Simple dislocations of the elbow are distinguished from complex injuries by the absence of fractures. They are more common in men and are usually the result of a fall onto the outstretched upper limb with axial loading and relative internal rotation of the trunk. They also commonly occur as the result of sporting or road traffic accidents.\(^1\)

The pathomechanics of elbow dislocation have been related to a ring of instability where the lateral ligamentous structures are injured first. Initially the lateral ulnar collateral ligament is torn followed by the remaining lateral ligamentous structures and the anterior and posterior capsule. Finally, the medial collateral ligament is torn completing the soft tissue injury.\(^2\) This represents a considerable energy transfer and the description as a ‘simple dislocation’ often belies the extent of the soft-tissue injury. The dislocation is commonly described by the direction of displacement of the radio-ulnar complex relative to the distal humerus and posterior dislocations make up the vast majority of these injuries.\(^1\)

The patterns of injury associated with elbow dislocation are well described. Fractures of the olecranon, radial head and neck, coronoid, distal humeral condyles and epicondyles should be specifically sought and have been estimated to occur in between 5% and 15% of elbow dislocations.\(^3\) These fractures convert a ‘simple’ dislocation into a complex injury. Apart from these well described injuries, it has been suggested and seems intuitive that elbow dislocation might be associated with a number of lesser osteochondral or articular injuries not always appreciated on plain radiographs. These are likely underestimated although the significance of these and how they might be best managed is unclear.\(^4\)

**Assessment and early Management**

The extent of the injury is confirmed by clinical and radiographic examination. The neurovascular status should be carefully assessed and recorded before reduction is attempted. Simple dislocations of the elbow are usually reduced under conscious sedation. The principles of reduction are adequate patient sedation, correction of medial-lateral deformity or displacement, longitudinal traction in flexion before the olecranon is levered over the distal humerus. A congruent reduction should be confirmed clinically and radiographically and the elbow should be gently taken through a range of movement in the flexion-extension plane to assess the stable range and to unmask any gross instability. It is common practice to immobilise the elbow in a posterior splint or bulky dressing at 90 degrees of flexion. It is possible that some degree of instability will persist immediately after joint reduction. It is not the aim to provoke this but rather to demonstrate that the ulnohumeral joint is congruently reduced and can be safely maintained in joint to allow soft tissue healing to occur.

Where a congruent reduction cannot be maintained or the elbow is grossly unstable, an examination under anaesthetic and attempted reduction should be undertaken in the operating theatre. Gross instability may reflect a major soft tissue injury including avulsion of the common flexor or extensor origins or an undetected bony injury compromising ulnohumeral stability. Persistent instability is an indication for surgery which may involve ligamentous repair, reconstruction or external fixation. In making this assessment, it is not uncommon to see slight subluxation at the joint which resolves once the dynamic stabilising action of the muscles crossing the elbow joint is restored. The tendency is for the elbow to dislocate in extension and where the elbow must be held in flexion of 45 degrees or more to maintain reduction, this is an indication for a formal examination under anaesthetic to assess the need for early surgical intervention.\(^5\)

A congruent and stable closed reduction is achieved for most simple elbow dislocations. Neglected or chronic injuries are frequently more difficult to treat and are more likely to require open reduction. This is particularly the case where an elbow remains unreduced for 10 days or longer and certainly when longer than 21 days.\(^6\) Chronic dislocations are now seen infrequently other than in developing nations where access to healthcare may be limited.

Prolonged immobilisation has been shown to result in greater stiffness, poorer satisfaction and a slower return to normal activities.\(^7\) Splints should not be routinely maintained for longer than 3 weeks and in many cases 1 week is sufficient. This reflects a gradual change in the management of these injuries which have historically been splinted for much longer periods. Long term outcome studies show that this strategy of a reduced period of splintage and early active mobilisation results in excellent functional outcomes.\(^8\)

**Prognosis and Complications**

Open dislocations are infrequent. Neurovascular injuries are also rare but where they do occur, the ulnar and median nerves are most often affected.\(^8\) The brachial artery may be lacerated at the time of injury or become entrapped during reduction of the elbow. The frequency of these injuries is so rare as to make interpretation of their importance difficult but it seems intuitive and the small numbers reported in the literature support the impression that these factors might result in a poorer prognosis for the patient.\(^5\)

Simple dislocations of the elbow are widely thought to have a benign prognosis. Long term outcome studies report excellent functional results however stiffness is commonly and usually
manifests as a loss of terminal extension. In Josefsson's long term outcome study half of all patients were asymptomatic 24 years after injury while one third of patients had what was described as 'moderate loss of extension' at the elbow. Loss of flexion is less common but is associated with poorer patient satisfaction and functional outcome scores. Melhoeff showed that patients splinted for 5 days after a simple dislocation of the elbow had flexion contractures of the order of 3 degrees while those splinted for 25 days or longer had considerably larger flexion contractures of around 30 degrees.

Despite excellent functional outcomes, many patients report persisting symptoms several years after injury. 56% of patients report long term stiffness after elbow dislocation and 62% report residual pain. It is clear that despite excellent functional outcomes, these injuries are not entirely benign although these problems may not have clear surgical solutions. Heterotopic ossification is widely and anecdotaly reported after elbow trauma and surgery. Apart from head injured and burns patients, this may occur in 3% of simple elbow dislocations and radiographically is evident around the collateral ligaments and in the brachialis muscle. Despite this, these appearances are frequently asymptomatic.

Our greater understanding of the pathoanatomy of instability has resulted in increased attention to residual instability as a potential complication of simple elbow dislocations. Nevertheless, instability is a rare complication. It is correct that earlier outcome studies were undertaken before the mechanism of posterolateral instability was so clearly defined. Various estimates of the prevalence of instability after simple dislocation have been quoted and depend largely on exactly how instability is defined or measured. Protzman found no cases of instability some 8 years after injury in his series of Service personnel, Kenter found a 15% rate of residual instability among National Football League players who had suffered a simple elbow dislocation and Eygendaal found radiographic evidence of persistent valgus instability in up to 50% of patients on formal stress testing of the injured elbow.

Reported instability is likely to depend on the demands placed on the elbow. Symptomatic or functional instability may be less common among patients who do not subject the elbow to significant loads. Patients who undertake weighted upper body activities such as manual workers and athletes may have a higher rate of functional instability however these groups have not been closely or specifically examined. In the general population, the prevalence of functional instability after simple elbow dislocation treated with an early movement programme is 8%. Stiffness remains a much more common problem for patients. High demand athletes and workers may be at increased risk of instability but although this argument is persuasive, at present the evidence to support this has not been clearly established.

Complex Injuries

Complex injuries are more likely to require operative treatment. The general principle of management is to convert a complex injury to a simple one and to institute early movement. Surgery primarily aims to maintain ulnohumeral reduction therefore allowing bony and soft tissue healing. This is usually achieved through fracture fixation, prosthetic replacement or bony excision. Reports in the literature summarise the results for small numbers of cases or incorporate a spectrum of injuries treated with a variety of techniques. There is little in the way of good evidence as to the outcomes for patients with these injuries. Nevertheless, the evidence shows that post injury stiffness is common but the risk of residual instability is greater than in the case of simple dislocations. Surgery aims to confer enough stability to confidently institute early movement.

Conclusion

Simple dislocations of the elbow are common injuries and while patients report excellent long term functional outcomes and satisfaction, residual pain and stiffness are common. Where these injuries are identified and treated expeditiously, closed reduction and early movement results in low rates of functional instability. The particular needs of high performance athletes and manual workers require closer examination as symptomatic instability likely depends on the functional demands placed upon the elbow.

References