Bi-columnar Plating For Supracondylar Fracture Extending Into Humeral Shaft : A Report Of Three Case And Literature Review

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Abstract

Supra-condylar humerus fractures with extension into shaft are difficult to treat and typically require open anatomical reduction and internal fixation. Here we describe our experience treating distal humerus fractures using a triceps splitting approach with bicolumnar locking plate fixation.

Introduction

Distal humerus fractures are rare and difficult injuries to manage due to the complex three-dimensional geometry of the distal humerus which poses a considerable challenge to reconstruction(1,2). Presence of comminution, significant soft tissue trauma and injury to neurovascular bundle further complicate the management. supracondylar fractures with fracture line extending into shaft are rare. Surgical treatment is preferred in these cases. Internal fixation of these fractures with a single plate is technically difficult and fracture fixation is not stable. Here, we present three cases of supracondylar fracture with extension into shaft which was treated with bicolumnar plating(3,4).

Methods

All three cases reported to our emergency department sustaining road traffic accident with fall onto outstretched hand. Amongst them, two were males and one female and mean age was 52.4. They complained of pain and swelling in distal part of the arm. Clinical examination revealed two closed fractures and one open fracture with grade 1 injury (Gustillo-Anderson classification). On examination tenderness, abnormal mobility and crepitus was present in the distal humerus without neurovascular deficit. Three point congruency was maintained in all the three cases. Antero-lateral and lateral radiographs of elbow with humerus showed supracondylar fracture extending into humeral shaft. Initially in the emergency, the arm was temporarily immobilized in an above elbow plaster slab. Open fracture was operated within six hours and other two were operated after five days once the swelling subsided.

Patients were reviewed at 3 weeks, 6 weeks, 3 months and 6 months. One of the patient who had developed radial nerve palsy in the form of neuropraxia, recovered during the course of follow up. At the end of follow up all patients have adequate clinical and radiological fracture union and functional range of motion at elbow and shoulder joint.

Results

The treatment of distal humeral fractures with extension into humeral shaft presents a challenge to the orthopaedic surgeon(6,7,8). Flattening of the humerus distally, the presence of the olecranon and coronoid fossae, the neurovascular structures in close proximity to the elbow and some physiological angulations that must be preserved make the surgical procedure difficult. With posterior approach, using single low contact dynamic compression plate left limited number of holes for distal fragment fixation, which was not adequate; hence we resorted to dual long locking plates(8,9). The optimal timing for initiating surgical distal humerus fractures remains controversial with some surgeons advocating emergency surgery within 24 hours of injury(8,9). In our experience, emergency surgery should be performed on patients with open fractures after...
thorough debridement. While in patients with closed fractures and severe initial local swelling, above elbow slab can be first applied and surgical fixation subsequently planned and performed once the swelling subsides. For patients with local blisters, blister extraction is necessary. Surgery should be performed once the swelling subsides and the blister scab(s) falls off. This improves surgical safety and facilitates early post-surgery functional range of motion exercises. Several commonly used approaches have been described for distal humerus fracture management (10,11). The posterior approach using triceps flap involves obliquely cutting the triceps muscle to produce a flap. Though this approach can result in significant bleeding, muscle fibre breakdown, swelling, and fibrosis, exposure is excellent. Many complications have been reported following surgical repair of distal humerus fractures (12,13). These include infection, nerve injury, joint stiffness, heterotopic ossification, and delayed union or non-union of the fracture. Strict adherence to basic surgical principles, optimal exposure, adequate and stable fracture fixation followed by supervised post-operative physiotherapy led us to escape from all these tenacious complications and to achieve good radiological and functional outcome at the end.

Conclusion(s)

Supra-condylar fractures of humerus with extension into shaft pose difficulty in reduction-maintenance using single plate as it leaves less number of holes distal to fracture site for adequate absolute fixation. Henceforth, we recommend two long locking plates on each column for fixation and rigorous physiotherapy protocol post-operatively to achieve good functional range of motion of neighbouring joints.

Reference(s)

Illustrations

Illustration 1

Pre-op radiograph showing supra-condylar fracture extending into humeral shaft
Illustration 2

Lateral radiograph showing bicolumnar plate fixation
Illustration 3

Antero-posterior radiograph showing bicolumnar plate fixation
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