Original article:

Comparative study of treatment outcome of fracture shaft humerus treated with I M nail and DCP

Aashish Somani\(^1\), Sanjay Mulay\(^2\), Mayank Patel\(^3\), Nikhil Suri\(^3\)

\(^1\)Associate Professor, \(^2\)Professor, \(^3\)Second Year Junior Resident, Department of Orthopaedics, Rural Medical College, Loni, Dist. Ahmednagar, Maharashtra, India.

Corresponding author: Dr. Sanjay Mulay

Abstract:
This is one of the commonest problems encountered in Orthopaedic practice. Most of the cases of the fracture shaft humerus are managed with conservative measures but in about 10% of the cases one may require ORIF. Internal fixation can be done by either LCP/DCP or I M nail/ILN. Due to the unpredictable results of ORIF this study was undertaken to analyse the results after fixation by DCP/LCP & I M nail. The results of either of the cases are more or less similar but with DCP/LCP, rigid fixation can be achieved. Newer designs of implants have proved to be better in osteoinduction. But each method has its merits & demerits and hence each case has to be evaluated individually and the most suitable modality of fixation must be used.

Key word: Polycystic ovarian disease, Oxidative stress, Malonyldialdehyde, Vitamin C.

Introduction:
Fracture of shaft of humerus is frequently encountered problem in orthopaedic practice. At the same time it poses difficult situation due to unpredictable results. Most of the times (around 90%) such cases can be managed by conservative methods such as hanging arm cast/ U cast/ U slab.\(^{[1,2]}\)

The fracture unites within 6-8 weeks and the angulation at the fracture site is minimal and within acceptable limits but surgical intervention, even the ORIF poses difficult problems, (of course this is seen only is 10% of cases). In ORIF also there is no uniformity about fixation of fracture with IM nail or DCP/LCP.\(^{[3,4]}\)

In the rural set up of RMC Loni, these treatment modalities have been used for long time. Each method of fracture shaft humerus has its merits and demerits\(^{[5]}\) accordingly they are to be weighed in individual cases & the most suited plan of t/t has to be chalked out.

Objectives:

- Hence and study was conducted in 2 samples of 20 each. One sample was t/t either with IM nail & other with DCP / LCP and afterwards their result were compared.
- The main purpose of this study to analyses the functional outcome of result is each (IM nail) and DCP/LCP. To see for clinical and radiological union and minimum time required for healing of fracture.
- The improved biomechanics of implants has improved early fracture healing as well.

Materials & Methods:

Sample size: 2 samples with 20 cases each were fixed with either IM nail or LCP/DCP plate. This study was conducted between 12-18 methods at Department of Orthopaedics Rural Medical College, Loni. In one sample of 20 cases, the fracture was fixed with Intra medullary device i.e. interlocking...
nail or titanium elastic nail. In other sample of 20 cases, the fracture was fixed with Dynamic Compression Plating (DCP) / Locking Compression Plating (LCP).

**Inclusion Criteria:**
1) Post traumatic fracture shaft of humerus
2) Age group between 20-50 yrs
3) Cases with segmental fracture shaft of humerus
4) Fracture associated radial nerve injury
5) Polytrauma

**Exclusion criteria:**
1) Patients with skeletal immaturity (children)
2) Pathological fracture of shaft of humerus
3) Compound fracture
4) Cases above 50 yrs where osteopenia / osteoporon is pronounced

**Parameters for observation:**
The result of the study were evaluated on following points-
1) Union – clinical and radiological
2) Minimal time for union
3) Residual deformity at fracture site
4) ROM at elbow
5) ROM at shoulder
6) Neurological recovery
7) Disability

**Results:**
Majority of the cases of fracture shaft humerus were from age group of 30-40 yrs (As fig. 1), cause of injury being road traffic accident. Most of the cases were males (80-85%) as compared to females (15-20%) as shown in Fig. 2. Clinical union seen cases operated with ILN were 76- 80% by the end of 10 weeks. About 4 cases (20%) were showing signs of non union. They were subjected for revision surgery & DCP / LCP with bone grafting was done. X-ray shows fracture reduction and LCP fixation, fracture reduction and DCP fixation, fracture reduction and inter-locking nail fixation in situ (As shown in Fig. 3,4 & 5).

Clinical union in cases operated with DCP / LCP was 90% by the end of 10 weeks. 2 cases landed in non union cause being shorter implant used & comminution at the fracture site. In revision surgery the larger plate was fixed with bone grafts. In ILN sample 50% of the cases had shoulder ROM more than 75%, while30 % cases had ROM between 50-75%, & 20% cases had significant restriction of shoulder movement around 50%. While in DCP / LCP sample 90% had ROM of shoulder more than 75% and 10% of cases had ROM between 50-75%. ROM of the elbow was more than 75% in 90% of case of ILN while 85% in cases of DCP / LCP.

Residual deformity was nil in 75% cases in ILN while 90% in DCP / LCP whereas angulation more than 20% was seen 5% in ILN while 10% in DCP / LCP. Wound infection was seen in 15% of cases in DCP / LCP & it was superficial infection restricted to skin which healed with secondary intention. No infection was found in cases with ILN. Revision surgery was done in 4 cases in ILN wherein the nail was removed & DCP with bone grafting was done. In DCP sample revision was required in 2 cases where larger plate was fixed along with bone grafts (As shown in Table 1).
Fig. 1: Age distribution of study population

![Age distribution of study population](image1)

Fig. 2: Sex distribution of study population

![Sex distribution of study population](image2)

Fig. 3: x-ray shows fracture reduction and LCP fixation in situ

![Fracture reduction and LCP fixation](image3)

Fig. 4: x-ray shows fracture reduction and DCP fixation in situ

![Fracture reduction and DCP fixation](image4)

Fig. 5: x-ray shows fracture reduction and interlocking nail fixation in situ

![Fracture reduction and interlocking nail fixation](image5)
Table 1: Evaluation of the results

<table>
<thead>
<tr>
<th></th>
<th>ILN</th>
<th>DCP/LCP</th>
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<tbody>
<tr>
<td><strong>Clinical Union</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-8 weeks</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>8-10 weeks</td>
<td>02</td>
<td>3</td>
</tr>
<tr>
<td><strong>Non Union</strong></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>04</td>
<td>2</td>
</tr>
<tr>
<td><strong>ROM Shoulder</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than 75%</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>50-75%</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Less than 50%</td>
<td>--</td>
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</tr>
<tr>
<td><strong>ROM of Elbow</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than 75%</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td>50-75%</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Less than 50%</td>
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<td>--</td>
</tr>
<tr>
<td><strong>Residual deformity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nil</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>Less than 20 degrees</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Wound infection</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nil</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>Revision Surgery</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4*</td>
<td>2**</td>
</tr>
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*Revision with DCP & bone grafting, **Bone grafting

Discussion:
The criteria for acceptable reduction in so unique in fracture shaft of humerus that

1) shortening upto 3 cms,
2) Rotation upto 30 degree,
3) Angulations upto 20 degree is considered to be acceptable reduction.

Hence, till today, majority of fracture shaft humerus are managed with conservative methods. Indication surgical interventions are inability to achieve acceptable reduction, neurological injury (radial nerve), vascular injury, open fracture, and part of polytrauma.

Most of the cases in our study were patients between 3rd and 4th decade of life. Major cause of injury was road traffic accident. Give an option between DCP / LCP and IM nail, till today plating is found to be the most preferred modality of fixation.\[7,8\] With the rigid fixation obtained by plating it continues to remain gold standard. But with DCP / LCP the risk of iatrogenic injury to radial nerve cases. Being an extensive exposure the blood loss is also seen to be more and preferred method of fixation of shaft humerus in with post approach after isolating radial nerve. While IM nail (ILN) are subjected to lesser amount of bending loads than plates (being closer to mechanical axes), Stress shielding which was commonly seen in plating in much minimised use of IM nail.

IM nail is less invasive procedure which maintain biological environment at the fracture site and can provide stable internal fixation. Being closed technique the blood loss is less chance of radial nerve injury (iatrogenic) are less. Rate of union were more or less same in both sample studies. There is still a controversy whether to use reamed or unreamed nail. Reaming can improved vascularity of fracture fragment and soft tissue can provide the reamed material as source of bone grafts. But disadvantages of reaming are radial nerve injury and heat necrosis.\[9\] Impairment of shoulder function is very common is case with IM nail.

Causes of shoulder dysfunction are\[10\]

1) injury to rotator cuff
2) prominent proximal end of nail
3) adhesive capsulitis
4) lack of early and vigourome physiotherapy

To avoid this retrograde nailing was tried but that has not been accepted by surgeon. There is risk of
iatrogenic supracondylar fracture. If the diameter of medullary canal is less than 8 mm then one may have to resort to Titanium elastic nail or Ender’s nail.\cite{5}

**Conclusion:**

Most of result of fracture union is both im nail and dcp/lcp more or less similar in our study. Slight distraction of fracture fragment with improper size of im nail can lead to non union. Shoulder function impairment is major drawback in fixation with intramedullary nail. In fixation with DCP / LCP the shoulder dysfunction can be absolutely minimised.

**References:**

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