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Retrograde interlocking nailing in diaphyseal fractures of humerus

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Background: Retrograde interlocking nailing for humeral fracture is technically difficult but has advantage of sparing the involvement of rotator cuff and subacromial bursa.

Methods: A total number of 12 cases (9 closed, 3 compound - Grade I and II), having diaphyseal fractures of upper (3 cases) and middle third (9 cases) of humures were treated by retrograde interlocking nailing. Out of 12 cases, 11 were fresh and 1 was old fractures. Cases were followed up for 3 year.

Results: Excellent results were seen in 8, good in 3 and fair in one case (delayed union). One case developed elbow stiffness, whereas none developed shoulder stiffness.

Conclusions: Apart from the overall advantages of conventional locked nailing technique, retrograde locked nailing has additional advantage of sparing the rotator cuff and subacromial bursa, thus prerserving the shoulder functions.

Key words: Retrograde interlocking nailing, rotator cuff, subacromial bursa.

Introduction

With the high speed of transportation and mechanisation, incidence of polytrauma is on rise. There are various methods described for the treatment of humeral shaft fractrues from conservative to operative methods. Interlocking nailing has revolutionised the surgical management of fractures of the shaft of humerus. The indication of locked nailing of humerus are fractures in polytrauma, open fractures, pathological fractures, segmental fractures, nonunions and fractures with neurovascular compromise. Locked nailing has serveral advantages over internal fixation by plating. They are load sharing devices, require less exposure, less blood loss, less operative time, do not jeoparadise the vascularity and allow early mobilisation. Antegrade locked nailing had the disadvantage of restriction of shoulder functions[1].

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Material and methods

Twelve patients with diaphyseal fractures of humerus were included in the study and treated by retrograde locked nailing during the period of 2002-2005. Criteria for the selection of patients were: patients after skeletal maturity having fractures of upper and middle third of the shaft of humerus. Patients with fractures of distal third of humerus were excluded from the study. Preoperative planning was done to assess the proper nail length and diameter.

Operative technique: Procedure was done either under G.A. or brachial block anaesthesia. Patient was placed in prone position. After cleaning and drapping, approx. 6cm long incision extending proximally from the tip of olecranon process was made. After retracting the triceps muscle, olecranon fossa was identified. Approx 2-2.5 cm. proximal to the tip of olecranon fossa, a portal of entry (2cm longx1 cm wide) was made in posterior cortex of humerus by using a drill. Reaming was done under image control. Nail of appropriate length and diameter was assembled and introduced into the distal fragment; fracture reduced under image control and nail was further introduced into the proximal fragment. Distal screw was inserted from posterior to anterior and proximal screw from lateral to medial side. Then the incision was closed in layers. POP cast was applied if required. Post operatively limb elevation and active finger movements were advised. Shoulder and elbow exercises within the limit of tolerance were started as soon as the pain subsided. Stitches were removed from 11th -14th post operative day.

Table I. Results based on Neer's criteria.

Types of Fracture	Excellent	Good	Fair	Poor
Transverse	6	1	1	-
Oblique	1	1	-	-
Comminuted	1	1	-	-
Total	8	3	1	-

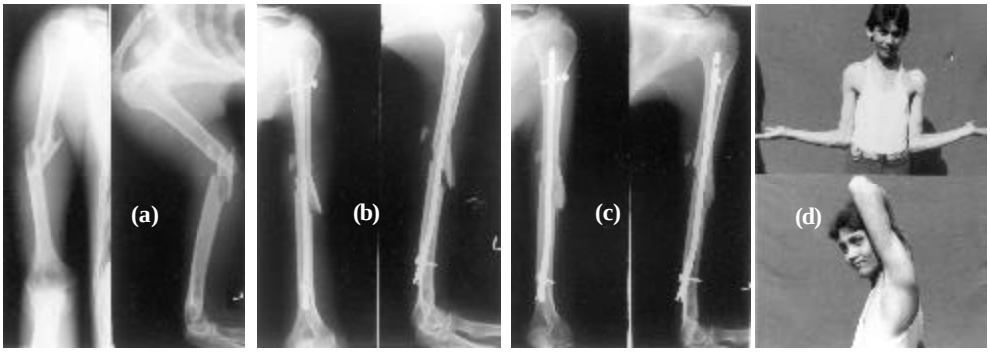

Fig. 1. (a) ***Preoperative X-ray (both AP and lateral views) showing comminuted fracture in middle third of shaft.*** **(b)** ***Immediate post operative X-ray (both AP and lateral views) showing retrograde nailing with proximal and distal screws.*** **(c)** ***Follow up X-ray (both AP and lateral views) showing good reduction, good alignment and union at 8 months,*** **(d)** ***Functional result.***

Results

There were 8 male and 4 female patients. Right extremity was involved in 8 cases and left in 4 cases. Fractures were closed in 9 cases and 3 cases had compound fractures (Grade I, Grade II). Eleven fractures were fresh and one case had 4 weeks old fracture with misalignment. Nine fractures were in middle third and 3 cases had fracture in proximal third of humerus. Fractures were of transverse type in 8 cases, comminuted in 2 cases and oblique in 2 cases. Two cases required open reduction and in one case that had 4 weeks old fracture bone grafting was also done. Shoulder and elbow physiotherapy was started within the limits of tolerance as soon as the pain subsided. The patients were followed for an average period of 36 months. 8 cases united within 12 weeks, 2 cases within 12-16 weeks, one case in 16-20 weeks. Once case was in the process of union even after 20 weeks time and labelled as delayed union. Half of the cases (6 cases) returned to their daily routine works without any or minimal discomfort within 5-7 weeks after surgery. During follow up, one case who went in delayed union was treated by bone grafting and proceeded to union, one case had partial neurological deficit (partial radial nerve injury) treated conservatively and recovered within 6 weeks, one case had elbow stiffness due to poor physiotherapy compliance and one case developed triceps irritation and fracture at nail insertion site, this case had history of fall during follow-up, fracture was undisplaced and treated conservatively. Excellent results were seen in 8 cases, good in 3 cases and fair in one case. None of the case developed shoulder stiffness. All cases had nearly full range of movements at shoulder (abduction > 150º, internal rotation 50º-60º, external rotation 45º-55º). All cases except one had full range of flexion and extension movements at elbow. One case had restricted elbow flexion (upto 90º).

Discussion

Fractures of the shaft of humerus are more common in adults and middle aged group. Road traffic accidents were the predominant mode of injury. Half of the cases had other associated injuries. No deep infections developed even in compound fracture cases. Most of the fractures cases (8 cases) got union in 12 weeks time. Time of union has been reported as between 5 and 12 weeks[3] and 8.2 weeks[2] in other studies. Four cases developed complications during followup, one delayed union, one partial radial nerve injury, one elbow stiffness and one fracture at nail insertion site.

Retrograde locked nailing is a technically demanding procedure but besides all other advantages of conventional locked nailing, it preserves the shoulder functions. Recovery of shoulder functions after retrograde locked nailing is complete and only few had mild loss of elbow movements[1-6].

In study of Loitz et al only one patient out of 39 had loss of 15º at elbow[3], 2 patients out of 39 had supracondylar fracture during nail insertion. None of the case developed deep infections, shortening, angulation, nonunion, implant failure and shoulder stiffness.

So we conclude that retrograde locked nailing is a useful option in the treatment of diaphyseal fractures of humerus where preservation of shoulder function is a demand.

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