Efficacy of external fixation in high risk intertrochantric fracture of femur patients

Pawan Jadhav

Department of Orthopaedics, Indian Institute of Medical Science & Research College and Noor Hospital, Warudi, Taluka Badnapur, Dist. Jalna, Maharashtra, INDIA.
Email: drpawanjadhav@yahoo.co.in

Abstract

Introduction: Hip fractures are a leading cause of death and disability among the elderly. Treatment goals for this patient include early rehabilitation, restoration of the anatomic alignment of the proximal part of the femur and maintenance of the fracture reduction. Various treatment modalities have been explained by various authors. But the treatment of choice in high surgical risk elderly patients is not clear. Aims and objectives: To study the efficacy of external fixation in a group of high surgical risk elderly patients. Materials and methods: 20 cases of intertrochantric fracture of femur with ASA grade more than 2 were studied. First the fracture reduction was achieved using standard procedure. The reduction was confirmed in two planes that is, anteroposterior and lateral view on x-ray or c-arm. Schanz screws and connecting AO clamps were used as external fixators. The surgical time blood loss was recorded. Average hospital stay and post operative complications were recorded. Results: Majority of the patients were in grade III and IV of Tronzo fracture grading. According to the ASA grading majority (55%) of the patients were in ASA III grade. Superficial infection was the most common complication. In 7 cases malunion was observed. One case was reported as delayed union for which continuation of the fixator was needed for 14 weeks. There was no case of nonunion. The neck shaft angle in 13 patients was excellent (between 125 to 135 degrees). In two patients it was fair (between 110 and 125 degrees). In one patients it was poor (<110 degrees). The final outcome was not measured in 4 cases because they lost to follow-up. Two patients died in the curse of treatment. The cause was unrelated to the fracture fixation. Conclusions: External fixation can be used as method of choice in high-risk geriatric patients with intertrochanteric fractures.

Key words: intertrochantric fracture of femur, external fixation, high risk patients.

Address for Correspondence:
Dr. Pawan Jadhav, Department of Orthopaedics, Indian Institute of Medical Science & Research College and Noor Hospital, Warudi, Taluka Badnapur, Dist. Jalna, Maharashtra, INDIA.
Email: drpawanjadhav@yahoo.co.in
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INTRODUCTION

Hip fractures are a leading cause of death and disability among the elderly.1,2 Treatment goals for these patient include early rehabilitation, restoration of the anatomic alignment of the proximal part of the femur and maintenance of the fracture reduction.3 The sliding hip screw is widely used for fixation of intertrochanteric fractures.4,5,6 Sliding hip-screw fixation is quick and straightforward and it utilizes controlled impacting during weight bearing to stabilize the fracture, thus facilitating healing.7 However internal fixation using dynamic hip screw is associated with intraoperative blood loss and prolonged anesthesia. The elderly patients are high risk patients for surgery. Conservative treatment is a bad alternative as it is associated with mortality rate up to 60%. The functional results following fixation of intertrochanteric fractures with a sliding hip screw in osteoporotic bone are sometimes unsatisfactory because of failure of the fixation or failure to reestablish acceptable hip biomechanics.2,7 During the 1950s, external fixation was used to treat intertrochanteric fractures, but a high prevalence of postoperative complication such as pin loosening, infection and mechanical failure of the fixator caused surgeons to discontinue its use.5 Newly developed external fixators prompted us to reconsider external fixation as a suitable treatment option for high risk patients. Thus the present study was conducted with the assumption that, the combination of a minimally invasive...
procedure and the external fixation would improve the clinical outcome in patients who are at high risk for osteosynthesis.

AIMS AND OBJECTIVES
To study the efficacy of external fixation in a group of high surgical risk elderly patients.

MATERIALS AND METHODS
The present study was conducted among the patients with intertrochanteric fracture and was unfit for anesthesia. Following inclusion and exclusion criteria was used to select the study subjects.

Inclusion criteria
- elderly patients with intertrochanteric fracture
- more than ASA II grade

Exclusion criteria
- A fracture secondary to a malignant tumor,
- Multiple fractures
- Cerebrovascular accidents, Compromised hepatic and renal function, Malignancy with disseminated metastasis or Severe anemia (hemoglobin<6 g%)

By using above mentioned inclusion and exclusion criteria 20 patients of intertrochanteric fracture with associated co-morbid conditions like Poor cardiopulmonary status, Uncontrolled diabetes mellitus, Compromised hepatic and renal function, Malignancy with disseminated metastasis or Severe anemia (hemoglobin<6 g%) were selected.

After receiving approval from the institutional ethical committee and informed consent from the patients the study was started. All the patients were examined in detail and the findings were recorded on proforma. Tronzo grading was used to classify the fracture. In the preoperative medication, antibiotics such as cephalosporin (1gm iv) and amikacin (750mg iv) were administered preoperatively and then every eight hours for three days. Sedation was done in selected patients depending on the requirement.

Implants
- Schanz screws: in the present study two types of self drilling schanz screws were used with 9 inch length and 4.5 mm diameter each. One type had 6.5 mm thread diameter whereas other had 7.5 mm thread diameter with self tapping tip.
- Connecting clamps: AO type and aesculap types were used.

Surgical procedure

RESULTS

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. of patients (n=20)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70-80</td>
<td>8</td>
<td>40%</td>
</tr>
<tr>
<td>60-70</td>
<td>6</td>
<td>30%</td>
</tr>
<tr>
<td>50-60</td>
<td>5</td>
<td>25%</td>
</tr>
</tbody>
</table>
It was observed that majority of the patients with intertrochantric fracture were more than 60 years of age. 55% study subjects were male. The fractures were classified using Tronzo fracture grading. It was observed that majority of the patients were in grade III and IV. According to the ASA grading majority (55%) of the patients were in ASA III grade.

<table>
<thead>
<tr>
<th>Complication</th>
<th>No. of patients (n=20)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial infection</td>
<td>8</td>
<td>40%</td>
</tr>
<tr>
<td>Deep pin-tract infection</td>
<td>1</td>
<td>05%</td>
</tr>
<tr>
<td>Pin bending</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>Pin breakage</td>
<td>1</td>
<td>05%</td>
</tr>
<tr>
<td>Pin cutout</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>Malunion</td>
<td>7</td>
<td>35%</td>
</tr>
<tr>
<td>Delayed union</td>
<td>1</td>
<td>05%</td>
</tr>
<tr>
<td>Nonunion</td>
<td>0</td>
<td>00%</td>
</tr>
</tbody>
</table>

Figure 1: Distribution of patients according to complication

Superficial infection was the most common complication. A total of eight cases (40%) were having superficial type of infection and were treated with daily dressing and antibiotics. In one patient deep pin-tract infection was associated with continuous discharge from the pin tract site and active signs of infection from the pin tracts. Intravenous antibiotics and supervised dressings was done but was a case of chronic renal failure with diabetes mellitus with ischemic heart disease and died due to septicemia. There were two cases of pin bending. One case developed pin breakage at the shaft thread level. In two cases pin cutout occurred. It is defined as varus collapse of the fracture with the femoral neck shaft angle less than 110 degrees and with extrusion of screw from femoral head exceeding 1mm. At the end of six months, neck shaft angle was measured. All angles above 125 degrees are labeled excellent union and below 110 degrees were labeled as poor union. Thus in 7 cases malunion was observed. One case was reported as delayed union for which continuation of the fixator was needed for 14 weeks. There was no case of nonunion.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>No. of patients (n=20)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>13</td>
<td>65%</td>
</tr>
<tr>
<td>Fair</td>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>Poor</td>
<td>1</td>
<td>05%</td>
</tr>
<tr>
<td>Lost follow up</td>
<td>4</td>
<td>20%</td>
</tr>
<tr>
<td>Died</td>
<td>2</td>
<td>10%</td>
</tr>
</tbody>
</table>

Figure 2: Distribution of patients according to outcome

In the present study the union rate was 100% and the average time of union was 6 weeks. The neck shaft angle in 13 patients was excellent (between 125 to 135 degrees). In two patients it was fair (between 110 and 125 degrees). In one patients it was poor (<110 degrees). The final outcome was not measured in 4 cases because they lost to follow-up. Two patients died in the course of
treatment. The cause was unrelated to the fracture fixation.

**DISCUSSION**

Longer life-span has been accompanied by an increase in the incidence of intertrochanteric fractures, which mainly occur in the elderly. Open reduction and internal fixation is the gold standard treatment in the fracture neck femur. But the morbidity and mortality rates are very high if the patients are elderly with significant co-morbid factors. Nonoperative treatment also involves prolonged immobilization and hospitalization, and it is also associated with many problems and high mortality. Thus a method with the least blood loss, least procedure time and which ultimately facilitates early mobilization in the postoperative period for obtaining a perfect reduction of inter trochanteric fracture among high-risk group is required. Thus the present study was undertaken by using schanz screws and connecting AO clamps as external fixators in the management of inter trochanteric fracture among high-risk group patients. Total 20 patients with various associated co-morbid condition were included in the present study. Majority of the patients with intertrochanteric fracture were more than 60 years of age. The average patient age was 65.5 years. 55% study patients were male. Tronzo described a classification based on reduction potential. He divided intertrochanteric fracture into 5 types, suggesting a specific mode of reduction for each type, prior to fixation. The fractures were classified using Tronzo fracture grading. It was observed that majority of the patients were in grade III and IV. With regard to co-morbidities, according to the American Society of Anesthesiologist (ASA) scale, eleven patients in were classified as ASA III and three patients were classified as ASA IV and six patients were of death-on- table consent group (ASA V). It was seen that reduction was easy to achieve by using routine methods. The procedure was performed under local anesthesia thus the complication due to general and spinal anesthesia was prevented. Average operative time was 27 minutes. Initially it was one hour which was reduced to 20 minutes with the use of newly designed implants. Procedure is less time consuming thus decreasing the change of postoperative wound complications. Negligible or minimal blood loss during procedure, no need for blood transfusions during or postoperatively. Average hospital stay was 3 days. The trochanteric frame used was small and it did not interfere with sitting, lying or walking in conventional clothes. Thus the patients were more comfortable. The complication rate was high in the present study. But majority (40%) was superficial infection and was treated by antibiotics and daily dressing. There were two cases of pin bending. One case developed pin breakage at the shaft thread level. In two cases pin cutout occurred. In the present study 100% the union rate was achieved. The average time required for union was 6 weeks. At the end of six months, neck shaft angle was measured and the patients were categorized according to the angle form 90 up to 140 degrees. All angles above 125 degrees are labeled excellent and below 110 degrees were labeled as poor. It was observed that neck shaft angle in 13 patients was excellent. In two patients it was fair whereas in one patient it was poor. The final outcome was not measured in 4 cases because they lost to follow-up. Two patients died in the curse of treatment but the cause was unrelated to the fracture fixation. In the present study we had excellent results in 65%, fair in 10% and poor results in 5% which were comparatively better with other international studies. Our concern was to have controlled collapse at the fracture site slide sliding screw and side plate. We tried to use modified AO type clamps for holding proximal schanz screws on loosening of which, the controlled collapse was expected. But the result was unsatisfactory. But still, we were able to maintain neck-shafts angle reasonably well in 65% of the patients (between 125 and 135 degrees) in whom the fracture ultimately united at 6 weeks. Sala milenkovic et al reported putting two parallel steinman pins in the femoral head up to the subchondral level and again withdrawing these two mm 5 mm back creating a path along which controlled collapse occurred following mobilization. Similar to various authors, we also observed advantages of external fixation. The external fixator implants were cost effective because they can be reused. It saves times and decreased the anesthetic risk as general and regional anesthesia was avoided. Minimal blood loss and no need for postoperative blood transfusion were required. It avoids the complication of conservative treatment (chest infection, deep venous thrombosis, bed sores etc.). It also avoids the complication of major open surgery in the form of blood loss, the risk of general and regional anesthesia, cost hospitalization, would infection etc. Despite of these advantages, the external fixator has failed to become popular as most of the surgeons reported complications and infection being the most common. Cases of deep infection that required pin removal or repositioning have been reported. Vossinakis and Badras reported that pin track infection developed in 15 of their 50 patients (30%) treated with the Orthofix external fixator using standard pins. In our study also one case of pin-track infection was observed but the patients died sue to septicemia because of associated co morbid condition. Even though from the above mentioned advantages and disadvantages, we
believe that the use of appropriate external fixation for the management of intertrochanteric fracture in elderly patients with poor health is a valuable alternative. External fixation is minimally invasive and causes no additional tissue trauma. In elderly patients of poor health (ASA 3 or 4), who are often malnourished, stable fixation without surgical trauma could be vital for a faster recovery and mobilization, with reduced morbidity and mortality.  

Thus external fixation decreases the morbidity and mortality related to non-operative treatment as it minimizes surgical damage and blood loss. It allows early mobilization and reduces the length of the hospital stay. So rehabilitation is easier in these patients with better functional result. It is also effective whenever early elective surgery is not possible.

CONCLUSIONS

External fixation can be used as method of choice in high-risk geriatric patients with intertrochanteric fractures.

REFERENCES

3. Baumgaertner MR. the pertochanteric external fixator reduced pain, hospital stay, and mechanical complication in comparison with the sliding hip screw, J Bone joint surg Am.2002: 84:1488.
8. Sala milenkov, milorad mitkovic, Mile radenkovic, Gesinir mladenovic zoran golubovic, milos stanjovic; surgical treatment of the trochanteric fractures by using the external and internal fixation methods.

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