

A Clinical Study to Compare the Outcome of Locking Compression Plate versus Intramedullary Nail for Humerus Fracture

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Abstract

Background: With the dramatic success of intramedullary fixation of fracture of the Femur and Tibia there was speculation the intramedullary nailing (IM) is more appropriate for humeral diaphyseal fracture than locking compression plating. **Aim:** The aim of our study was to compare the two and see the more optimum method to treat them. Outcome was compared in term of time to achieve union, rate of infection and functional outcome (DASH score). **Methods:** A total of 40 patient were chosen after informed consent and randomly picked for either nailing / plating. These were patients who met him criterion for operative interventions. 4 patient who did not give informed consent were not included. **Results:** Average union time was 12.4 weeks IMN V/S 15 weeks in plating group. Rate of infection was none IMN versus PLT. Complication of surgery was not seen in any group like radial nerve palsy. Functional outcome was excellent in both groups with complete patient satisfaction. **Conclusion:** Both the procedures are equally good and outcome depend upon expertise of surgeon, infrastructure, and proper schooling of patient.

Keywords: Diaphyseal Fracture of Humerus, Interlocking Nail, Plate Fixation, Superior Device.

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Introduction

Most Humeral diaphyseal fracture can be treated non operatively and functional bracing is the gold standard[1]. Choice of operative treatment will depend upon multiple factors. Mckee divided indication for surgery into three categories:

1. Fracture indication like failure to obtain and maintain length or adequate closed reduction rotation and angulation, segmental fracture ect.
2. Associated injuries like ipsilateral shoulder or elbow fracture or radial nerve injury.
3. Patient indication like polytrauma, chest injuries, head injuries. Plate osteosynthesis was being used as gold standard in operative treatment using locking / compression plate and screws but require extensivesoft tissue exposure and periosteal stripping. Intramedullary nailing has some advantages which include being less invasive surgery, undisturbed fracture hematoma and use of load sharing device supports its use in fracture humerus. Intra medullary fixation as well as lock compression plating or external fixation in open fracture are described.[2-8] Study was conducted with Russel Taylor locking intramedullary nails and with
2. Fracture with associated vascular injury.
3. Patient with a history of previous Humerusfracture.
4. Open fracture grade 2 or 3 . only those fracturetaken up which were open inside out.
5. Patient with head injury.
6. Injuries older than 21 days.
7. High velocity trauma like fire arm.
8. Patient with less than 6 month follow up were dropped from study.

4.5 compression plate and screw.

Lin reported 100% union rate in 73 fracture treated with either locked intramedullary nail or locked compression plate and screws.[9] Several randomized trial have been conducted to compare IMN with PLT. In treating fracture shaft humerus. There is controversy over which of the two procedure leads to superior results and functional outcome. There is no consensus as to whether IMN or PLT.is the optimal treatment. The purpose of this study is to find out if any procedure of the two is superior.

Materials and methods

This prospective study was conducted at Department of Orthopedics, at Vardhman Institute of Medical Sciences, Pawapuri. The study was approved by institutional research and ethical research committee. The study was conducted over a period of 02 years from August 2017 to July 2019. Informed consent was taken from all the participants after explaining the study protocol

The study included 40 fracture in 40 patients, 20-20 in each group. Make inclusion criterion was used for operation. The following fracture was excluded from the study.

1. Pathological fracture

All fractures were stabilized. The open fractureseligible in the study were stabilized primarily after irrigation and excisional debridement andreevaluated within 3-5 days for infection. Wound swab was taken for culture sensitivity before embarking on secondary procedure.

Inclusion criterion was all patients' required operative intervention and patients were above the age of 18 years, given informed consent.

After applying these criterion 20-20 patients in both series IMN and PLT. Were taken up for study.

An ante grade inter locking technique was used with an IM Nail (Russel Taylor) and care was taken to minimize damage of the rotator cuff during nail insertion with patient in supine position. Entry portal was just lateral to the articular surface of humeral head and medial to greater tuberosity. All fracture were reduced and stabilized under image intensifier guidance. All fractures were stabilized without opening the fracture site. At least one screw proximal and one screw distal were applied. Arm was supported with a U slab for 14 days after dressing in layers.All patients undergoing PLT. Fixation incisional approach was left to surgeon's choice and 4.5 mm DCP,

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LCDCP, or locking plate was used. At least four cortices above and four cortices below the fracture were fixed. After wound was closed inlayers dressing was done and U Slab was applied for 14 days. This group also included 4 cases of preoperative Radial nerve palsy.

Post operatively arm was supported in slab for 14 days but shoulder and elbow exercise started as soon as the condition of patient permitted. Follow up clinical and radiological examination was performed at 4, 8, 12 and 16 week and then monthly for another 6 months.

Clinical assessment included

1. Shoulder and elbow range of movement.
2. Neurological examination.
3. Rating of pain.

Pain was assessed on its presence or absence in the shoulder, arm or the elbow. Range of motion rated normal or limited based on its comparison with the normal contralateral uninjured joint. Limited motion was defined as more than 10 degree difference in range of motion of that joint compared to other side. Final functional outcome

assessed at the end of 6 months postoperatively in the entire patient in whom union was achieved[2-4].

Results

The nailing and plating groups were similar with respect to age, sex, dominant limb, injured limb, mode of injury, immediate treatment and injury surgical interval. 75% were male 25% were female. The mean age was 35.8 years for nailing group and 37.4 in plate group. Usual mode of injury in both group was road traffic accident, followed by fall from height and work place injury. Immediate immobilization was done with U Slab. All were operated within 5-7 days of injury mean time being 5.7 days.

Nailing took less time as compared to plating and the average time for surgery in IMN was 55 minutes and plating was 65 minutes.

Post-operative stay was average 3 days for nailing group and 5-7 days for plating group. Those patient 4 in number having pre-operative Radial nerve injury were plated as Radial nerve exploration was to be done simultaneously[5-7]

Table 1: Indication of surgery in two groups.

Showing indication of surgery in twogroups	IMN	PLT
Failure of closed reduction	14	12
Open fracture	3	1
Poly trauma	3	3
Preoperative Radial nerve palsy	0	4

Table 2: Showing the level of fracture in the two group.

Level of fracture	IMN	PLT
Upper one third	2	5
Middle one third	14	9
Lower one third	4	6

Post-operative complication usually reported in other studies were wound infection, Radial nerve palsy, shoulder pain, elbow pain, decreased shoulder elbow ROM, nonunion.[10] In our series 4 patient complain of shoulder pain and 3 decreased shoulder movement all recovered within 6 months in IMN group and 2 patient of inside out open fracture were found to have superficial infection which subsided after culture and sensitivity and change of antibiotic.

Table 3: Showing incidence of complication in the twogroup.

Complication	IMN	PLT
Wound infection	0	2
Radial nerve palsy	0	0
Shoulder pain	4	0
Elbow pain	0	0
Decreased shoulder ROM	3	0
Decreased elbow ROM	0	0
Non union	0	0
All complication after 6 months	0	0

Discussion

The nailing and plating groups were similar with respect to age, sex, dominant limb, injured limb, mode of injury, immediate treatment, injury surgical interval which indicated that randomization has been effective. In study a total of 75% male 25% female in both nailing and plating group In study of Changulani M et al 86.9 % were male and 13.1 % were female in nailing group and 79.2% male and 20.8 % female in plating group are quite comparable. The mean age of patient was # (years in IMN group and 35 years in PLT group which is again quite comparable to our study. The optimum time for nailing was average 55 minutes and plating was 65 minutes. More time taken in plating can be attributed to more cases of comminution and radial nerve exploration .but time difference was not significant in both groups. There was no significant difference in pain in both groups. For shoulder pain in IMN group DASH score gradually improved equal to PLT group. Union signs were seen as early as 6-8 weeks in IMN group and 8-10 weeks in PLT group. Ultimately having consolidated union within 15 – 20 weeks. IMN group shows early union may be because of intact fracture hematoma. Vander Grinder RA et al reported union in 35 of 36 patient of plating group is comparable to our study. So both devices IMN and PLT provide equitable results.

Conclusion

Both the procedures are equally good and outcome depends upon

Conflict of Interest: Nil Source of support: Nil

expertise of surgeon, infrastructure and proper schooling of patient.

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