TO DETERMINE THE RATE OF UNION, COMPLICATIONS, AND FUNCTIONAL OUTCOMES IN INTERTROCHANTERIC FRACTURES TREATED BY PFN

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Abstract:
Introduction: Intertrochanteric fractures are commonly seen in patients over 70yrs of age. Incidence of these fractures has increased primarily due to increasing life span and more sedentary life style brought by urbanization. In younger population, IT fracture occurs due to high velocity trauma, whereas in elderly population, it is most often due to trivial trauma.

Discussion: At present it is generally believed that all intertrochanteric fractures should be internally fixed to reduce the morbidity and mortality of the patient. But the appropriate method and the ideal implant by which to fix the intertrochanteric fractures I still in debate. Because each method having its own advantages and disadvantages.

In the present study 30 patients of either sex with intertrochanteric fractures were studied.

Conclusion: Literature suggests that Dynamic hip screw is the gold standard for treatment of stable type of intertrochanteric fractures as well as unstable types. According to our study and use of Proximal femoral nail in intertrochanteric fractures we can say that: proximal femoral nail can be considered the most judicious and rational method of treating intertrochanteric fractures, especially the unstable and reverse oblique type.

Key words: Intertrocanteric fracture, PFN, DHS, Peritrochanteric fracture
Introduction

Intertrochanteric fractures are commonly seen in patients over 70yrs of age. Incidence of these fractures has increased primarily due to increasing life span and more sedentary life style brought by urbanization. In younger population, IT fracture occurs due to high velocity trauma, whereas in elderly population, it is most often due to trivial trauma.

Incidence of intertrochanteric fractures is more in females compared to males due to osteoporosis. Mortality ranges between 15%-20 %.

IT fractures can be managed by conservative or operative methods. Conservative methods were the treatment of choice until 1960 before the introduction of new fixation devices. As conservative methods resulted in higher mortality rates and complications like decubitus ulcer, urinary tract infections, pneumonia, thromboembolic complications. These methods have been abandoned. Conservative methods are now indicated under 2 conditions:

(i) Elderly person with high medical risk for anaesthesia and surgery.
(ii) Non ambulatory patient with minimal discomfort following injury.

Rigid Internal fixation and early mobilization has been the standard method of treatment.

Strength of fracture implant assembly depends on the following variables:

- Bone quality
- Fragment geometry
- Reduction
- Implant type
- Implant placement

Surgeon can control only the quality of reduction, choice of implant and its placement.

Implants for the fixation of intertrochanteric fractures can broadly be divided into:

- Extramedullary devices, ex:- DHS.
- Intramedullary devices ex:- PFN.

DHS with side plate assembly is most commonly used device for fixation of intertrochanteric fractures. It is a non collapsable fixation device, which permits the proximal fragment to collapse or settle on the fixation device seeking its own position of stability.

The latest implant for management of intertrochanteric fracture is PFN. This implant is a cephalomedullary device and has many potential advantages like:

- Being intramedullary, load transfer is more efficient.
- Shorter lever arm results in less transfer of the stress and hence less chance of implant failures.
- Advantage of controlled impaction is maintained.
- Amount of sliding is limited by intramedullary location, therefore less chance of shortening and deformity.
- Shorter operative time, less soft tissue dissection and less blood loss.

The sliding hip screw has been considered the choice because fracture union predictably occurs. A problem with sliding hip screws is collapse of the femoral neck, leading to loss of hip offset and shortening of leg. Therefore a new intramedullary device Proximal Femoral Nail was designed in 1996 which gives an advantage of minimally invasive surgery.

Here is an effort to study the results of Proximal Femoral Nail in the management of intertrochanteric fractures by analysing the factors which influence the postoperative mobility.

Objectives

To determine the rate of union, complications, and functional outcomes in intertrochanteric fractures treated by PFN

Materials And Methods

The material for the present study was obtained from the patients admitted in, Department of Orthopaedics with diagnosis of intertrochanteric fractures. A minimum of 30 cases were taken and the patients were informed about the study in all respects and informed consent was obtained from each patient. Study was conducted for two years.

Methods Of Collection Of Data

All the patients coming with intertrochanteric fractures would be reviewed for inclusion and exclusion criteria and treatment with Proximal Femoral Nail. The patient fitting into inclusion criteria would form the study group.

Inclusion criteria:

1. Patients above 18 years of age
2. All intertrochanteric fractures treated with PFN
Exclusion criteria:

1. Intertrochanteric fracture with subtrochanteric extension
2. Pathological fractures

Intraoperative photos

Results And Observation

The study involved 30 confirmed cases of intertrochanteric fractures of either sex. All the cases were treated with intramedullary fixation – “Proximal femoral nail”. The analysis of the patient data & postoperative outcome is as follows

Age

The study involved patients above 18 years of age. The average age was 65.7 years the largest group of patients being from >60 years

<table>
<thead>
<tr>
<th>Age</th>
<th>No of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 to 40 yrs</td>
<td>3</td>
</tr>
<tr>
<td>41 to 60 yrs</td>
<td>7</td>
</tr>
<tr>
<td>&gt;60 yrs</td>
<td>20</td>
</tr>
</tbody>
</table>

Sex

There were 13 males and 17 females in the study

<table>
<thead>
<tr>
<th>Sex</th>
<th>No of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>13</td>
</tr>
<tr>
<td>Female</td>
<td>17</td>
</tr>
</tbody>
</table>

Side of fracture-

There were 18 right and 12 left side fractures

<table>
<thead>
<tr>
<th>Side</th>
<th>No of Fractures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right</td>
<td>18</td>
</tr>
<tr>
<td>Left</td>
<td>12</td>
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</tbody>
</table>

Mode of injury

Domestic fall and road traffic accidents were the mode of injury in all patients. Most of the patients with domestic fall were older in age.

<table>
<thead>
<tr>
<th>Mode of Injury</th>
<th>No of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTA</td>
<td>6</td>
</tr>
<tr>
<td>Fall</td>
<td>24</td>
</tr>
</tbody>
</table>
Fracture patterns: All the fractures were classified as per Boyd & Griffin classification

<table>
<thead>
<tr>
<th>Type of fracture (Boyd &amp; Griffin)</th>
<th>No. of patients %</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>7 (23%)</td>
</tr>
<tr>
<td>II</td>
<td>14 (47%)</td>
</tr>
<tr>
<td>III</td>
<td>6 (20%)</td>
</tr>
<tr>
<td>IV</td>
<td>3 (10%)</td>
</tr>
</tbody>
</table>

Discussion

The successful treatment of intertrochanteric fractures depends on many factors like:

- Age of the patient
- Pts general health
- Time from fracture to treatment
- The adequacy of treatment
- Concurrent medical illness
- Stability of fixation

At present it is generally believed that all intertrochanteric fractures should be internally fixed to reduce the morbidity and mortality of the patient. But the appropriate method and the ideal implant by which to fix the intertrochanteric fractures is still in debate. Because each method having its own advantages and disadvantages.

In the present study 30 patients of either sex with intertrochanteric fractures were studied.

In our study the average age
was 65.7 years which was comparable to Indian as well as western authors with similar study.

We had an nearly equal male:female ratio, unlike male predominance in the Indian authors and female in western.

The most common mode of injury in our study was domestic fall 80%, which is comparable to most Indian studies. This was also affected by the age as the older the patient more likely he/she getting the fracture by domestic falls.

Osteoporosis was measured by Singh’s index. More osteoporosis was present in the older patient and postmenopausal females. In our study 28% had grade II and III, 24% had grade IV, 17% grade V and 3% grade VI.

In our study 47% had type II Boyd & Griffin fracture. The average operating time was 70min from the incision to closure. We had a greater operating time in the beginning which reduced greatly in the later part of the study. This signifies the learning curve of the Proximal femoral nail.

Total complications in our study were 13.33%. We had 6.66% of infection in which one was superficial and treated with antibiotics and dressing in the ward and healed well. Second was deep infection (methicillin resistant staphylococcal infection) which required debridement but patient died of septicemia. There were no cases of Z-effect or non-union in our study.

Results were evaluated by Kyle’s criteria in our series we had 47% excellent, 37% good, 13% fair and 3% poor results.

In the series of 295 patients with trochanteric fractures treated with PFN by Domingo et al33 the average age of the patient was 80 years, which possibly accounted for 27% of the patients developed complications in the immediate postoperative period.

The success of Proximal femoral nail depended on good surgical technique, proper instrumentation and good C-arm visualization. All the patients were operated on fracture table. We found following six advantages

- Reduction with traction is easier
- Less assistance is required
- Manipulation of the patient is reduced to minimum
- Trauma to patient is decreased
- Better use of C-arm with better visibility.

Placement of the patient on the fracture table is important, for better access to the greater trochanter the upper body is abducted away 10-15°. Position of C-arm should be such that proximal femur is seen properly in AP and lateral view.

The anatomical reduction and secure fixation of the patient on the operating table are absolutely vital for easy handling and good surgical result. If reduction was not achieved by traction and manipulation then nail reduction was done, in which nail was introduced in the proximal fragment and reduction was tried by rotational movements and compression by the nail. In our study no patients required open reduction.

The entry point of the nail was taken on the tip or lateral part of the greater trochanter. As the nail has 60° of valgus angle medial entry point causes more distraction of the fracture.

The hip pin is inserted 5mm away from the subchondral bone in the lower half in the AP view and centre on the neck in lateral view. The cervical pin is placed parallel to the hip pin in AP view and overlapping it in the lateral view. It should be 10mm shorter than the hip pin from the subchondral bone. This ensures that the cervical screw will not take the weight load but only fulfil the anti-rotational function. Failure to do this leads to the Z-effect. In which cervical pin backs out and the hip pin pierces the joint or vice-versa.

Distal locking was done with the interlocking bolt.

In our study one of the important factor was the cost of the implant as Proximal femoral nail is costly than the dynamic hip screw, but at the end it didn’t cause much of the difference as:

- Less operative time thus reducing the cost
- No or less need of transfusion of blood
- Less hospital stay
- Early return to daily activities.

Dynamic hip screw introduced by Clawson in 1964 remains the implant of choice due to its favourable results and low rate of complications. It provides control compression at the fracture site. Its use has been supported by its biomechanical properties which have been assumed to improve the healing of the fracture.

But Dynamic hip screw requires a relatively large exposure, more tissue trauma and anatomical reduction. All these increase the morbidity, probability of infection and significant blood loss. It also causes varus collapse leading to shortening and inability of the implant to survive until the fracture union.

The plate and screw device will weaken the bone mechanically. The common causes of fixation failure are instability of the fractures, osteoporosis, lack of anatomical reduction, failure of fixation device and incorrect placement of the screw.

We found proximal femoral nail to be more useful in unstable and reverse oblique patterns due to the fact...
that it has better axial telescoping and rotational stability. It has shown to be biomechanically stronger because they can withstand higher static and severe fold higher cyclical loading than dynamic hip screw. So the fracture heals without the primary restoration of the medial support. The implants compensates for the function of the medial column.

The gamma nail is associated with specific complications like anterior thigh pain, fracture at the tip of the nail. But proximal femoral nail is long and it has smaller diameter at the tip which reduces the stress concentration at the tip.

Its position is near to the weight bearing axis so the stress generated on the implant is negligible. Proximal femoral nail also acts as buttress in preventing the medialization of the shaft. The entry point of the proximal femoral nail is at the tip of the greater trochanter so it reduces the damage to the hip abductors unlike the nails which has entry through pyriformis fossa. The hip screw and the anti-rotation cervical screw of the proximal femoral nail adequately compress the fracture, leaving between them adequate bone block for further revision should the need arise.

Conclusion

Literature suggests that Dynamic hip screw is the gold standard for treatment of stable type of intertrochanteric fractures as well as unstable types.

According to our study and use of Proximal femoral nail in intertrochanteric fractures we can say that:

Proximal Femoral Nail Can Be Considered The Most Judicious And Rational Method Of Treating Intertrochanteric Fractures

especially the unstable and reverse oblique type. The reason to support this are:

- It can be used in all configurations of proximal femoral fractures.
- It is a closed method thus preserves the fracture hematoma and yields. early healing and early union.
- It can be used with equally good results in all grades of osteoporosis.
- It is a quick procedure with small incision and with significantly less amount of blood loss.
- It gives good results even with non-anatomical reduction.
- Hip screw and cervical screw placement is important. They have to be parallel in AP and overlapping in lateral. And cervical screw 10mm shorter than hip screw to avoid “Z-effect”.
- Nail entry is on the tip of the greater trochanter or lateral to it as medial entry will cause distraction.
- Complications were minimal and comparable with any other fracture system.

But Proximal femoral nailing requires a higher surgical skill, good fracture table, good instrumentation and good C-arm control. It has a steep learning curve.

Thus we can conclude that the PROXIMAL FEMORAL NAIL is after proper training and technique a safe and easy implant option for treatment of complex intertrochanteric fractures.

Summary

- 30 patients of either sex with intertrochanteric fractures were studied with follow up up to 6 months.
- The average age of the patient was 65.7 years with predominance of female of 57%.
- 80% were due to domestic fall and 20% due to road traffic accidents.
- 28% had grade II and grade III, 24% had grade IV osteoporosis.
- The average operating time was 70 min.
- Total complications were 13.33% with infection 6.6%, shortening< one inch 6.6%.
- We had 47% excellent, 37%good, 13% fair, 3% poor results according to Kyle’s criteria.
- Our results were comparable with most of the similar studies.

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