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SURGICAL MANAGEMENT OF FRACTURE SHAFT OF HUMERUS IN ADULTS USING FLEXIBLE NAILS – BY RETROGRADE TECHNIQUE" AT NMC, SASARAM, BIHAR

Orthopaedics

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ABSTRACT

BACKGROUND AND OBJECTIVE: The fractures of the shaft of humerus are one of the commonest fractures found and can be treated by different methods. The present study is undertaken to know the functional outcome following the use of flexible nails for humeral shaft fractures in adults.
MATERIALS AND METHODS: It is a prospective study which was carried out NMC, Sasaram, Bihar. In this study period 20 cases of fracture shaft of the humerus were treated by closed reduction and internal fixation using flexible nails.
RESULTS: In our series, majority of the patients were males, middle aged, with road traffic accidents being the commonest mode of injury, involving middle third.
INTERPRETATION /CONCLUSION: Flexion intramedullary nailing done by retrograde technique produces equally good results comparable to any plate osteosyntehsis or interlocking intramedullary nailing. Another added advantage of flexible nail fixation is it requires very minimal operative instrumentation.

KEYWORDS

Humeral Shaft Fractures, Flexible Nails, Closed Reduction And Internal Fixation.

INTRODUCTION

A fracture of the humerus shaft is commonly encountered by orthopaedic surgeons and representing between 3% and 5% of all fractures.

Most will heal with appropriate conservative care, although a small but consistent number will require surgery for optimal outcome. Given the extensive range of motion of the shoulder and elbow, and the minimal effect from minor degrees of shortening, a wide range of radiographic malunion can be accepted with little functional deficit.

The emphasis has changed from splinting and prolonged immobilization, to internal fixation and early mobilization, with return to normal function as early as possible. Attitude toward internal fixation of fractures has changed over the past few decades. With the formation of the AO group in 1958, the base for evolution of internal fixation in skeletal surgery was set. Internal fixation techniques were tried in all types of diaphyseal fractures, and with increasing frequency in fracture shaft of humerus. The two modalities of internal fixation in fracture shaft of humerus are plate osteosynthesis and intramedullary nailing.

Current research in this area focuses on defining the incidence and health care resources required to treat this injury, refining the indications for surgical intervention, decreasing the surgical failure rate through new implants and techniques and minimizing the duration and magnitude of disability post injury.

The successful treatment of a humeral shaft fracture may not end with bony union. In the current emphasis on a holistic approach to patient care the treating Orthopedic surgeon may be in an ideal position to intervene and improve a patient's life beyond what is traditionally recognized as the surgeon's role. As with most orthopedic injuries, the successful treatment of a humeral shaft fracture demands a knowledge of anatomy, surgical indications, techniques and implants, patient functions and expectations.

With this background, this study is to evaluate the results of retrograde intramedullary flexible nailing in humeral shaft fractures.

OBJECTIVES

1. To study the functional outcome following the use of flexible nails for humeral shaft fractures in adults.
2. To study the duration of union in the above mentioned fractures.
3. To study the complications of flexible intramedullary nailing of humeral shaft fractures.

MATERIAL AND METHODS

It is a prospective study which was carried out Narayan Medical College, Jamuhar, Sasaram, Bihar. In this study period 20 cases of fracture shaft of the humerus were treated by closed reduction and internal fixation using flexible nailing.

A careful history was elicited from the patients and/or attendants to reveal the mechanism of injury and the severity of trauma. The patients were then assessed clinically to evaluate their general condition and the local injury.

In general condition, the vital signs were recorded. Care was taken to detect shock and any associated injuries. Local examination of the injured arm, revealed the attitude of the limb to be flexed at the elbow, adducted at the shoulder and supported with the other hand at the elbow. Swelling, deformity, loss of function and nerve injury were looked for and noted.

Palpation revealed tenderness, abnormal mobility, crepitus and shortening of the affected arm. Distal vascularity was assessed by radial artery pulsations, capillary filling, pallor, paraesthesia at fingertips. Radial nerve was tested by active wrist and metacarpo phalyngeal joint dorsiflexion. Sensation in the autonomous zone of radial nerve (1st web space) was checked for any abnormality. Standard radiographs of the humerus, i.e., anteroposterior and lateral views were obtained. The shoulder and elbow joints were included in each view. The limb was immobilized in a U-slab with sling. Injectable analgesics were given.

The operative procedure and its advantages were explained in detail to each patient and an informed consent was obtained. The patients posted for surgery were subjected to routine investigations and were referred to the physician for fitness for surgery. The investigations are as follows.

Urine Routine, Hb%, FBS, Blood Urea, Serum Creatinine, HIV, HBsAg, ECG. Retrograde approach with two flexible nails was used under image intensifier.

INSTRUMENTS USED FOR RETROGRADE FLEXIBLE NAILING OF HUMERUS

1. Two SS/titanium flexible nails diameter ranging from 1.5 to 3 mm were used.
2. Universal T-handle.

3. 3.2 mm, 4mm drill bits
4. Flexible reamers
5. Mallet
6. General Instruments (retractors, periosteal elevator, bonelevers etc.)

OPERATIVE TECHNIQUE

PRE -OPERATIVE PLANNING:

When the surgical procedure was decided on, certain pre-operative steps were routinely taken.

1. The affected limb was immobilized in a U-slab during the entire preoperative period.
2. Pre-operative x-rays were taken in antero-posterior and lateral views including shoulder and elbow joint. The character of the fracture was studied and technical aspects of surgery planned.
3. Consent for surgery was taken from the patient and attendant after explaining the procedure and possible complications.
4. Tetvac and antibiotics were given 1 hour pre-operatively.
5. The limb was shaved from shoulder to hand including the axilla one day before the surgery.

Position of the patient: patient is placed in prone position and the entire limb in prepared and draped free. A radioluscent arm board in placed under the arm with the shoulder abducted 90° and the elbow flexed to 90°.

INCISION :

A 5 to 7 cm linear longitudinal incision was put starting from the tip of olecranon process extending proximally.

Divide the superficial and deep fascia. The triceps muscle is split between long and lateral head to approach the distal humerus. Using a 3.2 mm drill bit, 2 holes are made 1 cm above the olecranon fossa and 1cm on either sides which are in same line. Using flexible reamers track was made. Then depending upon the diameter of medullary cavity, 2/2.5/3 mm flexible nail was introduced using universal T-handle. The nail was prebent and hammered.

Progression of the nail was checked under image intensifier both AP and lateral views. Once the nail is at the fracture site, reduction was achieved manually and the nail progressed proximally. Similarly second nail was passed as the first one through the second entry point. Nails are driven up into the humeral head, and an effort in made to see that the ends of the nails diverge into the head. The shape, size and number of nails are determined by the fracture pattern and the size of the medullary canal. The ends of the nails should protrude just enough to make attachment of the extractor possible. Finally the placement of nails was checked under image intensifier. Then wound is closed in layers and sterile dressing was applied.

AFTER TREATMENT:

U-slab / humerus brace was applied over the affected arm.

Postoperatively the patients were asked to move their fingers and wrist joint.

The wound was inspected 2 and 6 days postoperative. Sutures/staples were removed on 10th postoperative day and check x-ray in antero-posterior and lateral views were obtained. Appropriate analgesics and antibiotics were given to the patient till the time of suture removal. Patients were discharged after suture removal with the arm in a humerus brace for a period of 1 month and advised to perform shoulder, elbow, wrist and finger movements. They were prohibited from lifting weight or putting additional stresses on the affected limb.

FOLLOW-UP:

All the patients were followed up at monthly intervals for the first 3 months, later at 2 monthly intervals till fracture union and once in 6 months till the completion of study. They were examined in detail clinically and special stress was laid on shoulder and elbow range of movements and subjective complaints. X-rays were obtained in anteroposterior and lateral views and signs of union were looked for. The fracture was considered to be radiologically united, when there was no visible fracture line and evidence of callus bridging the fracture site. Clinical healing of the fracture was defined by the absence of functional pain and local tenderness at the previous fracture site. A detailed observation is recorded using a standard protocol.

Incision

Opening the distal humerus

Inserting the nail

Inserting second nail

After complete nailing

Wound closure

RESULTS

All patients were evaluated clinically and radiologically before and following surgery, for an average period of follow up was 7 months. The age of the patient in this study, ranged from 20 years to 60 years average being 38 years. There were 6 male patients as compared to 14 female patients in this study.

12 patients had fracture of left humerus shaft and 8 patients had fracture of right humerus. All fractures were closed.

16 cases sustained fracture following road traffic accident, 2 cases had domestic trauma, 1 sustained fall from height and 1 case of assault. In this study, 12 fractures were situated in middle third of shaft, 4 fractures in the upper 3rd, and 4 fractures in the lower third of shaft of humerus.

Different fracture patterns were seen, 14 were transverse, 6 oblique. There were 4 cases of associated chest injury, 1 head injury, 2 cases of hand injury, one case both bone leg fracture.

The fractures united in 14 (70%) patients, 2 (10%) patients had delayed union and 4 (20%) patients had nonunion.

The fracture was additionally supported by humerus brace postoperatively for 10 days. Post operatively patients were rehabilitated with active exercises of all the joints of the involved upper limb as soon as possible.

Good or full range of mobility of shoulder and elbow joints was present in all patients. By the analysis of the data collected in the present study, closed reduction and internal fixation with flexible nailing for humeral shaft fracture is one of the modality of treatment for fracture shaft of humerus in adults.

CONCLUSION

Fracture shaft of humerus in adults is fairly common with an overall incidence of about 3 % in all fractures.

The mode of injury is usually a direct trauma following road traffic accident. As the fracture might accompany complications like radial nerve palsy, a detailed neurovascular examination is a must at presentation.

Majority of the fractures were transverse and oblique in the middle third and all of them were closed injuries.

Though rigid fixation of fracture shaft humerus can be obtained using

DCP/LC-DCP/LCP, it requires extensive exposure of fracture site and also disturbing the biology of fracture. Thus flexible nail fixation using retrograde technique requires very minimal soft tissue dissection and as it is a closed technique, the biology of fracture is also not disturbed.

Thus early fracture union can be anticipated.

Interlocking intramedullary nail also gives stable internal fixation but has its own disadvantage of rotator cuff problem when done by antegrade technique.

Another added advantage of flexible nail fixation is it requires very minimal operative instrumentation.

Thus flexible intramedullary nailing done by retrograde technique produces equally good results comparable to any plate osteosynthesis or interlocking intramedullary nailing.

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