Biological Outcome Of Single Proximal And Single Distal Screw In Intramedullary Interlocking Nailing Of Fractures Of Femur In An Only State Trauma Centre-is it justified? - A prospective study

A Qayum, B Mir, M Halwai

Citation

Abstract
ILN is known for being one of the best methods for the fractures of femur. Enough of material is there regarding various methods for the treatment of fractures of femur. we studied this method for those fractures which were stable in function and rotation. Rather than going for two screws we preferred this method .The objective of this study is to get another less time-consuming method in armamentarium of interlocking surgeons and study the advantages of this method of fixation over the previous method of double screw usage.30 [n=30] patients were operated between march 2004-jan 2007 using only single proximal and single distal screws. 60 % were males and 20% females. Age range was 18-60 years.7[n=7]cases, 23.3% had fracture at proximal 3rd level,4[n=4],13.3% % had fracture at middle 3rd level,5[n=5],16.66% had fracture at distal 3rd level. Union was achieved in all the patients. There was delayed union in 2[n=2],6.6% cases .No non-union or malunion was observed .2[n=2],6.66 % had infection at screw site with 5’ of valgus.We also observed shortening ,<2cms in 2[n=2],6.66% cases and proximal nail migration in 1[n=1] 13.33%. There was less operative time, less radiation due to C_ARM, only small stab incision was given.. We didn’t note any unfavourable influence on the weight bearing and fracture stability or union. It could be another less invasive tool in treating these fractures s of femur of stable variety.

INTRODUCTION
The femoral shaft fractures are very commonly encountered. These may result in severe disability unless the treatment is appropriate.

Reamed nailing for fractures has already got established. Interlocking nailing widens the surgical indications of nailing, allowing it to be used for comminuted fractures, on fractures too proximal or too distal. These are often the result of high energy trauma. Prolonged Anesthesia and Radiation both to the surgeon and the patient is a real hazard.

These fractures being already life threatening from an open wound, fat embolism covert or overt ,ARDS and resultant multiple organ failure, can be better off with less invasive surgical procedure and anesthetic time.

30 cases with closed femoral fractures admitted in Bone & joint Hospital were taken up . The purpose was to assess the results of application of this technique to these patients visa- its influence on fracture stability and overall union.

MATERIAL AND METHODS
30 patients with closed diaphyseal femoral fractures were included in this study. The age of all these patients was more than 18 years

We excluded:
- compound fractures 
- multiple trauma
- >3wk old trauma
- path fractures 
- patients with unstable knee 
- Heavy patients.

SURGERY
Biological Outcome Of Single Proximal And Single Distal Screw In Intramedullary Interlocking Nailing Of Fractures Of Femur In An Only State Trauma Centre-is it justified? - A prospective study

Figure 1
Figure 1; Screw infection

Figure 2
Figure 2; Shortening visualised

Figure 3
Figure 3; Proximal nail migration
After proper anesthesia the patient was placed supine and traction table was used. The

**Figure 4**
Figure 4: operative position used

affected limb was adducted and the hip flexed to 25-30°. The incision was given from just distal to the greater trochanter to about 7-8 cms proximal & posterior.

Using a curved awl, pyriform fossa was opened in the midplane of femur in both AP &

**Figure 5**
Figure 5: Draping and incision

lateral views. Manipulative reduction of the fracture was done and a 3.2 mm guide rod was introduced. Femur was reamed over the guide wire by means of various sized reamers in 0.5 mm increments. Proximal femur was reamed 1mm more than the predetermined diameter of the nail. The nail was introduced and seated. Proximal locking was done by means of a jig and the distal locking was done by freehand technique.
All patients were assessed thoroughly and investigated.

**POSTOPERATIVE REHABILITATION**

On first postop day quadriceps muscle setting exercises and range of motion was begun on the morning after operation. Progressive weight bearing was allowed depending upon clinical & radiological union.

Monthly review was done until final assessment at 6 months.

**RESULTS**

The results were assessed as under:

**Figure 8**

1-AGE

<table>
<thead>
<tr>
<th>Serial number</th>
<th>Age range</th>
<th>Number</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18-32</td>
<td>16</td>
<td>53.33%</td>
</tr>
<tr>
<td>2</td>
<td>33-42</td>
<td>6</td>
<td>20%</td>
</tr>
<tr>
<td>3</td>
<td>43-52</td>
<td>5</td>
<td>16.67%</td>
</tr>
<tr>
<td>4</td>
<td>53-55</td>
<td>3</td>
<td>10%</td>
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</table>

The mean age of the patients was 32 years. This reflects the involvement of the younger population in outdoor activities.

**Figure 9**

2-SEX

<table>
<thead>
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<th>S.NO</th>
<th>Sex</th>
<th>No.</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>male</td>
<td>18</td>
<td>60</td>
</tr>
<tr>
<td>2</td>
<td>female</td>
<td>12</td>
<td>40</td>
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</tbody>
</table>

**Figure 10**

3-SIDE INVOLVED

<table>
<thead>
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<th>Left</th>
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<tbody>
<tr>
<td></td>
<td>14</td>
<td>16</td>
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</table>

**Figure 11**

4-MODE OF INJURY

<table>
<thead>
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<th>S.No</th>
<th>Mode of injury</th>
<th>No. of cases</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RTA</td>
<td>18</td>
<td>60</td>
</tr>
<tr>
<td>2</td>
<td>Fall</td>
<td>12</td>
<td>40</td>
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</table>

**Figure 12**

5-SITE OF FRACTURE

<table>
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<tr>
<th>Site</th>
<th>No. of cases</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal</td>
<td>7</td>
<td>23.3</td>
</tr>
<tr>
<td>Middle</td>
<td>4</td>
<td>13.33</td>
</tr>
<tr>
<td>Distal</td>
<td>5</td>
<td>16.66</td>
</tr>
<tr>
<td>Junction of prox &amp; middle</td>
<td>9</td>
<td>30</td>
</tr>
<tr>
<td>Junction of middle &amp; distal</td>
<td>5</td>
<td>16.66</td>
</tr>
</tbody>
</table>
7 - 28 cases were locked statically & 2 dynamically as the fracture was too proximal in these. One case was dynamised in a delayed manner at 18 wks.

8- 12\[n=12]\40% cases showed a callus appearance at 7wks and 13.3% cases at 12 wks

**Figure 14**
Figure 8; Progressive union

However, 25 \[n=25]\83.3% cases showed a callus formation from 4-8 wks.

9 -87% cases showed full ROM and 13% showed some restriction of motion in the adjacent joints.
DISCUSSION

Diaphyseal fractures of the femur represent a major chunk of the skeletal system injuries and mostly affect active young adults. Closed intramedullary locked nailing is a standard method for these fractures. The biologically good effects of physiological loading on fracture healing are well known. Early weight bearing improves vascularisation, enhances fracture healing. We didn’t note any disturbances in weight bearing using single screws.

The advantages of intramedullary nailing in the treatment of patients who have displaced diaphyseal fractures of femur are well documented and complex fractures that are unstable in length or rotation can be treated with closed intramedullary nailing using two screws with few complications. However, the fractures stable in length and rotation can be managed using single screws.

Preservation of length, alignment and rotation have been facilitated by the introduction of the intramedullary nails with locking capabilities, thereby extending the indications of the technique to even highly comminuted femur fractures. The risk of infection and non-union is low, the hospital stay is relatively low and early movement by the patient is possible.

According to Gross & Kempf, interlocking nailing can be used to any fracture of the femur provided about 3-4cm of bone is intact proximal & distal to the fracture site.

Reaming nailing for lower limb fractures is a well-established technique and several reports have evaluated its results. Interlocking nailing for long bone fractures of the lower limb have greatly increased the scope of the technique of closed intramedullary interlocking nailing.

The average time between injury & surgery was about 5 days which was due to the huge workload in our hospital. Satisfactory closed reduction was performed in all the cases.

The nail diameters used in our study were in the range of 9-11mm. Other studies show the use of the nail of 13-14mm. Racial differences in the bony dimensions are responsible for this variability.

Infection rate of 6.66%, two patients with infection at distal screw site was noted by us.

Majority of the cases in this series ended up with a stable fixation with early rehabilitation, mobilization & return to
work. This technique of using one one proximal and one distal screw doesn’t in an way compromise the stability of fracture.

CONCLUSION

Interlocking intramedullary nailing gave satisfactory results in our study. About 2 cases (6.66%) delayed unions were noted. No non-unions or malunions were noted.

Based on the present study it could be concluded that:

1. This technique is as efficient as the conventional two screw technique
2. It doesn’t expose the patient to an undue risk of infection or nonunion.
3. It reduces surgical time, radiation exposure and prolonged anesthesia.
4. It decreases the length of hospital stay further.
5. It is a minimally invasive procedure.
6. It doesn’t hamper fracture stability.

References

8. Rockwood & Green, fractures in adults 5th edition, vo2, page 1698-1725
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