



## International Journal of Orthopaedics Sciences

E-ISSN: 2395-1958  
P-ISSN: 2706-6630  
IJOS 2019; 5(4): 960-965  
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www.orthopaper.com  
Received: 02-08-2019  
Accepted: 05-09-2019

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## To study the results of humeral Enders nail in diaphysial fracture of humerus

Dr. Parimal Patel and Dr. Krunal Chaudhari

DOI: <https://doi.org/10.22271/ortho.2019.v5.i4p.1801>

### Abstract

**Introduction:** It is generally admitted that most humeral shaft fractures can be managed successfully by non-operative methods. Whenever operative treatment is required, a choice has to be made between plate osteosynthesis and intramedullary nailing. Fixation with plates requires extensive dissection and is complicated by the proximity of the radial nerve and the risk of mechanical failure in osteopenia bones. Biomechanically intramedullary nail is a better implant. They are subjected to smaller bending loads and are less likely to fail by fatigue, they act as load sharing devices, stress shielding with resultant cortical osteopenia is minimum, refracture after implant removal is rare and they do not require extensive exposure

**Methods:** We have done a prospective study of 30 patients with Fracture shaft Humerus stabilized with intramedullary nail of Enders type by antegrade approach. These nails were available in 3 & 3.5 mm diameter and in lengths ranging from 18-28Cms. The nail by design had proximal band of 6 degrees (apex medial band) to accommodate offset of the infusion portal with the medullary canal.

**Results:** Study shows more incidences of Humerus fractures in young patients as it is active age group in the society, more prone to vehicle accidents and falls. Most of the fracture of shaft humerus unites in 10-14 weeks and in minor cases more than 18 weeks were observed for union. Most common complication associated with operative method of fracture shaft humerus is non union.

Joint involvement in form of shoulder or elbow stiffness can occur in small number of cases. There are no cases of infection noted in our study

**Interpretation and Conclusion:** Internal fixation by close intramedullary nail for fractures involving middle two third shaft of humerus is a good technique if facilities are provided for image intensifier machine in operation theater. 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 bone humerus, allowing faster practice of physiotherapy to achieve full range of motion and power.

**Keywords:** Humerus, Enders, intramedullary, shoulder

### Introduction

It is generally admitted that most humeral shaft fractures can be managed successfully by non-operative methods. Whenever operative treatment is required, a choice has to be made between plate osteosynthesis and intramedullary nailing. Fixation with plates requires extensive dissection and is complicated by the proximity of the radial nerve and the risk of mechanical failure in osteopenia bones.

Biomechanically intramedullary nail is a better implant. They are subjected to smaller bending loads and are less likely to fail by fatigue, they act as load sharing devices, 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. With intramedullary nailing mechanism they achieve rotational stability and provide early mobilization of the neighboring joints and decrease the morbidity.

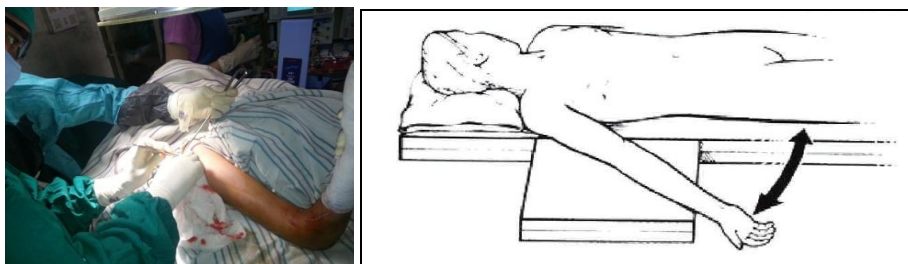
Keeping all these aspects in mind, we took up this study to assess the role of closed intramedullary nailing with a Enders nail in managing humeral shaft fractures.

**Material and Method**

We have done a prospective study of 30 patients with Fracture shaft Humerus stabilized with intramedullary nail of Ender's type by antegrade approach. These nails were available in 3 & 3.5 mm diameter and in lengths ranging from 18-28cms. The

nail by design had proximal band of 6 degrees (apex medial band) to accommodate offset of the infusion portal with the medullary canal.

**1. Patient positioning and fracture reduction**



**Patient position**

The patient is placed in a semi-reclined "beach chair position" or supine on a radiolucent table. Patient positioning should be checked to ensure that imaging and access to the entry site are possible without excessive manipulation of the affected extremity (Fig. 1). The image intensifier is placed on the opposite side of the involved extremities of patient.

entry point is more lateral. It is recommended to localize the entry point under image intensifier control, also palpating the bicipital groove, the portal is about 10mm posterior to the biceps tendon. This will make the entry portal concentric to the medullary canal.

**2. Incision**



A small incision (of 2-3 cm) is made in line with the fibers of the deltoid muscle anterolateral to the acromion. The deltoid is split to expose the subdeltoid bursa. Palpate to identify the anterior and posterior margins of the greater tuberosity and supraspinatus tendon. The supraspinatus tendon is then incised in line with its fibers. The real rotation of the proximal fragment is checked (inversion or reversion), considering that the entry point is at the tip of the greater tubercle. If the proximal fragment is inverted, the entry point is more anterior. If the proximal fragment is in external rotation, the

**3. Entry Point**



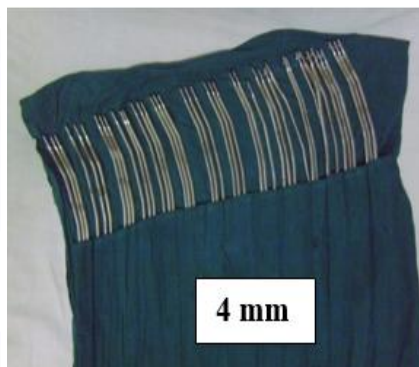
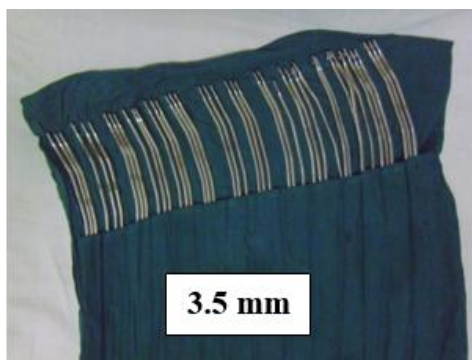
**Keep C-arm tilted like this**

The entry point is made with the Curved, cannulated Awl.

**4. Nail Selection**

The X-Ray Template should be used pre-operatively to determine the canal size radiographically.

**Diameter** The diameter of Nail should be 3mm – 3.5 – 4 mm.



**Instrument set for Ender Nailing**

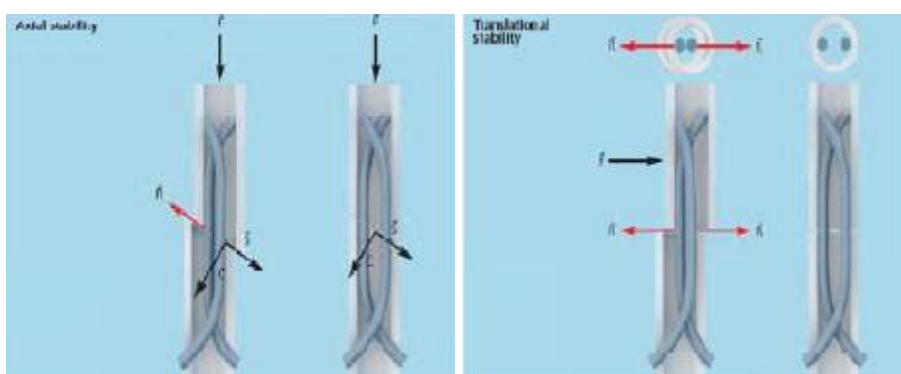


1. Kuderna's bending device
2. Hammer
3. Awl
4. Introducer with bar
5. Extractor
6. Bender
7. Final introducer

**Length**

Nail length may be determined with the X-Ray Ruler.

**Principles of Flexible Nail System**



**Axial stability**

**Translational stability**

The elastic flexible nail are bent and inserted, into the medullary canal. The elastic deformation, within the medullary canal creates a

bending moment within the long bone is not rigid but that is stable, enough to reduce and fix fracture

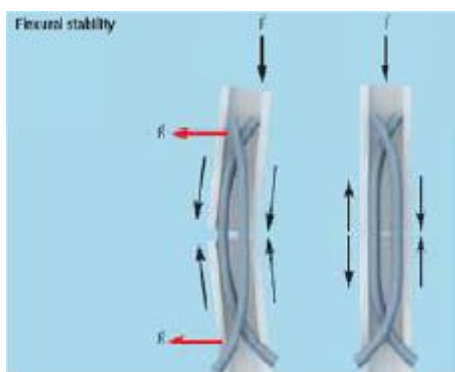


**Rotational stability**

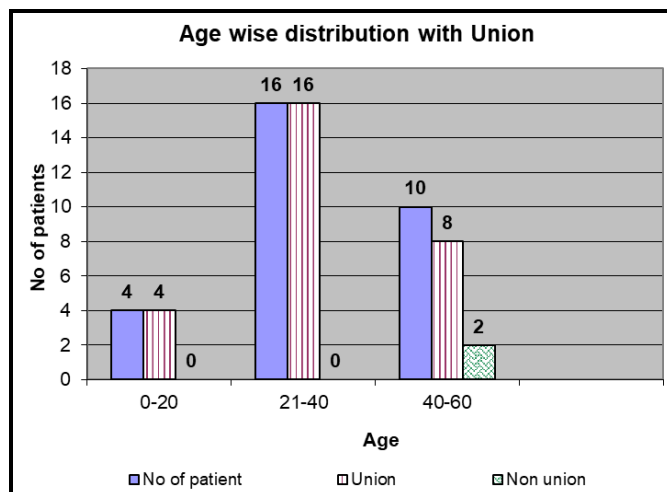
**Observation and Discussion**

**Table 1: Age wise distribution of Patients**

Age	No of patient	Union	Non union
0-20	4	4	0
21-40	16	16	0
40-60	10	8	2
Total	30	28	2



**Flexural stability**



**Fig 1: Age wise distribution with union**

Study shows more incidences of Humerus fractures in young patients as it is active age group in the society, more prone to vehicle accidents and falls.

Total number of male patients outnumber the female patients, since male are more prone to vigorous accidents.

**Distribution according to Time taken for Union**

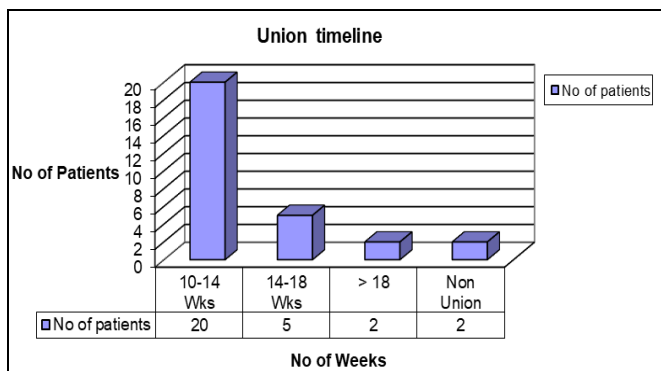


Fig 2: Union time line

Most of the fracture of shaft humerus unites in 10-14 weeks and in minor cases more than 18 weeks were observed for union.

**Sex Wise distribution of patents**

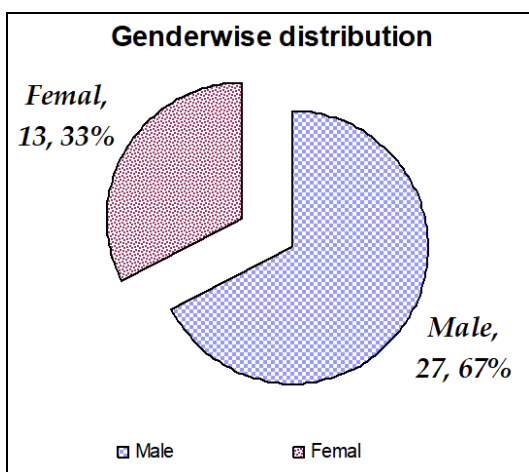


Fig 3: Genderwise distribution

**Distribution according to Type of Fracture**

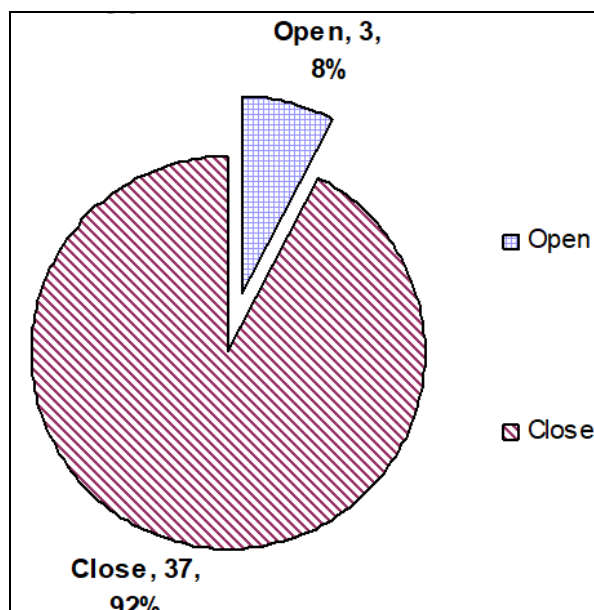


Fig 4: Fracture type

Study shows more close injuries than the open one.

Table 2: Distribution according to Type of Complication

Complications	No of patient
Elbow stiffness	2
Shoulder stiffness	2
Infection superficial	1
Infection deep	0
Impingement syndrome	2
Iatrogenic facture	1
Non Union	2
Instabilty	1
Radial nerve palsy	0

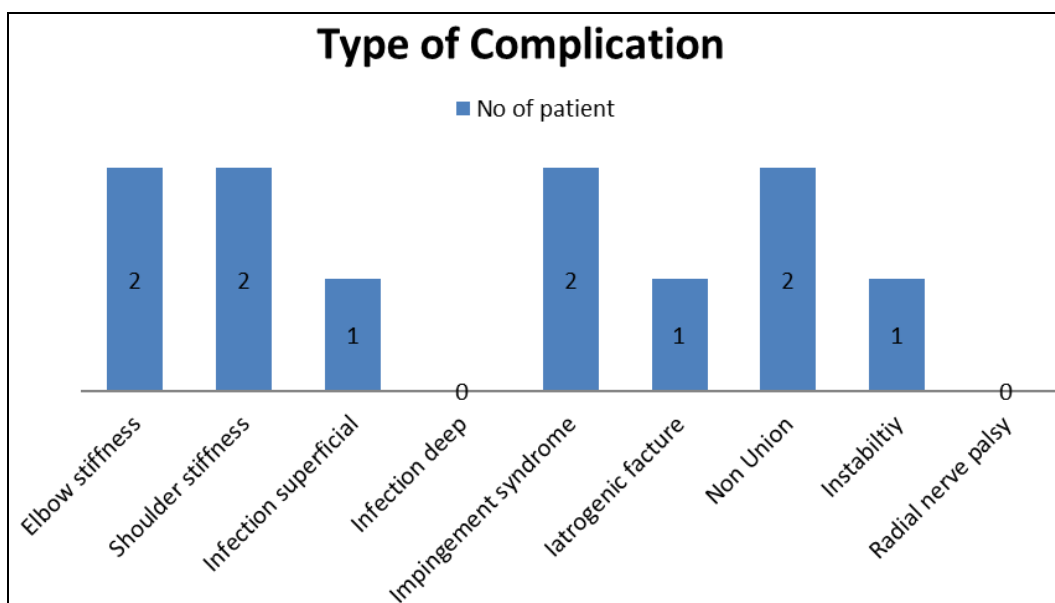


Fig 5: Type of complication



Most common complication associated with operative method of fracture shaft humerus is non union.

Joint involvement in form of shoulder or elbow stiffness can occur in small number of cases. There are no cases of infection noted in our study.

**Name:** Aal Hasan (11yr M) fall from Train

**Final range of Movement:** Full

**Clinical Outcome:** Excellent



Pre op

Post Op

Final F'up



Clinical Photo

**Name:** Jagdish bhai (36yr f) fall from Height

**Final range of Movement:** Full

**Clinical Outcome:** Excellent



Pre op

Post op

Final F'up



Clinical Photos

**Summary and Conclusion**

This study involves personal observations of 30 cases operated for Enders Flexible humeral nail in fracture shaft humerus and we conclude as follows

1. Internal fixation by close intramedullary nail for fractures involving middle two third shaft of humerus is a good technique if facilities are provided for image intensifier machine in operation theater.
2. In comparison to other operative techniques close intramedullary nailing is less invasive with minimal blood loss and hardly any chance of infection.
3. This technique gives rotational as well as torsional stability to fractured bone humerus, allowing faster practice of physiotherapy to achieve full range of motion and power.
4. It is advisable to take entry for antegrade humerus nail on medial side of greater tuberosity of humerus anteriorly to prevent injury to supraspinatus tendon.
5. It is absolutely 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 backtracking and collapsing fracture on table under IITV guidance.
6. It is advisable to keep the proximal end of nail just inside the bone to prevent restriction of shoulder movements.
7. Post operatively patients are advised to use functional brace for well fixed fractures of humerus while plaster cast is given for the rest of cases for a period ranging for 4 to 10 weeks depending on morphology of fracture and fracture fixation on table with serial periodic x-rays on follow up.
8. Management of fracture humerus in general depends on morphology of fracture pattern,
9. Age of the patient, skin condition, bone stock, associated injuries etc.
10. Whenever there is associated neurovascular injury open surgery is advisable to assess the injury to neurovascular bundle.
11. Humerus intramedullary nailing surgery should be considered as it is a safe procedure with good outcome in rightly selected patients as for example adults as well as elders having fractures middle two third of shaft of humerus. However preparation for plate osteosynthesis and bone grafting may be kept ready at the time of surgery if need arises.

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