

Epidemiology

Fractures of the distal part of the humerus are rare in adults.

These injuries occur in a bimodal distribution. Fractures that occur in physiologically young patients are usually the result of high-energy trauma and are often complicated by open wounds, other ipsilateral upper extremity injuries, and general systemic injury. A second peak is seen in the elderly population, especially women, as a result of low-energy falls.

Classification

OTA/AO classification system A Extra-articular B Partial articular C Intra-articular fractures

The drawback of this classification in its current form is that it lacks distinction of important elements such as the height of the columnar injury or the presence of a coronal component to the articular fracture, which will influence the surgery and possibly the prognosis.

Clinical assessment

1. Look for ipsilateral shoulder and wrist
2. Examination of the skin for open wounds
3. A detailed neurovascular examination.
4. The prevalence of incomplete ulnar neuropathy at the time of injury has been reported to be as high as 25%
5. X ray assessment
6. Computed tomography (CT) scanning is important.

Early management is preferable and outcomes are reported to be better with fewer complications for patients who are managed within 24 hours.

Surgical approach

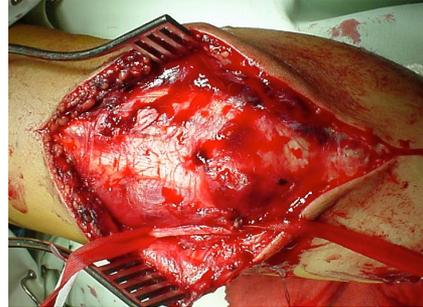
A longitudinal dorsal incision that will safely permit the elevation of broad skin flaps and provide extensile exposure of both medial and lateral sides of the elbow.

The ulnar nerve should be isolated and protected. Mobilize it over a 6 cm proximal and distal to the cubital tunnel to permit the nerve to rest in the subcutaneous tissues anteromedially to the epicondyle.

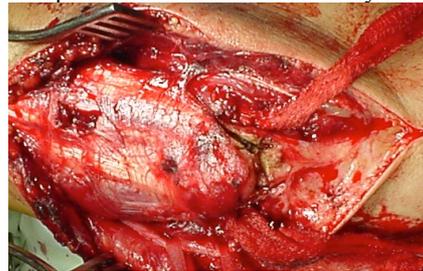
Osteotomy of the olecranon provides excellent exposure of the articular surface and columns of the distal humerus. Problems with the creation and repair of an olecranon osteotomy have led many surgeons to favor alternative exposures of the distal humerus that elevate the insertion of the triceps and then reattach it. It is our impression that many of these complications are related to technique.

The insertion of the anconeus onto the proximal ulna is partially elevated and an apex, distal, chevron-shaped osteotomy is planned so that it enters the joint at the straight osteotome. This maneuver creates an uneven surface that facilitates repositioning and may enhance stability. The olecranon fragment and triceps are elevated from the posterior aspect of the humerus.

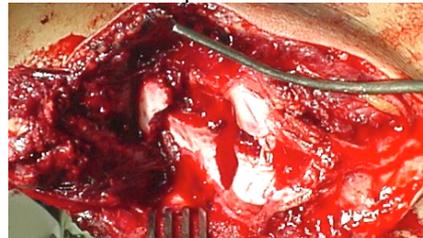
1. Posterior midline; identify the ulnar nerve



2. V periosteal mark for osteotomy



3. Elevated triceps with olecranon



4. Plate fixation



Double-plate osteosynthesis using conventional implants has tested well clinically. However, stable fracture fixation can be difficult to achieve in the presence of metaphyseal comminution or diminished bone quality and implant failures and non-unions are still frequent occurrences.

As proposed by the AO, we use screw fixation of the articular fragments : Column stabilization with two rigid parallel or perpendicular plates for the fixation of bicolunar distal humerus fractures. The use of a third plate can be advisable in the setting of metaphyseal comminution.

A tension band wire construct can be used to fix the osteotomy: Two parallel 0.045 inch smooth Kirschner wires are aimed into the anterior cortex of the ulnar shaft distal to the coronoid process to minimize the potential for proximal migration of the Kirschner wires. Two 20-gauge wires are threaded through separate holes on the ulna and tightened on both sides of the osteotomy to ensure symmetric tensioning. The tips of the Kirschner wires are bent under the triceps insertion and impacted into bone.

Alternative approach is: a triceps-splitting approach showed improved results compared with olecranon osteotomy. In this situation, the triceps aponeurosis and medial head are split in the midline. Dissection does not cease at the tip of the olecranon, but continues along the proximal one quarter of the ulna with dissection of the triceps insertion off the proximal ulna medially and laterally. At the conclusion of the procedure, the triceps is repaired back to the proximal ulna with interrupted, nonabsorbable suture through osseous drill holes.



The triceps-reflecting anconeus pedicle (TRAP) approach offers extensile surgical exposure of the distal humerus without the need for olecranon osteotomy. Advantages of this approach include preservation of the anconeus as a dynamic stabilizer of the lateral aspect of the elbow and the ability to convert to total elbow arthroplasty should the need arise. All fractures in Jupiter's series [2012] healed without any incident of screw breakage or secondary fracture dislocation. Ten patients with type C fractures were aged older than 60 years. The authors observed no case of pseudarthrosis, loss of reduction, or deep wound infection in this subgroup.

In our experience, conventional plate fixation fields good results in younger patients with good bone quality.

Complications

1. Ulnar neuropathy

Ulnar neuropathy is one of the most common complications of operative treatment of fractures of the distal humerus. This problem can be minimized by adequate mobilization and anterior subcutaneous transposition at the initial operation. Ulnar neurolysis and anterior transposition has been proven successful in the management of postoperative ulnar neuropathy.

2. Nonunion



demonstrated excellent union rates up to 100%. Nonunion is primarily the consequence of inadequate fixation. This can be a case in C3 fracture or due to unstable fixation.

3. Posttraumatic stiffness: is associated with nonunions about the elbow is technically challenging because of the distorted local anatomy, scarring, retained or broken implants, poor bone quality of the articular component, and capsular contracture.

Despite these difficulties, operative reconstruction is the procedure of choice in active individuals. When nonunion of the distal humerus is associated with severe posttraumatic arthritis, severe bone loss or when the patient is 65 years of age or older total elbow arthroplasty. When early motion is not possible or contracture has developed that has not improved with exercises and splinting, operative elbow capsular release is considered.

Patients with central nervous system injury and elbow dislocation are at increased risk for heterotopic ossification, and prophylaxis with radiation should be considered.

Indication for TER [JBJS A 86]

1. Unfixable fracture in a low
2. Patients were allowed to lift only 5 kg
3. Use Morrey's approach

Reference

- 1 Ring D, Jupiter JB: JBJS 80 A: 566
- 2 Morrey JBJS A 86
- 3 Steinman. Hand Clin 23 (2007) 457–469
- 4 Jupiter. Acta chirurgiae orthopaedicae et traumatologiae čechos 179, 2012, p. 203 - 212