoid loses both osseous and ligamentous contact with the scapula and the clavicle. The perceived concern was that the weight of the arm and the pull of the muscles around the shoulder girdle continue to displace the glenohumeral joint inferiorly as well as anteromedially.

Edwards reported a retrospective review of 20 patients treated nonoperatively for floating shoulders. The authors' general consensus was that operative fixation could be considered for significantly displaced fractures but that an individualized approach to treatment was more important.

Because of the rarity of this injury pattern, it will be challenging to generate enough number of cases to compare therapy modalities in a prospective manner. For now, the authors recommend the moderate approach of treating each injury individually and managing operatively any symptomatic or grossly unstable injury patterns based on radiographs and clinical examinations.

Summary

Clavicle fractures are one of the most common upper extremity injuries encountered.

In most cases, rare fractures involving the medial third of the clavicle are treated adequately with a period of immobilization.

There is increasing evidence supporting primary operative fixation of completely displaced mid-shaft fractures of the clavicle, especially in young, active patients who have visible deformity or shortening of 1.5 to 2.0 cm or more. At present, an anatomic, precontoured compression plate placed on the superior aspect of the bone through a minimally invasive approach.

Completely displaced fractures of the lateral third of the clavicle respond well to nonoperative treatment but have a high rate of delayed and non-union. This failure to achieve union may produce minimal symptomatology in older, sedentary individuals; primary operative repair should be considered in younger individuals, especially those who perform overhead activities regularly.

A floating shoulder is a rare clinical entity that has been treated both operatively and nonoperatively with good clinical outcomes in the past. Therapy recommendations cannot be made with the current level of evidence, and thus treatment must be individualized.

References

1. JBJS 94-A;8 , 18, 2012: 683
2. Acta Orthopaedica 2010; 81 (3): 273–279
3. J Am Acad Orthop Surg 2011;19: 392-401
4. Orthop Clin N Am 39 (2008) 491–505
5. Malunited fracture clavicle. JBJS A May 85

Natural History

Sweden: [245 cases over 9 years]

45% significant sequelae

9% pain rest and 30% on activity

7% Nonunion

Malunion **25%**

Late neurovascular impairment 0.3

Controversial

1. Lateral 1/3 fracture: Rockwood: High prevalence of delayed union. Not always require surgery [Robinson]

2. Fracture midshaft fracture with 2.5 cm overlap needs ORIF [McKee]