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CASE STUDY

MANAGEMENT OF IPSILATERAL INTERTROCHANCHTERIC FRACTURE AND SHAFT OF FEMUR WITH DHS AND DFN

Abdul Ghani, *Sumeet S Charak, Bias Dev, Khalid Muzzaffer and Suhail Bhat

Department of Orthopaedics, Government Medical College and Hospital, Jammu, India

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ABSTRACT

Background: Ipsilateral intertrochancteric ractures with fracture of shaft of femur are rare injuries. They warrant special diagnostic and therapeutic considerations. The aim was to study the results of operative treatment of ipsilateral intertrochanchteric and shaft femur fractures with dynamic hip screw (DHS) and retrograde nailing (DFN). Emphasis was posed on long- term functional outcome, especially daily activities.

Material and Methods: 8 patients (6 male and 2 female) with ipsilateral intertrochancteric and shaft of femur fractures were treated with various fixation devices. Functional outcome was assessed using the Friedman and Wyman classification.

Results: All the 8 intertrochancteric fractures united in a mean duration of 3 months. Of the femoral shaft fractures 6 united in a mean of 8.5 months, 2 non unions. One patient developed superficial infection, which resolved with debridement and antibiotic treatment. Functional results were good in 4 patients, fair in 2 and poor in 2.

Conclusion: Early diagnosis of all injuries and operative treatment are important to improve the functional outcome in ipsilateral intertrochancteric and shaft fractures. Basically, each technique has individual advantages and disadvantages, and all are technically demanding. Most important factor determines the outcome is the anatomical reduction and stable internal fixation of both fractures.

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INTRODUCTION

Ipsilateral femoral hip and shaft fractures are rare injuries. It was reported by Delaney and Street in 1953 (Delaney *et al*., 1953). Increase in the incidence may be due to better data reporting, better recognition of the injury pattern and better resuscitation efforts. In his systematic review, Alho reported the locations of the associated hip fracture as subcapital in 2%, midcervical in 21%, basicervical in 39%, peritrochanteric in 14%, and intertrochanteric in 24%. (Swiontowski *et al*., 1984) In a review of 52 patients with ipsilateral proximal femoral and shaft fractures, Only three fracture configurations were seen. The most common pattern was a basicervical neck fracture (AO 31-B2.1) in 55% followed by a vertical midcervical intracapsular shear pattern (AO 31-B2.3) in 35% and an intertrochanteric fracture through the greater trochanter (AO 31-A1.2) in 10%. This indicates that the majority of these proximal femoral fractures are extracapsular in location. All of the observed intracapsular femoral neck fractures were vertically oriented, making fixation particularly difficult in displaced patterns. Of the fractures that were initially missed, none were intertochanteric in location. (Alho, 1996) Normally, this type of injury is caused by high energy trauma like a motor vehicle accident, fall from height and industrial accidents. Associated injuries are very common (Alho, 1996). The delay in diagnosis of the intertrochanteric fracture is the result of several concurrent factors. Because of the presence of an ipsilateral fracture of the femoral shaft, AP imaging of the injured extremity before stabilization of the femoral shaft fracture is typically hampered by external rotation of the proximal femoral segment. (Daffner *et al*., 1991) Because these patients are frequently in severe discomfort as a result of their shaft fracture, suboptimal imaging of the hip may unfortunately be accepted. Even with careful positioning of the lower extremity for quality images of the hip as a part of the routine radiographic evaluation of a femoral shaft fracture, proximal segment control is inadequate because of the shaft fracture. The treatment of this combination of injuries continues to be controversial. Experience has led many authors to suggest that these two noncontiguous fractures should each be treated with an implant that optimizes fracture healing while simultaneously prioritizing the femoral neck fracture fixation. This is in large part because of the increased difficulty observed with managing complications associated with inadequate or suboptimal inter trochancteric fixation such as malunion,

Corresponding author:* **Sumeet S Charak,
Department of Orthopaedics, Government Medical College and Hospital, Jammu, India.

failure of fixation and non union. The major complications associated with failure of the available methods for treating the femoral shaft component of this injury combination are generally familiar and more straightforward. This has led to the recommendation that the intertrochanteric fracture should be treated with a sliding hip screw. The femoral shaft component can be treated with whichever method is most familiar and reliable, typically a retrograde femoral nail or lateral plate fixation. (Watson and Moed, 2002; Swiontkowski, 1987) Femoral plating combined with multiple screws or a sliding hip screw for the femoral neck fracture has yielded good results in several series. (Chen *et al*., 2000) But the ultimate goal of treatment is anatomical reduction and stable fixation of both fractures so that the patient can be mobilized early.

MATERIALS AND METHODS

The study period ranged from June 2014-December 2016. The total number of patients was eight. The study was conducted in Government Medical College hospital Jammu after ethical committee approval. Ipsilateral fracture of hip and shaft of the femur were included in our study. All the patients had plain radiographs of the pelvis including both hips, thigh including knee and hip joint. Both orthopaedic and non orthopaedic associated injuries are documented. Hip fractures were classified into two main groups, neck and peritrochanter. Patients with ipsilateral Neck fractures were excluded from the study. Boyd and Griffin classification was used for intertrochanteric fracture. The femoral shaft fractures were also classified with Winquist classification of comminution, (Winquist *et al*., 1984) site and also into open or closed fractures. All fractures in our study were closed fractures. Once the patient's general condition stabilized, they were treated with dynamic hip screw (DHS) plate with retrograde intramedullary nailing. In our series, other systemic injuries were found in 4 patients. Two patients had more than three bone fractures. One patient had head injury. Spinal and epidural anesthesia were used in 5 and 3 patients respectively. The proximal fracture is fixed first with dynamic hip screw (DHS) by lateral approach followed by distal femoral nailing by medial para-patellar approach. Internal rotation may be necessary to reduce the inter-trochancteric fracture into anatomical position, this is achieved by using joystick (uni-cortical steinman pin) in femur shaft few cms above the fracture. Fracture table was used for fixing inter trochancteric fracture and radiolucent table for fracture shaft femur with knee flexed in 30-40 degrees after painting and draping again. After the operation, patients were allowed to ambulate with partial weight bearing as early as possible. Quadriceps strengthening and knee-motion exercise were encouraged. Patients were followed-up in the outpatient department at 4-6 week intervals to assess the clinical and radio graphical fracture healing processes. Protected weight bearing was advised until bony union. Radiographical union was defined as bridging trabeculae across the fracture site or solid callus with cortical density connecting both fracture fragments. Nonunion was defined as a fracture site which remained unhealed one year after treatment or a fracture which required a second surgery to achieve union. (Wu and Shih, 1991; Wu, 2001) Functional results (Table 1) were assessed according to the Friedman and Wyman classification. (Friedman and Wyman, 1986)

RESULTS

The diagnosis of hip fracture was not delayed in our series. Hip fractures were classified into two main groups, neck (n = 0) and peritrochanter (n = 8). Among the femoral shaft fractures all were fractures. The data of shaft fracture pattern and grading of comminution are described below (Table 2 & 3) Mean duration of surgery is 140 min. Average blood loss is 450 ml. The mean union time was 12 weeks (range 6-28weeks) for hip fractures and 8.5 months (range 6-11 months) for shaft fractures. Time of fixation was generally within 7 days, expect one patient who was operated on 10 th day due to head injury. Complications were knee stiffness (two patients) and one superficial wound infection. 2 patients had delayed-union of the shaft of the femur in our series on 1.5 years follow up, which consolidated after bone grafting. Fat embolism was also not encountered in our series. Results (Table 4) were evaluated based on the criteria adopted by Friedman and Wyman classification. (Friedman and Wyman, 1986) Four patients (50%) had a good functional result, two patients (25%) had fair result and in two patients the result (25%) was poor.

Table 1. Functional assessment system adopted from Friedman and Wyman (1986)

Pain	Loss of hip or knee range of movement
Nil	<20 percent
Mild to moderate	20-50 percent
Severe	>50 percent

Table 2. The level of fracture in the femoral shaft

Location	No. of Patients
Middle 3rd	5
Lower 3rd	3
Total	8

Table 3. The grading of comminution (Winquist) of femoral shaft fracture

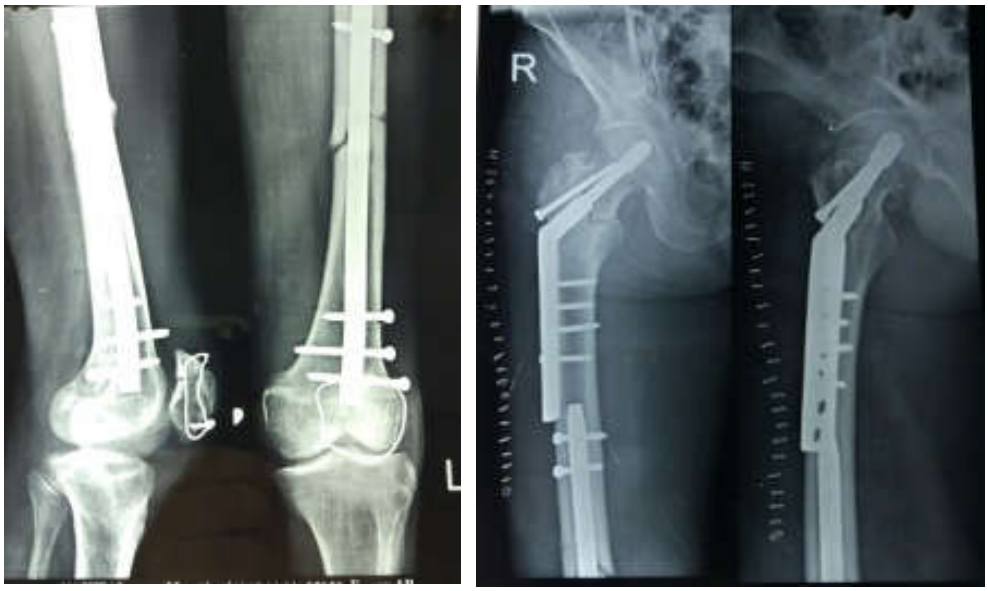
Comminution (Winquist)	No of patients
Grade I	4
Grade II	1
Grade III	3
Grade IV	0
Total	8

DISCUSSION

Ipsilateral femoral hip and shaft fractures are a challenge to the orthopaedic surgeons. High velocity injury like traffic accidents accounts for majority of cases. Most of the patients were young men and had multi-system injuries. Associated injuries are quite common, because of the high velocity impact, (Friedman and Wyman, 1986; Zettas and Zettas, 1981; Casey and Chapman, 1979; Bernstein, 1974). The diagnosis of hip fracture can be easily missed, if an anteroposterior radiograph of pelvis or hip is not taken. Early recognition of all fractures is of paramount importance in planning the surgical treatment, and is the first step towards good results. A careful examination and proper radiographs of the hip are necessary. In our opinion, entire shaft, hip and knee-joint X-rays are mandatory, to minimize the late detection of these injuries. Three major issues in this type of fracture management are 1) optimal timing of fracture stabilization, 2) deciding which fracture should be stabilized first inter trochancteric followed by shaft 3) optimal hardware combinations for fixation. Polytrauma patients with long bone fractures are advised to undergo surgical stabilization as early as possible. Early fixation removes the

Case 1

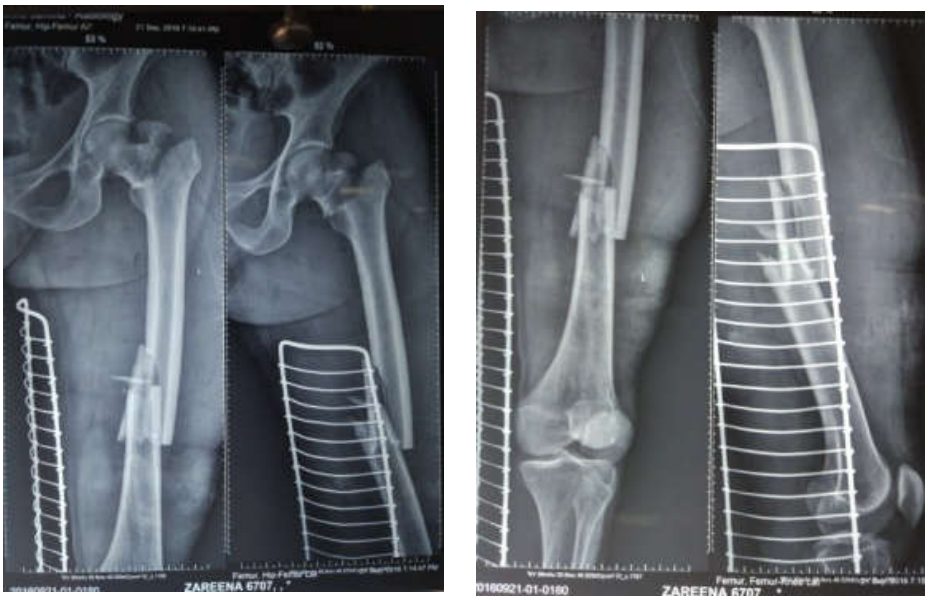
PRE-OP



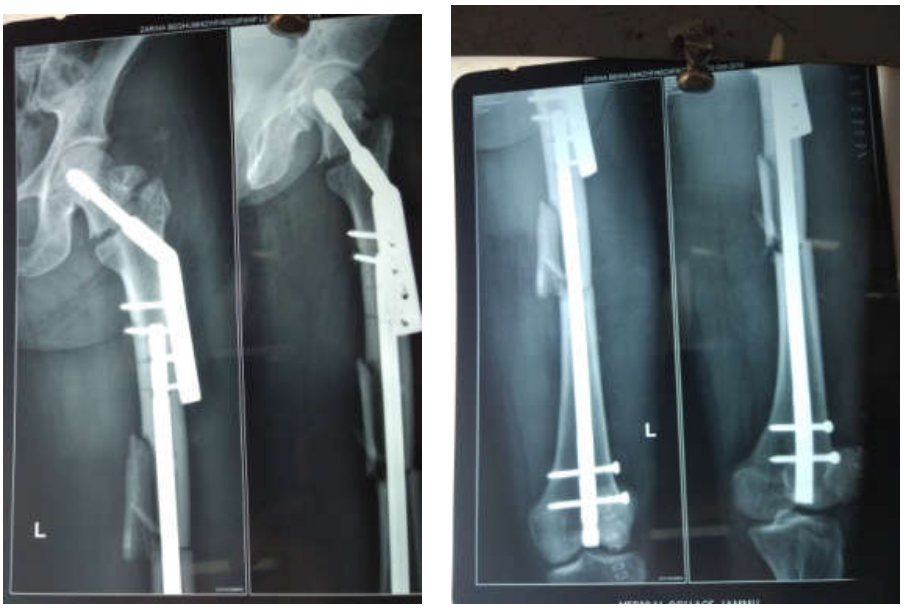
POST-OP

After 6 months

Case 2



PRE-OP



POST-OP

After 6 Months

Master chart

S.No	Age/ sex	Shaft fracture classification (winquist and hansen)	Hip fracture classification (boyd and griffin)	Associated injury	Complications	Function
1	30/M	II	III	Tibial shaft fracture	superficial infection, delayed shaft, knee stiffness	Poor
2	35/M	I	I	Clavicle, distal radius, metatarsals fractures	-	Good
3	63/M	I	I	-	-	Good
4	52/M	I	II	-	-	Good
5	55/m	III	I	-	-	Fair
6	24/F	III	I	Opp shaft of femur, head injury	Delayed union shaft	Poor
7	27/M	II	I	Proximal tibia	-	Fair
8	55/M	I	II	-	-	Good

fracture hematoma at the fracture site and minimizes the cascade of inflammatory mediators that may contribute to multisystem organ failure. Early fixation allows easier nursing care as it reduces the prolonged bedridden complications of skeletal traction and reduces hospital stay. Swiontkowski *et al*. (1984) gave priority to fixation of femoral hip fractures first as it is minimally displaced and shaft fractures were fixed next. None of the documented cases in the world literature have proved the superiority of a particular treatment protocol over the other. The pendulum has shifted from conservative management to operative treatment and the lack of consensus about best modality of fixation has lead to evolution of various techniques and numerous implants over a period of time. Basically, each device has individual advantages and disadvantages. Ultimate aim is to obtain stable internal fixation of both fractures by whatever means of internal fixation, familiar to the surgeon.

Complications

Infection

In the present study there was no case of knee sepsis, only 1 case developed superficial infection. The following factors were responsible for the decreased incidence of infection in our study:

i. Only closed cases were selected.
ii. Meticulous preoperative preparation of operative site.
iii. Use of perioperative and postoperative antibiotics
iv. Thorough lavage of the joint at the end of procedure and use of suction drain in all the cases.

Delayed union

There were 1 cases of delayed union in shaft fracture, which consolidated after bone grafting. There was no case of nonunion in the present series. All the inter trochanchteric fracture heal uneventfully.

Conclusion

Early diagnosis and surgical treatment are important for the better functional outcome in the management of ipsilateral fracture of the hip and shaft of the femur. Basically, each technique has individual advantages, disadvantages and is technically demanding. Most important factor determines the outcome of this combined injury is the anatomical reduction and stable internal fixation of both.

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