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Dr. Amit B Dhond
Associate Professor, Department of
Orthopaedics, D.Y. Patil Hospital
and Research Centre, Nerul, Navi
Mumbai, Maharashtra, India

Dr. Saamarthya Gupta
PG Resident, Department of
Orthopaedics, D.Y. Patil Hospital
and Research Centre, Nerul, Navi
Mumbai, Maharashtra, India

Dr. Sunil Shetty
Professor, Department of
Orthopaedics, D.Y. Patil Hospital
and Research Centre, Nerul, Navi
Mumbai, Maharashtra, India

Intramedullary nailing as a treatment modality in diaphyseal radius and ulna fractures

Dr. Amit B Dhond, Dr. Saamarthya Gupta and Dr. Sunil Shetty

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Abstract

Traumatic skeletal injuries are becoming very common with advent of modernization because of increased vehicles and increased industrialization. Radius and ulna fractures are among the most common long bone injuries admitted to any hospital. The management of Radius/ Ulna diaphyseal fractures has always held particular interest of orthopaedic surgeons. By virtue of its location Radius-Ulna are exposed to frequent injuries with elbow joint and wrist it forming the extinct boundaries with superior and inferior radio-ulnar joint and spanning interosseous membrane to control rotation in the forearm. Early treatment and proper stabilization gives a better functional outcome. Early fracture fixation either by closed reduction with nailing or open reduction internal fixation with compression plate reduce morbidity and mortality significantly.

Intramedullary nailing can be excellent choice of treatment especially in compound injuries, poor skin condition, segmental fractures and grossly comminuted fractures. Excellent results were obtained using closed reduction with large snugly fit intramedullary nail in radius ulna fractures which provided both rotational and angular stability.

Keywords: Intramedullary nail, radius-ulna, diaphyseal fractures, nailing

Introduction

What is Intramedullary Nailing

Intramedullary nailing (IM nail) or inter-locking nailing or Küntscher nailing (without proximal or distal fixation), is a metal rod forced into the medullary cavity of a bone. IM nails have long been used to treat fractures of long bones of the body. Gerhard Küntscher is credited with the first use of this device in 1939, during World War II, for soldiers with fractures of the femur. Prior to that, treatment of such fractures was limited to traction or plaster, both of which required long periods of inactivity. IM nailing is of two types-locking and non locking.

Why Intramedullary Nailing is used

Fracture of the forearm may result in severe loss of function unless adequately treated. Diaphyseal fractures of radius and ulna present specific problems in addition to the problems common to all fractures of the shafts of long bones. The rotational and angulatory forces acting on Radius-Ulna fragments make reduction very difficult. Earlier talwarkar square nail was used which led to restriction of supination and pronation. Tens nail allowed both supination and pronation maintaining the anatomical bowing. Thus maintenance of reduction by some device either a plate or nail is of utmost importance. Thus we performed closed Intramedullary nailing of both bone forearm fractures with minimal or no communication with Intramedullary nails with good results.

The management of Radius-Ulna diaphyseal fractures has always held particular interest for orthopaedic surgeons. By virtue of its location Radius/Ulna are exposed to frequent injuries with elbow joint and wrist it forming the extinct boundaries with superior and inferior radioulnar joint and spanning interosseous membrane to control rotation in the forearm. Early fixation by Intramedullary nailing reduced the morbidity and mortality significantly.

Correspondence

Dr. Saamarthya Gupta
PG Resident, Department of
Orthopaedics, D.Y. Patil Hospital
and Research Centre, Nerul, Navi
Mumbai, Maharashtra, India

Aims and Objectives of this Study

The main aim of this was to study the results and complication in diaphyseal fractures of Radius and Ulna in adults and also to evaluate the functional outcome of Diaphyseal fracture of Radius and Ulna treated with Intramedullary nailing.

Materials and Methods

Initial Process

Between October 2008 to September 2010 adult patients with diaphyseal fractures of Radius and Ulna were admitted to the trauma centre and emergency, Padamshree Dr. D.Y. Patil Medical College and Hospital, Navi Mumbai. Patients with Pathological fractures were excluded from the study. So altogether 30 patients who satisfied the criteria were included in this prospective study.

All the patients coming to Trauma centre were initially given first aid in the form of splintage, in the form of above elbow slab, supportive care, analgesics, IV fluids and routine relevant investigations were carried out. Basic radiological investigations pertaining to the nature of fracture sustained were done in addition to standard trauma series of investigations.

After the initial management all patients were assessed for any other medical ailment and patients were managed accordingly. Informed consent was taken from all patients and

also the consent was taken pertaining to bone grafting depending on the anatomy of the fracture.

Stable patients were taken to the surgery at the earliest after the pre anaesthetic evaluation.

Surgical technique for fracture fixation using Intramedullary Nailing

Indications

- Segmental Fractures
- Poor skin condition
- Polytrauma
- Osteoporotic bones

Contraindications

- Active Infection
- Medullary canal smaller than 3mm
- An open physis

Advantages

- Little or no periosteal stripping
- Smaller operative wound
- No opening of fracture site
- If nail removal is done no stress rises remain, with the potential for refracture

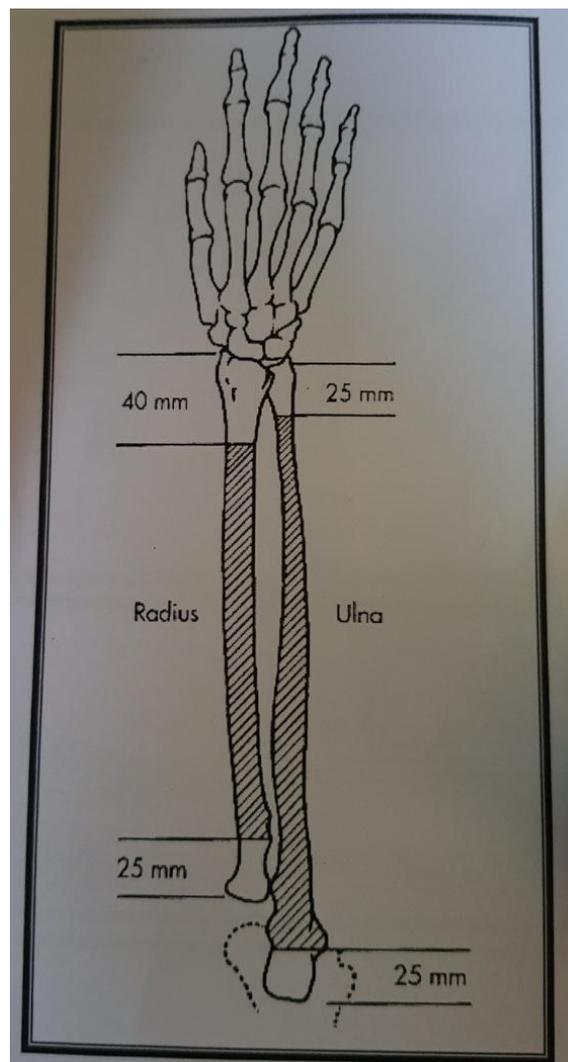


Fig 1: Area over Diaphysis where intramedullary nailing can be done Preoperative evaluation of nail length is done with X-Rays of normal side.

Position: Supine

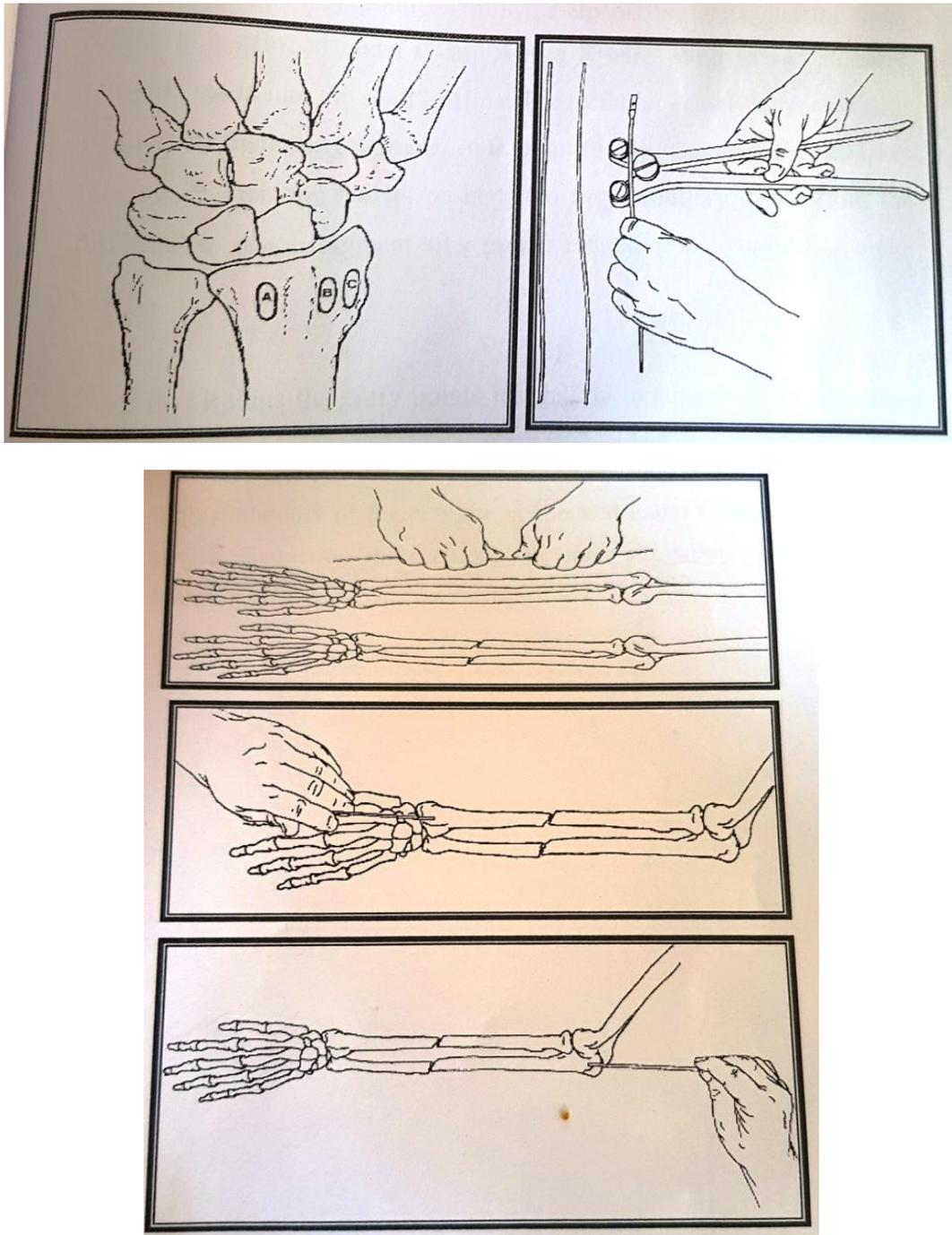


Fig 2: Techniques for Radius Ulna Nailing

Procedure

Entry point is from the tip of the Olecranon for Ulna which is confirmed under C-arm with a K-wire. With an awl an entry portal is made into the shaft of the Ulna. The medullary cavity is reamed with reamers of increasing diameter of 0.5mm till adequate medullary canal is reamed and then the nail is pushed into the medullary cavity from the proximal to distal fragment after proper reduction and confirming under C-arm. For Radius the entry point is just lateral to Lister's tubercle. Entry point is selected under C-arm guidance and as in Ulna, nail is introduced in the radius. Stability of fracture site is checked under C-arm guidance for reduction, distraction and rotation. The entry site wounds are closed by 2/0 ethilon.

Post-Operative Care

Patient is kept in slab till suture removal. Afterwards forearm

brace is given.

Follow-Up

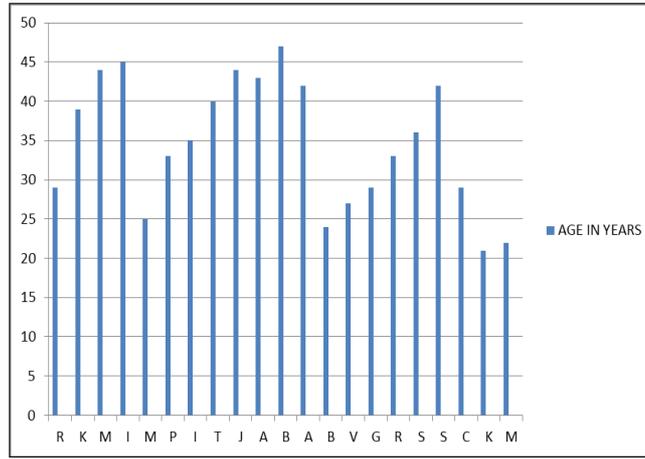
Patients were followed up at the regular interval of 3 week, 6 weeks, 3 month, 6 months and 9 months.

Observation and Results

The study was conducted on 30 patients who suffered from the fractures of Radius and Ulna at diaphyseal level and managed at Padamshree Dr. D.Y. Patil Medical College and Hospital with intramedullary nailing.

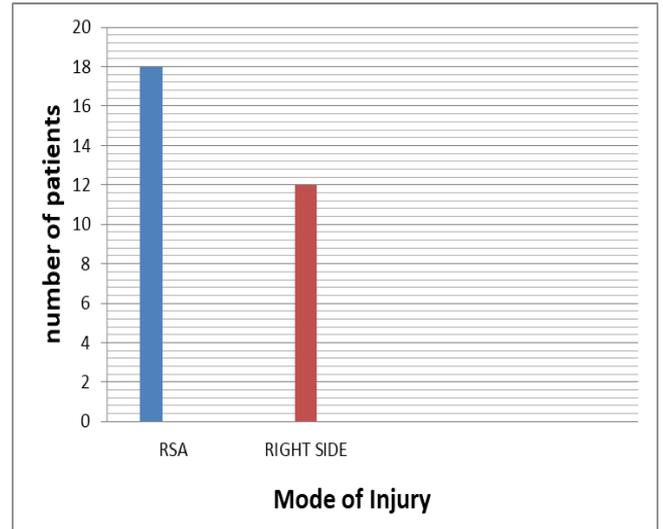
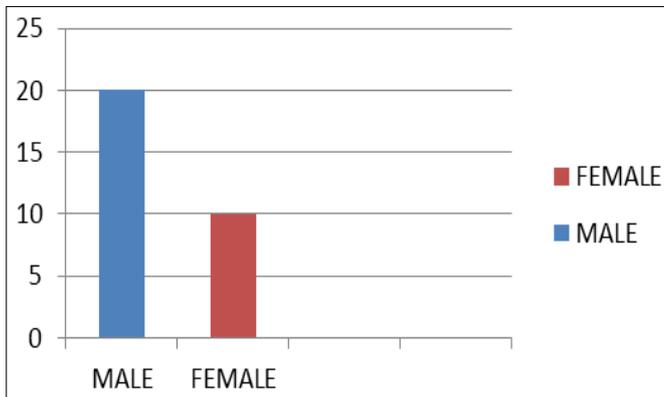
Age Comparison

All the patients were aged between 20 to 50 years with mean age of 35 years.



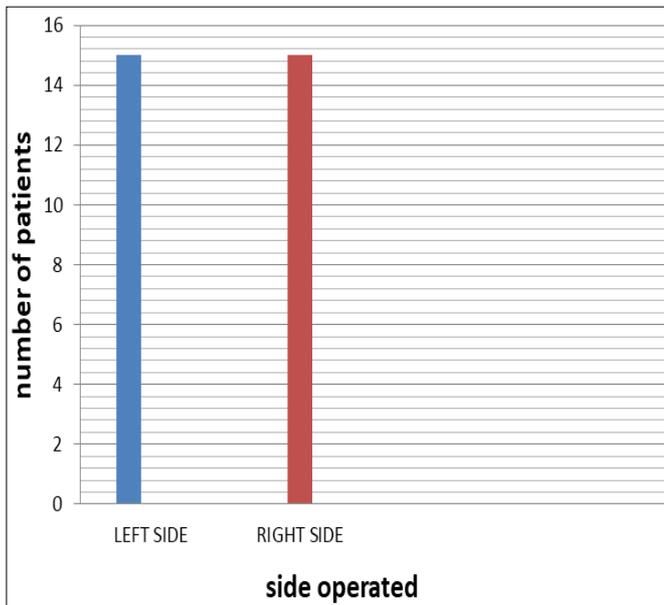
Sex Ratio

Out of 30 patients the male to female ratio was 2:1.



Side Operated

Patients sustaining from this fracture has equal incidence of injury to either side.



Mode of Injury

18 patients had the history of roadside injury and 12 had a history of fall.

Associated Disease

Diabetes Mellitus- 10 patients had diabetes mellitus which was handled by endocrinologist and patient was operated once the situation was managed.

Hypertension- 8 patients had associated hypertension managed by the physician and the patient was operated once the situation was managed.

Bronchial Asthma- 2 patient had a history of bronchial asthma.

Union

Most fractures united by three months and back to full activity were started when the radiographic signs of union were seen on the follow up.

Range of Motion

Flexion at Elbow-		Number of Patients
	>90 Degrees	16
	<90 Degrees	4
Flexion at Wrist-		
Dorsiflexion	>15	18
	<15	2
Volar Flexion	>15	18
	<15	2
Rotation Supination	>45	14
	<45	6
Pronation	>45	16
	<45	4

X rays



Fig 3: Pre-Op X-ray (AP view)



Fig 4: Pre-Op X-ray (Lateral view)



Fig 5: Post-Op X-ray (AP view)



Fig 6: Post-Op X-ray (Lateral view)

Discussions

In the series selected, diaphyseal fractures in Radius and Ulna in adults to be treated with Intramedullary nailing was selected. This was a time bound study and all the patients treated were followed up at interval of 3 week, 6 weeks, 3 month, 6 month and 9 month.

Age Comparison: In present study age group was between 20 years to 50 years at the mean of 35 years.

Side operated: In present study there was no difference in side operated as left to right hand ratio was 1:1.

Mode of Injury: In present study mode of injury was supposed to be more due to road accident than due to fall leading to the ratio of 3:2.

Sex Ratio: In present study more males were treated than the females leading to the ratio of 2:1.

Operative time: Operative time in the present study was 20 minutes for the Intramedullary nailing.

Union: Smith and Sage analyzed 555 patients with fracture diaphysis of radius-ULNA treated with IM nailing of which 8% showed non-union. Dr. Sharney and Sharma conducted a study in around 30 patients, 26 males and 4 female, union rate was noted to be 12.6 weeks. IM nailing remains the treatment of choice for most diaphyseal nonunions. IM nailing has low morbidity, may obviate the need for additional bone grafting, and allows full weight-bearing and active rehabilitation.

In present study all patients were followed up at 3 week, 6 weeks, 3 month, 6 month and 9 month. Fractures treated with Intramedullary nailing showed radiological union after 12-14 weeks in all the cases.

Conclusion

The ideal treatment for diaphyseal Radius/Ulna fracture has been debated for several years. Several fixation modalities have been suggested to improve upon the clinical outcome in the difficult situation. In the present study evaluation has been made on functional outcome of the patients with Radius/Ulna fractures treated with intramedullary nailing. In present study

age group was between 20 years to 50 years at the mean of 35 years. There was no difference in side operated as left to right hand ratio was 1:1. The mode of injury was supposed to be more due to road accident than due to fall leading to the ratio of 3:2. Also more males were treated than the females leading to the ratio of 2:1. Operative time in the present study was 20 minutes for the intramedullary nailing.

It was seen that the union rate was very high in the fractures treated with IM nailing, thus making it a very good functional outcome. It was seen that fractures showed no post operative instability. Done with proper techniques excellent results were achieved. Post operative joint stiffness was minimal as patient was mobilized early.

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