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STUDY OF RESULTS OF HUMERUS TITANIUM ELASTIC NAIL(TENS) IN ADULTS

Orthopaedics

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ABSTRACT

Aims: To study the clinical and radiological signs of healing, functional outcome and incidence of complications with this method

Introduction: Humerus is the single bone occupying arm. With options and controversies of operative and conservative management, management of humerus shaft fractures with closed nailing with TENs has shown better outcome.

Materials and Methods: We have done prospective study of 25 patients with humerus shaft fractures operated by intramedullary fixation by TEN nails with follow up of 6 to 30 months. Final outcomes were assessed per ASES score.

Results: Fracture union: 92% of patients showed evidence of union on or before 20 weeks. Functional outcome: was excellent to good in 92% patients according to ASES score with 96% patients returned to original work in follow up.

Conclusion: Humerus intramedullary TENs nailing may be considered a procedure of choice in fractures middle two third of shaft of humerus, since closed it preserves the fracture hematoma, is less invasive, has less complication rates & gives solid bony union & good functional outcome.

KEYWORDS:

Fracture Humerus, Closed reduction, TEN nail, ASES score

INTRODUCTION

Humeral shaft fractures account for 3-5% of all fractures. The ever-growing population with increasing number of automobiles has made motor vehicle accidents common. This has increased the incidence of fractures of all parts of the body including humeral shaft. It is generally admitted that most humeral shaft fractures can be managed successfully by non-operative methods but it requires prolonged immobilization, so operative treatment is a better option. Fixation with plates requires extensive dissection and is complicated by the proximity of the radial nerve and the risk of mechanical failure in osteopenic bones. Biomechanically intramedullary Titanium Elastic Nails are better implants. They are subjected to smaller bending loads and are less likely to fail by fatigue. They act as load sharing devices so stress shielding with resultant cortical osteopenia is minimum, refracture after implant removal is rare and they do not require extensive exposure. With the use of image intensification, these devices can be inserted in a closed manner without exposing the fracture site, with minimal soft tissue scaring and low infection rates. This preserves the fracture hematoma, which provides early fracture consolidation with higher union rates. They achieve rotational stability and provide early mobilization of the neighbouring joints and decrease the morbidity.

AIMS AND OBJECTIVES

To study the clinical and radiological signs of healing, functional outcome and incidence of complications with this method

APPLIED SURGICAL ANATOMY

The shaft of the humenus presents several unique anatomic features which have a bearing on the current rationales of therapy.

- As the humenus functions principally as a lever and is not a weight bearing bone, compression forces are not a problem in the manag ement of humeral fractures.
- Realignment of fracture fragment is facilitated by physiological dependent position under the influence of gravity.
- The entry portal for intramedullary TENs, may damage the rotator cuff with resultant shoulder stiffness if proper care not taken while making entry.
- The axillary nerve runs at a distance of 4.56 cms from the tip of acromion. It may be injured while making entry with awl and while inserting nails.
- Radial nerve is least mobile as it passes through lateral intermuscular septum in distal third of arm. **Holstein and Lewis** described that an oblique fracture in distal third is typically angulated laterally and the distal fragment is displaced proximally. Radial nerve, fixed to proximal fragment by lateral intermuscular septum, is trapped between fragments when closed reduction is attempted.

CLASSIFICATION

Humerus shaft fractures are classified in various ways:

1. Site of Injury:
A. Proximal one-third
B. Middle one-third
C. Distal one-third

2. Fracture line configuration:
A. Oblique
B. Transverse
C. Spiral
D. Comminuted
E. Segmental

3. Using other variables:
A. Associated soft tissue injury
B. Associated Peri-articular injury
C. Associated Nerve injury
D. Associated Vascular Injury
E. Intrinsic condition of bone

4. AO Classification:

METHODS AND MATERIALS

In this prospective study of 25 patients of fracture shaft humerus treated by Titanium Elastic Nails by antegrade, retrograde or combined approaches meeting the inclusion and the exclusion criteria as given below were followed up every 1 and half months for period of 6 months to 30 months radiologically and clinically using ASES score.

Inclusion criteria:
1. More than 18 years of age
2. Diaphyseal fractures
3. Simple fractures (closed & Open type I II III a, b fractures as per Gustilo
Anderson classification)

Exclusion criteria:

1. Metaphyseal fractures
2. Pathological fractures
3. Associated vascular injury or compartment syndrome
4. < 18 years of age

SURGICAL APPROACH:

ANTEGRADE: A small incision of 2-3 cm in line with the fibres of the deltoid muscle just lateral and inferior to the acromion. The deltoid is split in line of its fibres and the entry is taken just lateral to the greater tubercle. The real rotation of the proximal fragment is checked (internal rotation or external rotation). It is recommended to localize the entry point under image intensifier. According to surgeon's choice second nail can also be inserted after making second entry just below to the previous entry point.

RETROGRADE: Small stab incision put on lateral supracondylar region and common extensors spared and entry made just above lateral condyle under the IITV guidance.

OBSERVATION AND DISCUSSION:

We have studied 25 patients prospectively with following observations:

- More incidence of humerus fracture in younger age group (20-40) and 72% of patients were male with right side involved in 72% patients and major cause was RTA.
- 88% of patients had close fracture with 64% having AO type A, and 36% having type B fractures and 36% patients having associated injuries.
- Most of the fractures were in middle third shaft (44%) and in lower third shaft (40%). 88% of the surgeries were completed in less than 1 hour.
- Only 12% of the patients required blood transfusion during operation, of which 4% being polytrauma and 8% being open fractures requiring blood transfusion pre-operatively. Rest of 88% patients did not require blood transfusion.
- Mean time for union was 15 weeks with 4% of fractures showed delayed union which ultimately united in follow up at 30 weeks and 4% showed non-union which was not managed further due to non-willingness of the patient.
- No incidence of superficial or deep infection with 8% having impingement, 8% having shoulder stiffness and 4% having elbow stiffness which can be minimized by burying of nail flush to the bone at the time of surgery as nail's end was found above bone surface at follow up in these patients.
- Functional outcome based on ASES score were excellent to good in 92% patients with 96% patients returned to original work in follow up.

CONCLUSION

From our study, we conclude that

- Internal fixation by close Titanium Elastic Nailing for fractures involving middle two third shaft of humerus is a good technique if facilities are provided for image intensifier machine in operation theatre.
- In comparison to other operative techniques close intramedullary nailing is less invasive with minimal blood loss and hardly any chance of infection.
- This technique gives rotational as well as torsional stability to fractured humerus, allowing faster physiotherapy to achieve full range of motion and power.
- It is necessary to prevent any resultant gap at fracture site at the completion of the procedure to avoid delayed union or non-union. It is advisable to do primary bone grafting at the same sitting if gap is found more than 2 to 3mm at the fracture site even after collapsing fracture on table under IITV guidance.
- It is advisable to keep the proximal end of nail just inside the bone to prevent restriction of shoulder movements.
- Thus Humerus intramedullary TENs nailing may be considered a procedure of choice in fractures middle two third of shaft of humerus, since closed it preserves the fracture hematoma, is less invasive, has less complication rates & gives solid bony union & good functional outcome.

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