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Functional outcome in intertrochanteric fractures treated with proximal femoral nail

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Abstract

The most widespread internal fixation device used today is the fixed angle extramedullary device, such as a 95-degree lag screw and side plate or blade plate. This implant includes a large lag screw positioned in the center of the femoral neck and head and a side plate alongside the lateral femur. The screw-plate interface angle is changeable and depends on the anatomy of the patient and the fracture. A total of 30 patients who were admitted with intertrochanteric fractures that fitted into the inclusion criteria and managed surgically with proximal femoral nail were included in the study. In our series, Boyd and Griffin type II and type III contributed eighteen and six cases in each group, making to 60% and 20% followed by type IV contributing 6 cases making 20%. We performed closed procedure in 26 cases (87%) and open nailing in 4 cases (13%). The average duration of radiation exposure was 120 seconds, average duration of surgery was 95 minutes and average blood loss was 140 ml with 23% intraoperative complications.

Keywords: Functional outcome, intertrochanteric fractures, proximal femoral nail

Introduction

The incidence of intertrochanteric fractures has been increasing significantly due to the rising age of modern human populations [1]. Elderly patients with a minor fall can sustain a fracture in this area because of debilitated bone due to osteoporosis or pathological fracture and this account for 90%.

The occurrence of proximal femoral fractures among females is 2 to 3 times higher than the incidence of such fractures amongst males [2]. Also, the possibility of sustaining a proximal femoral fracture doubles every 10 years subsequent to age 50 years [3]. Added risk factors for proximal femoral fractures include osteoporosis, a maternal history of hip fractures, disproportionate alcohol consumption, high caffeine intake, physical inactivity, low body weight, prior hip fracture, the use of certain psychotropic medications, visual impairment, dementia, residence in an institution, and smoking.

In view of the fact that the femur is the longest and the strongest bone in the body and the principal load bearing bone in the lower extremity, fracture of this bone may result in drawn out morbidity and far-reaching disability unless the treatment is apt. Conservative management of intertrochanteric femoral fracture often yields poor therapeutic outcomes and surgical fixation is generally warranted [4]. Until 1960's non operative treatment was the

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option on hand for these types of fractures in the form of traction with prolonged bed rest with fracture healing occurring in ten to twelve weeks (usually) followed by a prolonged programme of ambulation training. These are coupled with problems of prolonged recumbence like decubitus ulcer, UTI, pneumonia, joint contractures and thrombo-embolic complications ensuing in a high mortality rate. Successful treatment depends on many other associated factors, including age of the patient, fracture: the age of the patient, the patient's general health, the time from fracture to treatment, the adequacy of treatment, concurrent medical treatment, and the stability of fixation [5]. The primary reason for surgery is to permit the early mobilization of the patient, with partial weight-bearing limitations depending on the stability of the reduction [6].

The most widespread internal fixation device used today is the fixed angle extramedullary device, such as a 95-degree lag screw and side plate or blade plate. This implant includes a large lag screw positioned in the center of the femoral neck and head and a side plate alongside the lateral femur. The screw-plate interface angle is changeable and depends on the anatomy of the patient and the fracture. The advantage of the sliding lag screw, compared with a static screw, is that it permits impaction of the fragments; this impaction enhances the bone-on-bone contact, encouraging osseous healing while decreasing implant stress. DHS requires a relatively larger exposure, more tissue handling and anatomical reduction, all of which increase the morbidity, the probability of infection and significant blood loss, the possibility of varus collapse and the inability of the implant to survive until fracture union. The side plate and screws weaken the bone mechanically. The common causes of fixation failure are instability of the fractures, osteoporosis, lack of anatomical reduction, failure of the fixation device and incorrect placement of the lag screw in femoral head [7].

The other spectrum is intramedullary fixation with devices like the IMHS (intra medullary hip screw), Gamma nail, Russell-Taylor reconstruction nail, ATN (Ante grade trochanteric nail), TFN (Trochanter fixation nail) and the PFN (Proximal femoral nail). The screw and side plate and blade plate have been revealed to have elevated rates of fracture union when used with fractures involving the piriformis fossa, but intramedullary nails have been suggested if the posteromedial cortical buttress cannot be established in unstable fractures. Benefits of intramedullary devices include preserved blood supply to the bone fragments, less operative blood loss and less disruption of the environment [8].

After fracture fixation, the patient usually requires protected weight bearing for 6 to 12 weeks and as callus formation is observed radiographically, weight bearing is slowly increased.

Methodology

A total of 30 patients who were admitted with intertrochanteric fractures that fitted into the inclusion criteria and managed surgically with proximal femoral nail were included in the study.

Criteria to include the patients in this series were

- All unstable intertrochanteric fractures including Intertrochanteric fractures with Subtrochanteric extension.
- Age > 20 years.

Exclusion criteria

- Less than 20 yrs.
- Pathological Fractures.
- Compound fractures.

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- Previous wound or bone infections, operatively treated fractures

Unstable intertrochanteric fractures were categorised as those with the following fracture configurations:

- Loss of medial support with involvement of the lesser trochanter
- Lateral column involvement
- Reverse obliquity fractures
- Fractures with Subtrochanteric extension

These cases would be evaluated on the basis of method of injury, classification and treatment with proximal femoral nail and their surgical and functional outcome with or without residual complication.

The end results were evaluated in terms of:

- Clinical parameters
- Wound healing
- Fracture union
- Mobilization status
- Range of motion; hip, knee
- Complications & Subsequent procedures
- Resumption of activities

Results

In our follow up of cases the maximum age was 85 years and minimum age was 24 years. In our series 20% of the patients were in the age group of 20 to 50 years and other 80% were above 50 years and mean age group was 65 years.

Table 1: Age Distribution

Age group	No. of cases	Percentage
21- 30 years	2	6%
31- 40 years	2	6%
41-50 years	2	6%
51- 60 years	8	27%
Above 61 years	16	53%

Table 2: Distribution of Fractures According to Boyd and Griffins classification

	Type	No. of cases	Percentage
Intertrochanteric Fractures (Boyd and Griffins classification)	I	0	0%
	II	18	60%
	III	6	20%
	IV	6	20%

In our study of 22 operated cases no deaths reported during the study period.

The results of the treatment of intertrochanteric and Subtrochanteric fractures using Proximal Femoral Nail were assessed by HARRIS HIP SCORE system (Modified).

Table 3: Results of the treatment assessed using HARRIS HIP SCORE system

Harris hip score	No. of cases	Percentage
Poor (0-69)	4	13%
Fair (70-79)	10	33%
Good (80-89)	14	47%
Excellent (90-100)	2	7%

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Discussion

In our series, Boyd and Griffin type II and type III contributed eighteen and six cases in each group, making to 60% and 20% followed by type IV contributing 6 cases making 20%.
We performed closed procedure in 26 cases (87%) and open nailing in 4 cases (13%). The average duration of radiation exposure was 120 seconds, average duration of surgery was 95 minutes and average blood loss was 140 ml with 23% intraoperaive complications. In the intraoperative period, in one case we had jamming of the drill sleeve and in two cases we had breaking of the guide wire, however, the jammed drill sleeve was removed and operation was continued using another drill sleeve and in case of guide wire breakage, it was retrieved successfully and we did not put hip screw in 1 case.
In the study carried out by Papasimos *et al* the average operating time was 71.2 minutes and open reduction was needed in 8.1% with mean blood loss of 220 ml. seven cases showed local intraoperative complications (3.3%) [9].
The average duration of hospital stay was 16.83 days; average time for full weight bearing was 13.5 weeks. Post operatively all patients were mobile of which two of them required walking aids. One patient had 1.5 cms shortening after fracture union which was managed conservatively by single rise. All patients had good range of hip and knee movements except eight patients had hip restrictions and five patients had knee limitation of movements.
In the study conducted by Papasimos *et al.* the average duration of hospital stay was 8.8 days. In that study the average weeks of fracture union was 13 weeks and complication rates were 25%. Two patients had varus deformity of less than ten degrees and no attempt was made to revise. Fracture union was uneventful. One patient had malrotation and five case of Z effect were observed [9].
In our study, no deaths were reported during the study period.
In the series conducted by Papasimos S, Koutsojannis CM, Panagopoulos A, Megas P, Lambiris E and others, 40 patients of proximal femoral fractures were treated by PFN[9]. In the series conducted by Boldin C, Seibert FJ, Fankhauser F and others, 34 patients of unstable proximal femoral fractures were managed by PFN [10]
According to Hip Harris Score (Modified), overall 7% of patients had outstanding results, 47% of patients had good results, 33% of patients had fair results and only 4 cases i.e., 13% of patients had poor results. After comparing in various studies, it was seen that our series was comparable with most of the standard published series.

Conclusion

In the light of the results obtained from the present study, we believe that the PFN emerges as a valid option for the treatment of unstable proximal femoral fractures of the trochanteric region, because of the simplicity and lack of aggressiveness of the surgical technique and the low level of technical complications encountered, which is particularly important bearing in mind that the large majority of patients who suffer these kinds of fracture are elderly, and their general condition is frequently compromised.

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