

Management of outer clavicle fractures and acromioclavicular joint dislocations

DES BOKOR MB BS(Hons), FRACS, FAOrthA

Fractures and dislocations of the outer clavicle commonly occur due to a direct blow to the shoulder. Nonoperative treatment can be offered to most patients with mild to moderately displaced acromioclavicular dislocation.

If there is a disruption of the suspensory ligaments of the clavicle, surgical reduction and stabilisation is the preferred option.

The function of the acromioclavicular joint is to anchor the scapula to the clavicle and, through this, suspend the shoulder girdle on the trunk. The main stabilisers of the acromioclavicular joint are the acromioclavicular and coracoacromial (conoid and trapezoid) ligaments (Figure 1). All these ligaments make the acromioclavicular joint very resilient so

that it requires a significant amount of force to tear it apart. If there is a disruption of the ligaments or a fracture of the outer end of the clavicle then the scapula/ upper limb may sag inferiorly and alter the patterns of motion of the scapula against the thorax. Injuries in this region tend to arise from a fall onto the point of the shoulder or by an upward directed force along the arm.

Acromioclavicular joint dislocations

Most acromioclavicular joint injuries occur in adult males in their twenties. Collision sports tend to be the most at-risk environment. Patients with this type of injury present with localised pain and swelling with or without significant deformity. X-rays are essential. An anterior-posterior (AP) view of the acromioclavicular joint should be requested and if there is doubt about any displacement of the outer clavicle then a view with weights on the arm should be ordered. This will accentuate the displacement of the bone ends. It can be difficult to interpret significant displacement of the outer clavicle because of the highly variable appearance of the acromioclavicular joint. It is often easier to measure and compare the 'coracoclavicular distance' between the affected and normal sides (Figure 2).

Dislocations of the acromioclavicular joint can be classified by the amount and direction of displacement of the outer clavicle (Figure 3). Type I separation causes a strain or tearing of the acromioclavicular ligaments only and there is local pain and swelling without prominence of the outer

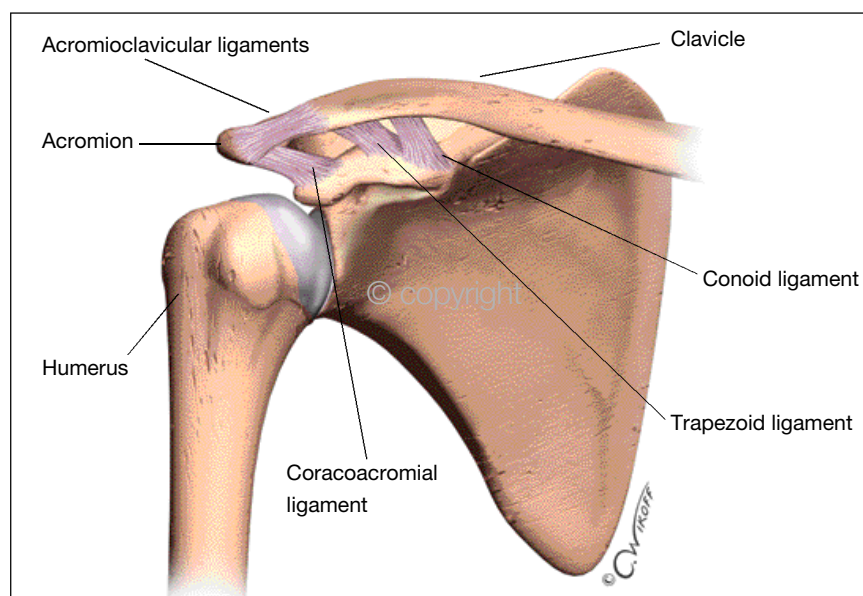


Figure 1. Normal acromioclavicular joint and outer clavicle anatomy.

Dr Bokor is an Orthopaedic Surgeon specialising in shoulder and elbow surgery at Specialty Orthopaedics, Parramatta and Sydney Sports Medicine Centre, Olympic Park. He is also an Associate Professor and Chairman of the Department of Orthopaedics at the Australian School of Advanced Medicine, Macquarie University, Sydney, NSW.

Series Editor: Dr Ken Crichton, MB BS(Hons), FRCS, Director of Sports Medicine at North Sydney Orthopaedic and Sports Medicine Centre, and a Consultant Sports Physician at the Children's Hospital Institute of Sports Medicine, Westmead, Sydney, NSW.

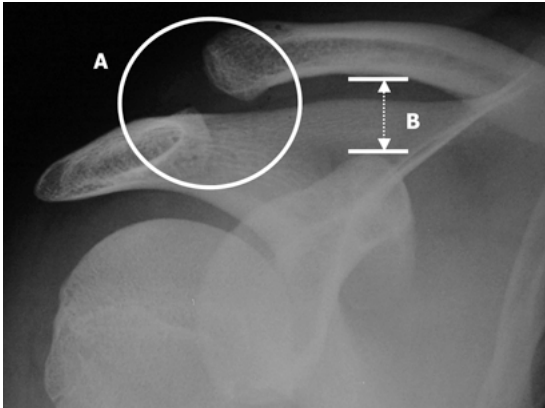


Figure 2. Measurement of clavicle displacement in acromioclavicular joint dislocation. Prominence of the outer clavicle may indicate dislocation (circle A). Measurement of the coracoclavicular gap and comparison with the opposite normal side is more helpful and accurate (gap B). This is a type III dislocation.

clavicle. Type II injury tears the acromioclavicular ligaments and only partially tears the conoid and trapezoid ligaments. Apart from pain and swelling, there is only slight prominence of the outer clavicle. Both these injuries are often seen as minor by the patient and the treating doctor, and treatment is with analgesia, ice for local

swelling and then early mobilisation as comfort allows. Return to sports is encouraged when symptoms are minimal. It is not unusual, however, for up to 40% of patients to have nuisance residual pain at six months.^{1,2} Continuing pain can be treated with intra-articular corticosteroid injection; if pain persists, the recom-

mended treatment is arthroscopic excision of the outer clavicle.

Type IV, V and VI dislocations are widely separated with different directions of displacement (Figure 3). Associated with the ligament tears is significant damage and tearing to the delto-trapezial musculature. It is well accepted that these injuries should be treated with surgical repair.³ This involves repair of the delto-trapezial musculature and acromioclavicular ligament, augmented with coracoclavicular stabilisation using either a screw or suture sling. If the outer clavicular articular facet is arthritic or damaged then excision of the outer end is also carried out at that time to improve long-term outcomes.⁴

Treatment of patients with type III dislocations is still controversial. This is the most common type of dislocation with complete separation of the bone ends. Many papers have discussed the

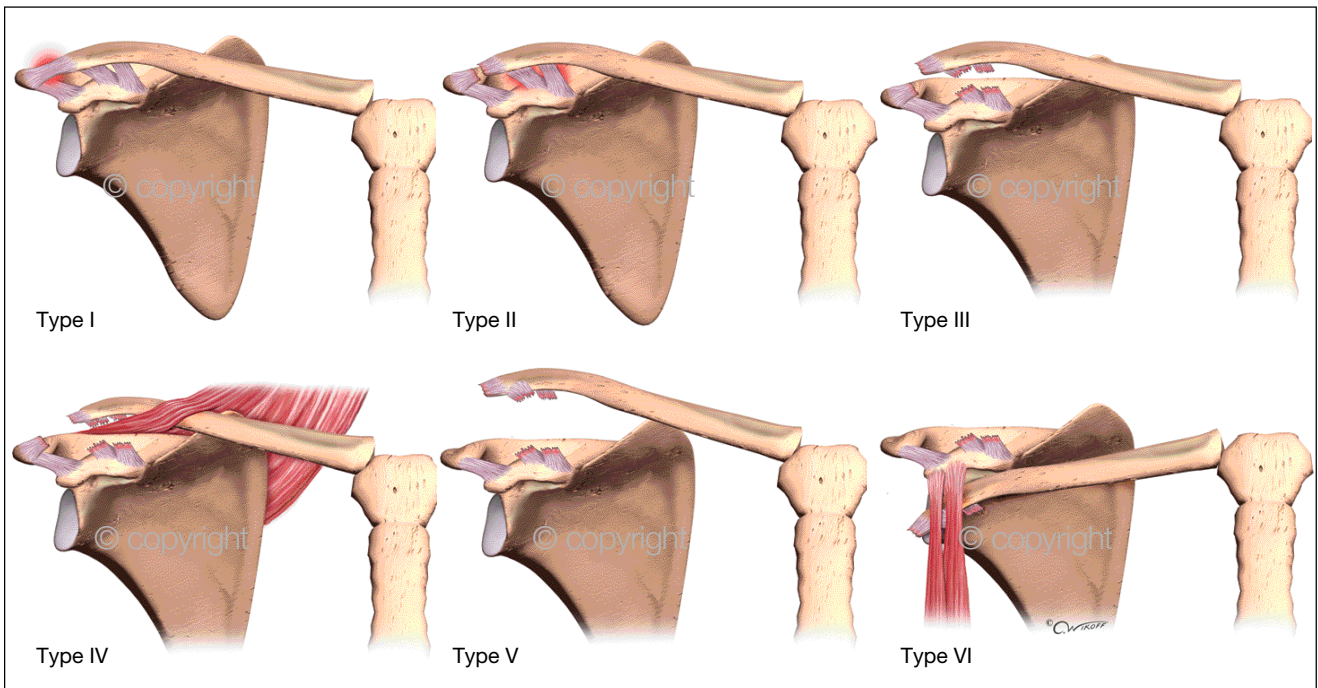


Figure 3. Classification of acromioclavicular joint dislocation. Type I = acromioclavicular ligament sprain, no displacement. Type II = acromioclavicular ligament tear, slight deformity. Type III = acromioclavicular, conoid and trapezoid ligament tears, deformity. Type IV = acromioclavicular, conoid and trapezoid ligament tears, deformity, clavicle posteriorly dislocated through trapezius muscle. Type V = acromioclavicular, conoid and trapezoid ligament tears, severe deformity, torn delto-trapezial muscles. Type VI = all ligaments and delto-trapezial muscle torn. Clavicle dislocated below coracoid process.

merits of nonoperative versus operative treatment.^{5,6,7,8} In most circumstances non-operative management with analgesia, sling and then a graded physiotherapy rehabilitation program will give results equal to acute surgical correction of the dislocation. The main difference is the presence of a deformity as opposed to a surgical scar.

Some studies have suggested there is a slight decrease in bench press strength in nonoperative cases.⁸ In one study, the period of rehabilitation was shorter in the nonoperative group and a number of patients in the operative group had complications related to the surgery, such as superficial infection and metallic device breakage.⁷ This study, however, recommended that surgery be offered to patients who are thin (with marked prominence of the outer clavicle), undergo heavy work or regularly use their arms at shoulder height or above.

Delayed reconstructive surgery can be performed in patients who have undergone a nonoperative approach and have significant residual symptoms after three to six months. These symptoms include ongoing pain, excessive deformity, clicking and weakness with overhead use of the arm. Surgery usually consists of excision of the outer end of the clavicle and transfer of the coracoacromial ligament into the excised outer end (modified

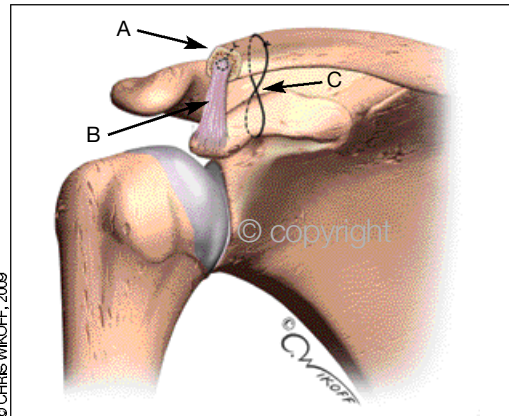


Figure 4. Delayed reconstruction of type III dislocation of the acromioclavicular joint. The outer 1 cm of the clavicle has been excised (arrow A). The coracoacromial ligament has been transferred into the mouth of the excised clavicle – modified Weaver-Dunn reconstruction (arrow B). A coracoclavicular suture sling (nondissolving suture) has been used to augment the repair (arrow C).

Weaver-Dunn reconstruction). This is augmented with either a screw, suture sling or hamstring tendon grafts, which stabilise the coracoclavicular gap (Figure 4).

Fractures of the outer end of the clavicle

Distal clavicle fractures tend to arise as a result of a high energy, direct blow to the shoulder in the younger population. It can also be seen in the elderly following lower energy injuries. Whereas the average age of patients with mid-shaft clavicle fractures is 21 years, the average age of patients with outer clavicle fractures is 47 years.⁹

These fractures are classified into three patterns (Figure 5). Type I fractures are essentially undisplaced fractures in which there is not significant adjacent ligament damage. Studies have shown that the

union rate of these fractures, which can be treated with rest, sling and analgesia, is 100%.¹⁰ The fracture unites with no residual symptoms around the shoulder. Type III fractures are also essentially undisplaced with the ligaments remaining intact. The fracture, however, involves the outer end and extends into the acromioclavicular joint facet. This is often a comminuted intra-articular fracture. The recommended treatment is the use of a sling, rest and analgesia, and union tends to occur in almost all cases. The long-term problem is the increased risk of degenerative change and arthritis developing in the acromioclavicular joint, leading to residual pain. In these cases, further treatment with anti-inflammatory medication, intra-articular corticosteroid injections or ultimately arthroscopic excision of the outer clavicle

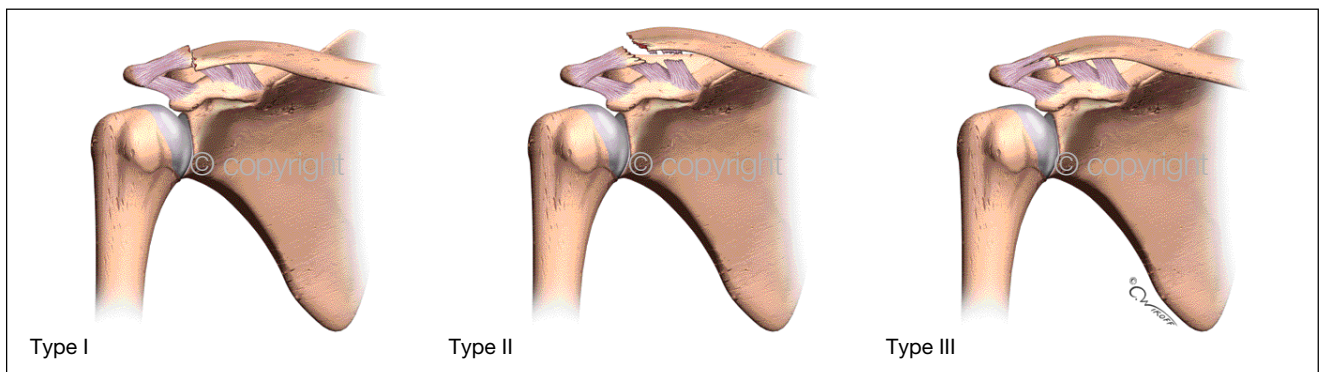


Figure 5. Classification of outer clavicle fractures. Type I = undisplaced outer end fracture, ligaments intact. Type II = displaced fracture, tearing of the conoid and trapezoid ligaments. Type III = comminuted intra-articular fracture, undisplaced, ligaments intact.

continued



Figure 6. Type II outer clavicle fracture requiring internal fixation. Conoid and trapezoid ligaments are also torn with an increased coracoclavicular (gap C).

may be necessary.

Type II fractures pose a difficult management problem. The fracture of the outer end of the clavicle is displaced and the line of failure passes through the conoid and trapezoid ligaments, destabilising the clavicle (Figure 6). The lateral fragment of clavicle may have comminuted fragments present. This fracture has a 20 to 35% chance of developing a non-union.¹¹ This non-union may give rise to local pain as well as clicking and altered scapulo-thoracic motion due to the loss of the supporting strut effect of the intact clavicle. The recommended treatment for acute fractures is surgical reduction either with plates, screws, wires or nondissolving sutures with union being almost universal following this fixation.

Conclusion

Fractures and dislocations of the outer clavicle commonly occur due to a direct blow to the shoulder. Nonoperative treatment can be offered to most patients with mild to moderately displaced acromioclavicular dislocation. Disruption of the ligaments and delto-trapezial muscles alters the pattern of shoulder motion and may cause problems if the outer clavicle end is widely separated, the patient is thin with severe deformity or the patient is involved in heavy or repetitive use of the arm at or above shoulder height. Surgical

reconstruction of the acromioclavicular joint is the best option for these patients. If there is an associated displaced fracture of the outer clavicle, reduction and internal fixation is also recommended because of the high rate of symptomatic non-union.

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COMPETING INTERESTS: None.