COMPARATIVE STUDY OF COMPRESSION PLATING VS. INTERLOCKING NAIL IN FRACTURE SHAFT OF HUMERUS
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ABSTRACT

BACKGROUND
Fractures of shaft humerus are among the most common fractures. The modes of treatment are also changing with the advancement in the field of orthopaedics. This study was conducted to evaluate the outcome of the results of open reduction and internal fixation with DCP and close interlocking nail in fracture shaft of humerus.

MATERIALS AND METHODS
It was a prospective study consisted of 60 cases of fracture shaft humerus divided in two groups of 30 each to which closed interlocking nail and open dynamic compression plate was done. Study was conducted in Department of Orthopaedics, Nalanda Medical College Hospital, Patna. Results were evaluated with Neer’s criteria. The results were analysed on the parameters of sex, age, mode of trauma, functional outcome and complications, etc.

RESULTS
The average age of patients was 41.5 years with male:female ratio 6:4, more common on right side 68%, road traffic accident in 60% cases as common mode of injury, middle third as common region 52.8%, most common AO type A3 56.4% cases, 80% cases were closed type as most common type with group A ILN shows 30% cases as excellent result and 54.6% cases showing satisfactory results and in group B, DCP shows 85% cases excellent result and 15% cases shows satisfactory results.

CONCLUSION
In the present study, it was concluded that compression plating is still time tested and best treatment for fracture shaft humerus.

KEYWORDS
Interlocking Nail (ILN), Dynamic Compression Plate (DCP).

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BACKGROUND
Fractures of humerus shaft are very common accounting for about 3% of all the fractures.¹ Treatment methods are also advancing for these fractures. Initially, they were treated with the help of hanging casts, arm cylinders, then functional cast bracing, U casts and shoulder spica was introduced as different modalities of treatment, but the long duration of treatment adversely affects livelihood of the patients.² Nonunion, malunion, limitation of joint motion and are commonly seen complications in conservative methods of treatment, hence the need of operative intervention was required. The mode of injury are direct trauma, indirect forces like fall on outstretched hand or elbow are also common causes of shaft humerus fracture. The encouraging results of recent advances in internal fixation techniques and latest instrumentation have led to an increased trend towards surgical management of such fractures. The present study compares results of open reduction and internal fixation by dynamic compression plate with closed interlocking nailing in fracture shaft of humerus.

MATERIALS AND METHODS
This was a prospective study conducted in Nalanda Medical College Hospital between April 2015 and May 2016. The study consists of 15 cases (group A) of fracture shaft humerus treated with closed intramedullary nailing and 15 cases (group B) treated with dynamic compression plating. The grouping was done randomly. All the cases were done in general anaesthesia or interscalene block as preferred by anaesthetist. The inclusion criterion was patients more than 17 years of age of either sex. All cases of open fracture and patients below 17 years of age were excluded from the study. All the fractures were managed and stabilised initially with pop back splint after the x-rays was done. Fractures were classified and managed accordingly with intramedullary nails or DCP. For interlocking nail, patient was placed in semi-inclined position. A 2-3 cm incision was...
given lateral to acromion in the direction of deltoid fibers. Entry was made into the medullary canal just medial to the greater tuberosity. Guidewire passed under C-arm control in both proximal and distal fragments. Tissue protector (sleeve type) was used to prevent damage to rotator cuff. Sequential reaming done over the guidewire. Then, nail of appropriate size was inserted over guidewire after mounting over jig. Guidewire was taken out. Distal locking done first by freehand technique. Fracture compression given by back hammering and proximal locking was done. Wound was closed, ASD done and sling applied. For DCP, patient was placed in supine position for anterior approaching case of fracture of proximal two third with affected limb on the arm board. For fracture of distal third, posterior approach was used, applied arm sling given. Postoperatively, limb was elevated. Broad-spectrum ceftriaxone IV antibiotic was given for 72 hours, anti-inflammatory and analgesic were given.

Range of motion exercises of shoulder and elbow were advised at the earliest when patients were comfortable in group A patients and after stitch removal on 12th day in group B patients. Suction drain was removed after 24-48 hours. Patients were followed up, examined every 3 weeks interval till union. On every visit, radiographs were taken in anteroposterior and lateral view. Radiological sign of union, displacement and angulation were recorded (Figures 1, 2). Clinically, patients were examined for any tenderness, infection and pain. Movements of elbow and shoulder recorded. Results were evaluated according to Neer's classification.3

RESULTS
60 patients of fracture shaft humerus admitted in Orthopaedics Department of Nalanda Medical College Hospital. Out of 60 patients, 30 were grouped as A and given interlocking nail as treatment and 30 were given the DCP as treatment group B. The youngest patient in our study had age of 19 years and oldest has age of 65 years. Average age was 37 years. 85% of fractures occurred between age group of 20-50 years as this age has more outdoor activities. There is male preponderance in our study with male:female ratio 6:4 similar. Injury was more common on right arm because of protective reflex in using right upper limb more often to avoid trauma. As >80% persons are right handed in most 40 (66.6%) common mode of injury was road accident, being most common mode of injuries. 20 (33%) cases occurred because of fall from height and 4 (7%) case, mode of injury was railway accident. 50% cases had fracture in middle third, 38% in distal third and 12% in proximal third. Present study had 87% fractures of type A (simple), 10% had type B (wedge) and 3% of type C (complex). Present study had 100% closed fractures and compound fractures were excluded. 10 (33%) patients had associated injuries like fracture both bone, forearm, radial nerve injury, fracture metatarsals, head injury, pelvic injury and abdomen injury. In this study, majority of the patients were operated within five days (80%) in group A and (73.33%) in group B with average union time in group A was 11 weeks; average union time in group B was 13 weeks. With early complications are more in group B like superficial infection 7%, radial nerve neurapraxia 5.5 with late complications like shoulder pain 66.67%, delayed union in 13.33% cases and shoulder stiffness in 66.67% cases in group A compared with 20%/20%/10% in group B, respectively (Table 1). There was statistical significant (p <0.05) decrease in abduction and rotation at shoulder joint at final follow up in group A patients (Table 2, 3).

DISCUSSION
In the study of comparison of compression plating vs. interlocking nail in fracture shaft humerus conducted in Orthopaedics Department in Nalanda Medical College Hospital, Patna, 30 cases in group A and group B were treated with interlocking nail and compression plating respectively with age of youngest patient 19 years and oldest 65 years with mean age 37. Similar trend was seen in a series of Lal et al4 in which mean was 39.5 years and Chacha et al5 average being 36.3 years. In this study, male:female ratio being 6:4 similar.

To study series of Reddy et al,6 where also M:F ratio was 7:3. The study shows the more involvement of right side with road side accidents as mode of injury 60% cases, fall from height 33.33% cases and 3.33% cases due to railway injuries. Loomer et al observed that injuries were as a result of motor vehicle accidents in 50% of cases. In this study, only closed fractures were included.1 PM Rommens7 found 7% rate of open fracture. No patient of group A had superficial infection8 in comparison with 1 patient in group, which is not statistically significant (p value 0.015). One patient in group B has postoperative neurapraxia of radial nerve with no patient in group A, which is not statistically significant (p value 0.150). This patient recovered from neurapraxia within 12 weeks of conservative management and no exploration was needed in this case. 10 patients in group A had shown pain in shoulder in comparison to 3 in group B shows statistical significant difference (p value 0.009). 10 patients of group A has shoulder stiffness in comparison to no patient in group B showing statistical significant difference (p value 0.001). Two patients in group A had shown delayed union in comparison to 3 in group B showing no statistical difference (p value 0.08). In this study, 66% of patients develop shoulder stiffness treated with interlocking nail. Same trend seen in study of Suh JT et al9 where 50% of patients shows shoulder stiffness. No patient in either group shows nonunion, malunion, deep infection and any instability. In our study, 100% cases achieve union. Ikpeme10 noted 100% union of shaft fractures with I.L.N. Willis MP et al11 reported union rate of 100% in humerus fractures with plating. The results in group A shows excellent in 3 cases (20%), satisfactory 7 cases (46.67%) unsatisfactory 5 (33.33%) with group B shows excellent in 12 cases (80%), satisfactory 3 cases (20%), unsatisfactory 0 (0%) with statistical difference (p value 0.002) (Chi-square 12.00) in two groups in their results (Table 4).
Complications of Group A and Group B

<table>
<thead>
<tr>
<th>Complications</th>
<th>Group A (Interlocking)</th>
<th>Group B (DCP)</th>
<th>P Value</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoulder pain</td>
<td>20 (66.6%)</td>
<td>6 (20%)</td>
<td>0.009</td>
<td>Significant</td>
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<tr>
<td>Malunion</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Delayed union</td>
<td>4 (13.3%)</td>
<td>6 (20)</td>
<td>0.08</td>
<td>Not significant</td>
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<tr>
<td>Deep infection</td>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Shoulder stiffness</td>
<td>20 (66.6%)</td>
<td>0</td>
<td>0.001</td>
<td>Highly significant</td>
</tr>
<tr>
<td>Elbow stiffness</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>-</td>
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CONCLUSION
So, we concluded that compression plating is gold standard for fracture shaft humerus. While there is no significant difference in the patients treated with interlocking nail and compression plate, but there is significant decrease in movements of shoulder joint, shoulder stiffness and persistent shoulder pain in patients treated with interlocking nail.

REFERENCES