

Chapter 2

The Shoulder

K. Mohan Iyer

Fractures of the Clavicle

Most fractures of the clavicle are caused by a fall on the shoulder and some fractures are also caused by a fall on the outstretched hand.

The most common site of fracture of the clavicle is at the junction of its middle and outer thirds. When displaced, the outer fragment is downward.

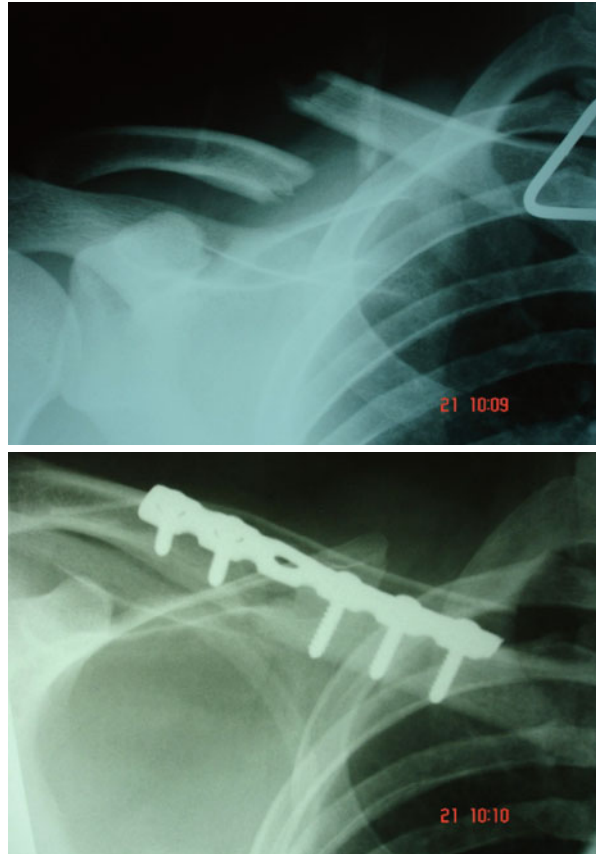
Treatment

The most traditional way is by bracing the shoulder backward by a figure of eight bandage, with the aim of getting the two fragments together. This has been abandoned as it has the disadvantage that these bandages interfere with venous return of the upper limb. Many agree that only an arm support by a simple sling is enough for the relief of pain. The position of the fragment remains in perfect position, as moderate displacement will not interfere with union and the functions of the shoulder is not affected and hence should be accepted. The sling should be worn for 3 weeks, by which time the pain subsides, and active shoulder exercises should be started to regain normal shoulder mobility.

Fractures of the clavicle unite readily, and the only residual deformity is a palpable bump over the fracture, which in children, remodeling takes place very early to resume a normal contour of the shoulder. In adults, some thickening may persist

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Figs. 2.1 and 2.2 Fracture of the clavicle. Treated by internal fixation (Courtesy of Dilip Malhotra, Bahrain)



permanently, and if the patient is seriously concerned about it, operative smoothing of the bony prominence may be undertaken. In young ladies who are extremely concerned about this cosmetic deformity, open reduction, and internal fixation (Figs. 2.1 and 2.2) of the fracture with an intramedullary pin or plate and screws may be considered. This operation is seldom advised, as the bony deformity is avoided at the expense of a scar.

The nonunion rate in a fracture clavicle is less than 1 %, and hence, the operative treatment is only reserved in cases where there is a widely displaced and severely comminuted clavicle.

Fractures of the Scapula

Fractures of the scapula usually occur with direct injuries.

Fractures of the Body of the Scapula: Though these fractures may be comminuted, there is no important displacement because they are held by muscle attachments both on the deep surface and on the superficial surface of the bone.

Treatment: The overall treatment is mainly directed toward restoration of shoulder function. Initially, a sling is used when there is pain initially, and when the pain begins to subside, intensive active and passive movements are carried out. The fracture usually extends from the scapular notch to the axillary border so that the part carrying the articular surface is detached in one piece from the body of the bone. The glenoid fragment is usually downward, but rarely, the displacement is not so severe because the soft tissues help it to retain this fragment in place.

Once the pain subsides, shoulder exercises are begun with active and passive movements and restoration of shoulder function.

Fracture of the Acromion Process: The fracture usually occurs at a variable distance from the tip of the acromion process, usually with any displacement, and it is comminuted and displaced downward.

If the fracture is just an undisplaced fracture or merely a crack, then shoulder exercises should be started once the initial pain settles down. If the acromion is severely comminuted, then an operative intervention to excise the acromion is indicated. Postoperatively, the arm is rested in a sling, whereafter exercises are started.

Fracture of the Coracoid Process: Fractures of this bone may range from an undisplaced crack to severely comminuted fractures, along with downward displacement of the coracoid process. In either cases, the fracture is disregarded and careful attention given to shoulder exercises when the initial pain settles down.

Dislocations of the Medial End of the Clavicle

This condition is extremely rare as the bone breaks easily and the ligaments supporting this articulation are strong; particularly, the rhomboid or the costoclavicular ligament is very strong and resists the tendency of the clavicle to slip upward, medially, and forward in line with the slope of the joint cavity. The dislocation is usually anterior and medially along with complete rupture of the costoclavicular ligament. Subluxation may also occur without breaking if the capsule and ligaments are stretched.

Posterior dislocation is very rare and is caused by direct violence, for this may injure the large vessels in the superior mediastinum.

Subluxation can be reduced by direct pressure over the clavicle, while the shoulder is simultaneously pulled upward and outward. This reduction is difficult to maintain and is usually held by a figure of eight bandage along with axillary pads for 6 weeks to allow the ligaments to heal.

In posterior dislocations, manipulation is usually ineffective, and hence reduction by an open operation is advocated.

Resection of the inner end of the clavicle is only used as a last resort for relief of symptoms and minimal residual disability.

Recurrent Dislocation of the Sternoclavicular Joint

In a very high proportion of cases, dislocation of the sternoclavicular joint may become recurrent, despite adequate and prompt treatment of the first episode. In this

condition, the clavicle springs forwards when the shoulders are braced backward and clicks back into place when the shoulders are arched forwards.

Treatment: Usually, the disability is negligible and hence left alone. An operation is indicated when it becomes extremely troublesome with repeated dislocation, when the joint is stabilized by constructing a new ligament from a strip of fascia lata than the tendon of the subclavius.

Strain of the Sternoclavicular Joint

When the sternoclavicular joint is accompanied by pain and swelling, and the joint is tender on palpation, and the clavicle not displaced, a strain of the sternoclavicular joint is diagnosed and no special treatment is required for this condition.

Strain of the Acromioclavicular Joint

When the violence is sufficient to sublunate or dislocate the joint, a fall on the point of the shoulder may cause a strain of the joint capsule. The patient complains of pain, and there is tenderness on palpation. Pain is also aggravated by full abduction of the arm, when the acromioclavicular joint is also involved in this movement.

When painful, a sling may be worn, and the shoulder exercised after the pain settles down. Recovery is often spontaneous with time and use.

Recurrent Dislocation of the Acromioclavicular Joint

The clavicle may be dislocated upward or downward at the acromioclavicular joint, but upward dislocations are more common due to a blow on the back of the acromion or a fall on the tip of the shoulder.

In upward dislocations, the acromioclavicular ligament and the conoid and trapezoid ligaments which hold the clavicle down to the coracoid are ruptured, and hence the lateral end of the clavicle slides upward and projects.

As a result of this, the patient complains of severe deformity along with difficulty in some movements, such as lifting the arm.

If the reduction has occurred spontaneously, it can be secured firmly by a Robert-Jones strapping, when broad strips of sticking plaster is passed round the elbow and the shoulder, medial to the acromioclavicular joint.

Should these measures fail, then an operation is indicated. A lag screw is inserted down the clavicle to engage into the superior cortex of the coracoid process. An alternative operation may be excision of the lateral aspect of the clavicle for about 3 cm, till the trapezoid and conoid ligament, which is very helpful.

Subluxation and Dislocation of the Acromioclavicular Joint

Injuries of the acromioclavicular joint are more common than injuries of the sternoclavicular joint because the joint has a weak capsule and is vulnerable in falls of the shoulder. The joint depends largely on the accessory extra-articular ligaments, namely, the conoid and the trapezoid ligaments. Injuries are common by falls onto the outer prominence of the shoulder, when the acromion is forced downward, such as rugby/football players.

Pathology

Subluxation: In this condition, the joint capsule is torn, and the acromion is slightly displaced downward from the lateral end of the clavicle. Severe displacement is prevented by the intact conoid and trapezoid ligaments, which anchor the clavicle to the coracoid process.

Dislocation: When the joint is dislocated, the mechanism is the same but with more violence, when the conoid and trapezoid ligaments are torn and the acromion is displaced medially and markedly downward.

Treatment

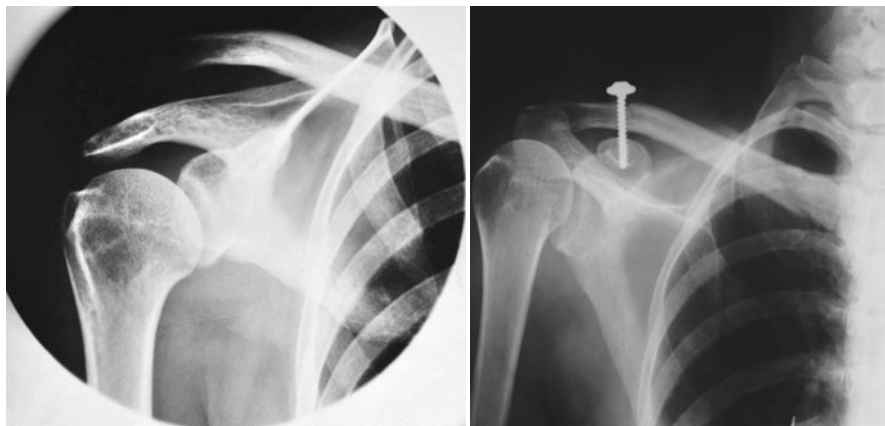
The strapping which is given from the midpoint of the clavicle round a flexed elbow is not recommended these days as it is ineffective and unnecessary in subluxation and inadequate for dislocation.

Subluxation: Any disability from subluxation of the acromioclavicular joint is normally insignificant and can be accepted. The only treatment is a sling for the first 2 weeks for pain, followed by intensive exercises to the shoulder girdle.

Dislocation: Because it is difficult to hold the joint in a reduced position by external splintage, an operation is usually considered.

A simple method of holding the clavicle in place is by a screw passed through the clavicle to engage into a pilot hole in the coracoid process (Figs. 2.3 and 2.4). Alternatively, a wire is passed horizontally from the tip of the acromion across the acromioclavicular joint into the clavicle. The screw or the wire is removed after 10–12 weeks, by which time the ligaments should have healed.

Late Reconstruction: In late and long-standing cases, a late reconstruction is indicated. The ideal technique is in which the coracoacromial ligament is detached from the acromion process and sutured to the stump of the clavicle after excision of its outer end, distal to the attachments of the conoid and trapezoid ligaments. After this operation, further stability is maintained by a screw to the coracoid process as described above.



Figs. 2.3 and 2.4 Dislocation of the acromioclavicular joint (Courtesy of Magdi E. Greiss, Whitehaven, Cumbria, UK)

Recurrent Dislocation of the Shoulder

See Chapter 1 in my book entitled 'Orthopedics of the Upper and Lower Limb' (Springer)

Rupture of the Tendinous Cuff of the Shoulder

See Chapter 1 in my book entitled 'Orthopedics of the Upper and Lower Limb' (Springer)

Fracture Neck of Humerus

Fracture neck of humerus is a common injury seen in the elderly, mainly women, due to rarefaction by osteoporosis. The fracture mainly results from a fall. Displacement is variable, and it may be ranging from none or there may be moderate to severe tilting of the head fragment so that the humeral shaft may be tilted and appears to be abducted or adducted in relation to it. A very common finding is that in majority of cases, the fragment is impacted so that the entire bone moves in one piece, and this feature is extremely important from the treatment point of view.

Diagnosis

The fracture may easily be overlooked, if it is impacted, since the patient can abduct his arm, without severe pain. The fracture should be suspected in an elderly lady

with a history of fall and the marked bruising in the upper and middle part of the arm which accompanies it.

X-rays may not indicate for sure whether the fracture is impacted, and this is best judged by clinical examination, when the arm can be moved passively through a reasonable range without causing severe pain, and vice versa, when there is a fracture.

Treatment

It is very important to keep in mind that even severely displaced fractures can heal very well with restoration of function that is adequate for an elderly woman. Also that the shoulder is very prone to become stiff if it is immobilized for a long time, especially in the elderly.

Impacted Fractures: If the fracture is impacted, immobilization is not needed, and shoulder movements, both active and passive, should be started at the earliest to prevent stiffness.

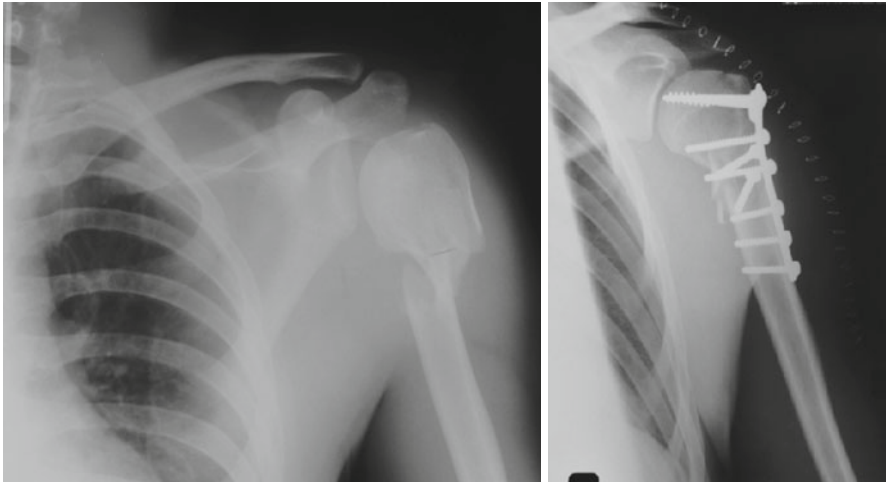
Unimpacted Fractures: If the fracture is not impacted, shoulder exercises should be prevented because any movement of the shoulder will cause pain. In these cases, the arm is supported by a sling along with a body bandage to hold the arm to the chest wall for the first week. Finger, wrist and elbow exercises should be started from the very start, and shoulder exercises started after 2 weeks. After this, intensive shoulder exercises may be carried out without any fear, as the fracture will have become gummy.

Alternative Method

There is an alternate method if there is considerable displacement as in young patients, reduction can be obtained by reduction of the fragment by manipulation, with the distal fragment being brought in line with the head fragment. To maintain the fracture, it may be necessary to place the limb in a shoulder spica or an abduction frame for 4 weeks.

Operative reduction is rarely justified if after manipulation, it is very difficult to hold the fragments together, especially in a “three part fracture,” which is associated with a fracture greater tuberosity or a dislocation of the shoulder. Here, the choice rests between a plate and screws (Figs. 2.5 and 2.6) or an intramedullary nail, being inserted retrograde through the olecranon fossa.

In the more severe “four part fracture,” there is always a risk of avascular necrosis or nonunion, and these cases are best treated with a replacement arthroplasty of the head of the humerus, with a long-stemmed prosthesis.



Figs. 2.5 and 2.6 Unstable fracture neck of humerus, treated by open reduction and internal fixation (Courtesy of Magdi E. Greiss, Whitehaven, Cumbria, UK)

Complications

1. Joint stiffness: In the elderly, patients are very prone to become stiff, and hence early mobilization is encouraged as early as possible.
2. Arterial injury: There is a risk of arterial injury to the brachial artery by a sharp spike of bone, particularly when the shoulder is dislocated. This is an acute vascular emergency, or it may lead to a traumatic aneurysm along with vascular and neurological deficiency.
3. Nerve injury: Occasionally, a fracture of the neck of the humerus may be complicated by an injury to the axillary nerve, which is noted by the patient's inability to actively abduct the shoulder along with numbness or anesthesia over a small area at the outer side of the upper arm. Treatment is expectant, and there is gradual recovery in most cases.

Very rarely there is damage to the brachial plexus either from direct injury to the nerves when the shoulder is dislocated or from progressive stretching of the nerves over a traumatic aneurysm of the brachial artery.

4. Dislocation of the shoulder: It is very rare for the fracture to be associated with a dislocation. The treatment is to reduce the dislocation first and then treat the fracture on its merits.

Juxta-Epiphyseal Fracture Separation

In children, this injury corresponds to a fracture of the neck of humerus, usually with detachment of a marginal piece from the shaft. If there is severe displacement,

a reduction should be tried and, if it is not possible, then should accept the position because of the virtue of remodeling in children.

Fracture of the Greater Tuberosity of the Humerus

This is usually caused by a fall on to the shoulder in the elderly. Usually, there is not much of displacement, though it may be comminuted in many cases.

Treatment: The treatment mainly depends on the severity of displacement of the fragment.

When the fragment is not displaced, even any form of splintage is unnecessary, and shoulder exercises are mainly indicated to restore shoulder function and movements.

If the fragment is widely displaced, then an accurate reduction is very essential for the shoulder function and movements to return. It may be possible to replace the fragment by merely abducting the arm, which position is difficult to maintain without holding the limb in a plaster or splint. Hence, it is preferable to do an open reduction and fix the fragment with a screw, when early exercises may be given and shoulder movements can be restored adequately.

Complications

Painful Arc Syndrome: Thickening or irregularity of the greater tuberosity may interfere with free abduction because the thickened area may impinge on the acromion process or the acromioclavicular ligament, with resultant pain.

The majority of cases settle down nicely with treatment by exercises and very rarely do the symptoms not settle, when the need for excision of the acromion is indicated.

Scapular Disorders

For Sprengel's shoulder, winged scapula, or grating scapula, see Chapter 1 of my book entitled 'Orthopedics of the Upper and Lower Limb' (Springer).

Musculotendinous Cuff Lesions

For acute tendinitis, chronic tendinitis or painful arc syndrome, frozen shoulder or adhesive capsulitis, or supraspinatus tears, or lesions of the biceps tendon like bicipital tendinitis or rupture of the biceps tendon, see Chapter 1 of my book entitled 'Orthopedics of the Upper and Lower Limb' (Springer).



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Trauma Management in Orthopedics

Iyer, K.M. (Ed.)

2013, XVI, 236 p., Hardcover

ISBN: 978-1-4471-4461-8