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Dr. Abdul Hadi Shareef
Associate Professor and Unit Head, Department of Orthopedics, Akash Institute of Medical Sciences and Research Centre, Devanahalli, Bangalore, Karnataka, India

Dr. Muralidhar N
Professor and HOD, Department of Orthopedics, Akash Institute of Medical Sciences and Research Centre, Devanahalli, Bangalore, Karnataka, India

Khudaija Nazhath MR
3434/19, Behind Gym Road, Shankar Vihar Layout, Davangere, Bangalore, Karnataka, India

Corresponding Author:
Dr. Muralidhar N
Professor and HOD, Department of Orthopedics, Akash Institute of Medical Sciences and Research Centre, Devanahalli, Bangalore, Karnataka, India

Study of surgical management of pertrochanteric fracture in our institute with proximal femoral nail

Dr. Abdul Hadi Shareef, Dr. Muralidhar N and Khudaija Nazhath MR

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Abstract
Background: Pertrochanteric fracture are devastating injuries that most commonly affect the elderly and also young. Numerous variations of intramedullary nails have been devised to achieve a stable fixation and early mobilization of pertrochanteric fractures; among these, the proximal femoral nail (PFN), devised by the AO/ASIF group in 1996, has proven to be a promising implant in per-, inter-, or subtrochanteric femoral fractures. Hence; the present study was conducted for assessing the surgical management of pertrochanteric fracture in our institute with proximal femoral nail.
Methods: This was a prospective study of 20 cases of trochanteric and sub trochanteric fractures admitted to Akash institute of medical sciences and research centre between January 2017 to December 2018. Cases were taken according to inclusion and exclusion criteria. i.e. patients with pertrochanteric fractures above the age of 18 years and post traumatic pertrochanteric fractures.
Results: In our 20 cases there were 15 male and 5 female, maximum age of 90 years and minimum age of 23 years, most of the patients were between 30 to 65 years. Mean age of 50.3 years.70% of cases were admitted due to RTA and 14 were sub trochanteric. In trochanteric class 83.3% were Boyds and Griffith type 2, 16.67% were B type 3and in subtrochanteric class 7.1% were type 1, 21.4% were Sinsheimer type 2a, 28.6% were 2b, 21.4% were 3a, 7.1% were type 3b and 14.3% were type 4. Mean duration of hospital stay is 20.67 days and mean time of full weight bearing is 16.3 weeks. Excellent results were seen in 50% cases, good in 33.3% cases fair in 16.7% in trochanteric fractures. In subtrochanteric fractures excellent results were seen in 64.3% good in 21.4% cases and fair were seen in 14.3%.
Conclusion: We consider that PFN is an excellent implant for the treatment of pertrochanteric fractures. The term successful outcome includes a good understanding of fracture biomechanics proper patient selection good preoperative planning accurate instrumentation, good image intensifier.

Keywords: PFN, peritrochanteric, subtrochanteric, trochanteric

Introduction
Peritrochanteric fractures occur typically at the junction between trabecular bone and cortical bone where the mechanical stress across the junction is highest in the femur, which is responsible for their frequent comminution. These fractures account for 10% to 34% of all hip fractures. These fractures occur typically in two age groups. In young and healthy individuals, the injury results from high-energy trauma, whereas in the elderly population, most of the fractures arc osteoporotic, resulting from a fall. With the increase in the aging population, there is also considerable growth in the number of pathological fractures and fractures around hip prostheses (periprosthetic fractures) [1-3].
Numerous variations of intramedullary nails have been devised to achieve a stable fixation and early mobilization of pertrochanteric fractures; among these, the proximal femoral nail (PFN), devised by the AO/ASIF group in 1996, has proven to be a promising implant in per-, inter-, or subtrochanteric femoral fractures. These intramedullary devices are more stable under loading with a shorter lever arm, so the distance between the hip joint and the nail is reduced compared with that for a plate, thus diminishing the deforming forces across the implant. Furthermore, these devices minimize soft-tissue dissection and thereby reduce surgical trauma, blood loss, infection, and wound complications [4-6].
Hence; the present study was conducted for assessing the surgical management of pertrochanteric fracture in our institute with proximal femoral nail.

Materials & Methods

The present study was conducted in the department of orthopaedics and it included assessment of surgical management of pertrochanteric fracture in our institute with proximal femoral nail. This was a prospective study of 20 cases of trochanteric and sub trochanteric fractures admitted to Akash institute of medical sciences and research centre between January 2017 to December 2018. Complete demographic and clinical details of all the patients were obtained. Radiographic assessment of all the patients was carried out before surgery. Ethical approval was obtained from institutional ethical committee before the starting of the surgery after explaining in detail the entire research protocol.

Inclusion criteria

1. Peri-trochanteric fractures of all types of Boyd and Griffin classification.
2. Only closed fractures will be considered.
3. These fractures should have been treated by PFN fixation.

Exclusion criteria

1. Open fractures.
2. Patients with missing data were excluded.

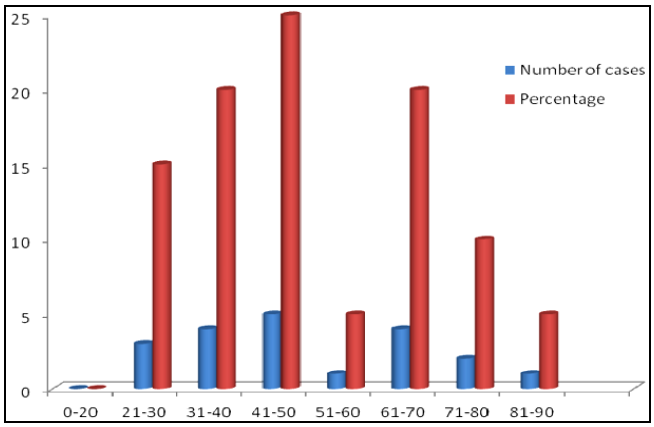
Medical records were deemed to be complete if in patient progress notes, outpatient follow up notes, intra op notes & report of labs and radiological investigation were complete. Till the day of surgery, patient was kept on skeletal/skin traction. Pre-operative antibiotics were given to the patients. All the patients underwent PFN fixation under the hands of skilled and experienced orthopaedic surgeons.

Patients were given post-op antibiotics for adequate duration. Postoperative dressing was done on third day for evaluation of condition of the wound. Patients were discharged from hospital after satisfactory stitch removal, wound condition & physiotherapy achieved. All the patients were maintained on regular follow-up till the starting of full weight bearing. All the results were analysed by SPSS software. Chi-square test, Mann-Whitney U test and student t test were used for assessment of level of significance. P-Value of less than 0.05 was taken as significant.

Results

In our 20 cases there were 15 male and 5 female, maximum age of 90 years and minimum age of 23 years, most of the patients were between 30 to 65 years. Mean age of 50.3 years.70% of cases were admitted due to road traffic accident (RTA) and 14 were sub trochanteric. In trochanteric class 83.3% were Boyds and Griffith type 2, 16.67% were B type 3and in subtrochanteric class 7.1% were type 1, 21.4% were Sinsheimer type 2a, 28.6% were 2b, 21.4% were 3a, 7.1% were type 3b and 14.3% were type 4. Mean duration of hospital stay is 20.67 days and mean time of full weight bearing is 16.3 weeks. Excellent results were seen in 50% cases, good in 33.3% cases fair in 16.7% in trochanteric fractures. In subtrochanteric fractures excellent results were seen in 64.3% good in 21.4% cases and fair were seen in 14.3%.

Mean duration of surgery was 57.81 minutes. Mean duration of hospital stay is 20.67 days and mean time of full weight bearing is 16.3 weeks. Excellent results were seen in 50% cases, good in 33.3% cases fair in 16.7% in trochanteric fractures. In subtrochanteric fractures excellent results were seen in 64.3% good in 21.4% cases and fair were seen in 14.3%.



Graph 1: Age-wise distribution

Table 1: Type of fracture

Type of fracture	Number of cases	Percentage
Trochanteric	6	30
Subtrochanteric	14	70

Table 2: Duration of surgery

Duration of surgery (minutes)	Number
Mean	57.81
SD	5.75

Table 3: Duration of hospital stay

Duration of hospital stay (days)	Number
Mean	20.67
SD	2.69

Table 4: Time of full weight bearing

Time of full weight bearing (weeks)	Number
Mean	16.3
SD	3.2

Table 5: Complications

Complication	Number of cases	Percentage
Open reduction	2	10
Failure to get anatomical reduction	2	10
Failure to put derotation screw	2	10
Varus angulation	1	5

Table 6: Functional results of Peritrochanteric fractures

Functional results	Number of cases	Percentage
Excellent	12	60
Good	5	25
Fair	3	15
Poor	0	0
Total	20	100

Discussion

Hip fracture contributes to both morbidity and mortality in the elderly. The demographics of world populations are set to change, with more elderly living in developing countries. Gulberg *et al*. has predicted that the total number of hip fractures will reach 2.6 million by 2025 and 4.5 million by 2050. In 1990, 26% of all hip fractures that occurred in Asia were intertrochanteric fractures whereas this figure could rise to 37% in 2025 and 45% in 2050. Cooper was the first one to classify hip fractures into extracapsular (intertrochanteric) and intracapsular (femoral neck) [7-9].

Proximal femoral Fractures account for a large proportion of hospitalization among trauma cases. An overwhelming

majority of these patients (>90%) are aged above 50 years. The incidence of these fractures is 2-3 times more in females as compared to male population. They are classified on basis of anatomical location of fracture into: Neck of femur fracture, Inter trochanteric fracture and Subtrochanteric fracture. Pertrochanteric fracture are devastating injuries that most commonly affect the elderly and also young. Pertrochanteric fracture is a leading cause of hospital admissions in elderly people. The number of such admissions is on a raise because of increasing life span and sedentary habits. Conservative methods of treatment results in malunion with shortening and limitation of hip movements as well as complications of prolong immobilization like bed sores, deep vein thrombosis and respiratory infections [8-10]. Hence; the present study was conducted for assessing the surgical management of peritrochanteric fracture in our institute with proximal femoral nail.

In our 20 cases there were 15 male and 5 female, maximum age of 90 years and minimum age of 23 years, most of the patients were between 30 to 65 years. Mean age of 50.3 years.70% of cases were admitted due to road traffic accident (RTA) and 14 were sub trochanteric. In trochanteric class 83.3% were Boyds and Griffith type 2, 16.67% were B type 3and in subtrochanteric class 7.1% were type 1, 21.4% were Sinsheimer type 2a, 28.6% were 2b, 21.4% were 3a, 7.1% were type 3b and 14.3% were type 4. Mean duration of hospital stay is 20.67 days and mean time of full weight bearing is 16.3 weeks. Excellent results were seen in 50% cases, good in 33.3% cases fair in 16.7% in trochanteric fractures. In subtrochanteric fractures excellent results were seen in 64.3% good in 21.4% cases and fair were seen in 14.3%. Wali P *et al*., analysed the cases of peri-trochanteric fractures treated with PFN fixation. They encountered intraoperative complications like iatrogenic fracture of lateral cortex in 2 cases (10%) due to selection of wrong entry point, failure to put derotation screw in 2 cases (10%) and guidewire breakage in 1 case (5%). Delayed complications like hip joint stiffness in 3 cases (15%), knee joint stiffness in I case (5%) and shortening of more than one cm in 1 case (5%) and delayed union in 2 cases (10%). Open reduction offer advantage in preventing malalignment of peritrochanteric fractures as compared to closed reduction. The authors concluded that PFN is a reliable implant for peritrochanteric fractures, leading to high rate of bone union restoring the anatomical alignment and reduced chance of implant failure or deformities [11]. In the series of 295 patients with trochanteric fractures treated with the PFN by Domingo *et al*., the authors emphasized that the surgical technique is not complex, the number of complications recorded was acceptable, and the overall results obtained were comparable with those of other fracture systems [12].

In the present study, mean duration of surgery was 57.81 minutes. Mean duration of hospital stay is 20.67 days and mean time of full weight bearing is 16.3 weeks. Excellent results were seen in 50% cases, good in 33.3% cases fair in 16.7% in trochanteric fractures. In subtrochanteric fractures excellent results were seen in 64.3% good in 21.4% cases and fair were seen in 14.3%. The Proximal Femoral Nail (PFN) System offers some major biomechanical advantages. Axial loading in A1 and A2 fractures leads to fracture impaction, whereas in A3 fractures such impaction doesn't occur and medial displacement of the distal fragment of the fracture is common due to the instability. Proximal Femoral Nail for A3 type unstable fracture has superior results; PFN prevents the fractures of the femoral shaft by having a smaller distal shaft diameter which reduces stress concentration at the tip. Due to its position close to the weight-bearing axis, the stress generated on the intramedullary implants is negligible. The PFN implant also acts as a buttress in preventing the mediatization of the shaft. The entry portal of the PFN through the trochanter limits the surgical insult to the tendinous hip abductor musculature, only unlike those nails which require entry through the pyriformis fossa [13-16].

In another study conducted by Fogagnolo F *et al*., authors performed a case series study in a teaching hospital to analyse the results of the recent AO-ASIF proximal femoral nail (PFN). 46 consecutive patients (47 fractures) were included in the investigation. Intraoperative technical or mechanical complications occurred in 11 patients (23.4%), mostly problems with the distal nail locking and fracture of the lateral wall of the greater trochanter. In view of only one loss of reduction with Varus collapse clearly caused by a technical error, they concluded that the PFN is a suitable implant for unstable fractures, but the high re-operation rate precludes its routine use for every pertrochanteric fracture [17].

Conclusion

From the results, they concluded that PFN is an excellent implant for the treatment of pertrochanteric fractures. The term successful outcome includes a good understanding of fracture biomechanics proper patient selection good preoperative planning accurate instrumentation, good image intensifier.

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