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A study on complications of proximal femoral nails in management of intertrochanteric fracture

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Abstract

Most intertrochanteric fractures occur in patients above 50 yrs who have additional systemic problems and functional disability. So the goal to treatment is early mobilization and return to pre operative functional state. Current treatment approach is possible anatomical reduction and rigid fixation. Considering the mean harris hip score as 93 and assuming the standard deviation as 4, with 5% relative precision and 95% confidence level, the minimum required sample size is 23. However 70 patients were selected for our study. Among the early complications that were being evaluated, 3 patients had superficial infections which were treated by a course of antibiotics. 1 patient had a stage 1 pressure sore which was managed with daily dressing. The wound healed well. 1 patient had backing out of the lag screw at immediate post op period. This was probably because the lag screw was inserted into the fracture site. However at 3 months and 6 months of follow up there was no further backing out of the screw and the fracture united well.

Keywords: Proximal femoral nails, intertrochanteric fracture, complications

Introduction

Inter trochanteric fracture is one of the most devastating injuries in the elderly. Intertrochanteric fractures of femur is one of the most common fractures of the hip especially in elderly, accounting for 10 to 34% of all hip fractures.¹ By 2040, the incidence is estimated to be doubled. The incidence of these fractures increases with advancing age. These patients are more limited to home ambulation and are dependent in basic and instrumental activities of daily living. 50 % of fracture around hip patients in elderly is of trochanteric fracture and these 50 % of fracture are unstable type of trochanteric fractures^[1]. The sliding hip screw device has been used for more than a decade for the treatment of these fractures. Though Zickel introduced his nail long ago, it was not a very popular fixation device due to higher incidence of complications. So was the case with Enders nail. The Zickel nail was later modified and renewed interest is being given to intramedullary fixation with devices like the Proximal Femoral Nail, Intramedullary Hip Screw and Gamma Nail due to shorter operating time, less blood loss and earlier mobilization with these devices. Side plate devices when used for unstable trochanteric fracture which are commonly associated with lateral wall comminution results in excessive collapse of the proximal fragment and gross medialisation of distal fragment resulting in implant failure and delayed union or non union at fracture site^[2]. Intramedullary position of the PFN prevents the excessive collapse of proximal fragment & medialisation of distal fragment. Being a intramedullary load sharing device, PFN helps in early post operative mobilization, weight bearing and ultimately the early fracture union. Being done as a closed nailing procedure PFN preserve the fracture haematoma and associated with less blood loss and short operating time^[3].

Before 1960s the treatment for intertrochanteric fractures were mainly treated conservatively. The treatment consisted of long term immobilization with skeletal traction. It resulted in higher mortality rates and complications like decubitus ulcer, urinary tract infections, pneumonia, thromboembolic complications^[4].

Most intertrochanteric fractures occur in patients above 50 yrs who have additional systemic problems and functional disability.

So the goal to treatment is early mobilization and return to pre operative functional state. Current treatment approach is possible anatomical reduction and rigid fixation [5].

In 1996, the AO/ASIF developed the proximal femoral nail (PFN) as an intramedullary device for the treatment of unstable per-, intra- and subtrochanteric femoral fractures [1].

Intramedullary devices offer certain distinct advantages.

- A. An intramedullary fixation device provides more efficient load transfer than does a Sliding hip screw, because of its location.
- B. A shorter lever arm of the intramedullary device can decrease tensile strain on the implant so decreasing the risk of implant failure.
- C. Because an intramedullary fixation device incorporates a sliding hip screw, the advantage of controlled fracture impaction is maintained.
- D. The intramedullary location limits the amount of sliding and therefore limb shortening and deformity that can occur.
- E. Insertion of intramedullary hip screw requires shorter operative time and less soft tissue dissection than a sliding hip screw, so decreasing the overall morbidity [6].

Methodology

Inclusion criteria

- All patients where proximal femoral nail has been used
- All patients above 30 years of age

Exclusion criteria

- Open fractures
- Non ambulant patients
- Polytrauma patients

Study Design

Hospital based prospective study

Sample size: Considering the mean harris hip score as 93 and assuming the standard deviation as 4, with 5% relative precision and 95% confidence level, the minimum required sample size is 23. However 70 patients were selected for our study.

Standard Pre-operative work up:

- All patients were classified based on AO system of classification for intertrochanteric fractures. AO system was used because it needed only AP view of the pelvis
- Standard preoperative evaluation was be followed with complete assessment by anesthetist.

- Routine institutional protocol was followed for preoperative preparation and surgery

Results

In our study maximum age was 95 years and minimum age was 36. Most of the patients were between 71 to 80. Mean age was 70.24 with standard deviation of 14.76.

Table 1: Age distribution

Age	Frequency	Percent
≤40	4	5.7
41-50	5	7.1
51-60	8	11.4
61-70	14	20.0
71-80	24	34.3
81-90	11	15.7
≥91	4	5.7
Total	70	100.0

Table 2: Gender distribution

There were 40 males and 30 females included in our study.

Sex	Frequency	Percent
Female	30	42.9
Male	40	57.1
Total	70	100.0

Majority of our patients had sustained a fall and sustained the fracture.

Table 3: Mode of Injury

RTA/Fall	Frequency	Percent
1	5	7.1
2	65	92.9
Total	70	100.0

Majority of our patients had a history of slip and fall (65) and the rest had sustained a RTA

Among the early complications that were being evaluated, 3 patients had superficial infections which were treated by a course of antibiotics. 1 patient had a stage 1 pressure sore which was managed with daily dressing. The wound healed well. 1 patient had backing out of the lag screw at immediate post op period. This was probably because the lag screw was inserted into the fracture site. However at 3 months and 6 months of follow up there was no further backing out of the screw and the fracture united well.

Table 4: Early complication

Early Complication	Frequency	Percent
No early complication	66	94.2
Infection – Superficial-	3	4.28
Infection – Deep	0	0
Wound gaping	0	0
Epidermal necrosis	0	0
Seroma / Haematoma	0	0
Decubitus ulcer	1	1.4
Backing out of screw	1	1
Total	70	100.0

Complications after 1 month following surgery was classified as late complications. In the six months of follow up of patients there were no late complications that were observed in 66 of them. There were 3 cases of hip stiffness even after 1 month following surgery but it was managed with physiotherapy. 4

patients had abductor lurch at the 3rd month of follow up, however at 6th month of follow up there was no abductor lurch in these patients.

One patient had cutting out of the screws beyond the neck at 3 months postoperatively. Implant removal was done and as

patient developed bradycardia intraoperatively a further procedure was abandoned and patient was shifted to ICU. After

stabilisation patient was planned for further procedure but patient was lost to follow up.

Table 5: Late complication

Late Complication	Frequency	Percent
No late complication	66	94.2
Cutting out	1	1.4
Cutting out of screws - - Z ⁺ effect of screws or Reverse Z effect	0	0
Varus collapse	0	0
Nail breakage	0	0
Limb length discrepancy > 1 cm	0	0
Hip stiffness	3	4.2
Abductor lurch	4	5.7
Delayed union /Non union	0	0
Total	70	100.0

Discussion

It is recommended that the tip of the lag screw should be placed as close to the sub chondral bone as possible. The length of the anti-rotation screw is also important in this aspect. The PFN is fixed with 2 screws; the larger (lag) screw is designed to carry most of the load, and the smaller screw (The hip pin/anti rotation screw) is to provide rotational stability.⁷ If the hip pin is longer than the lag screw, vertical forces would increase on the hip pin and start to induce cutout, a knife effect or Z-effect. This might force the hip pin to migrate into the joint and the lag screw to slide laterally. Therefore the derotation screw is recommended to be at least 10 to 15 mm shorter than the lag screw. We did not encounter Z effect or reverse Z effect in the six months of follow up of patients.

In our series the incidence of abductor lurch in the post operative period was 5.7% in the 3rd month of follow up. Gluteus medius tendon injury has been reported in 27 % patients with the use of Trochantric entry nails (Mc Connell et. al. 2003). The abductor lurch may improve in many numbers of patients and may remain static in some patients. In our series the abductor lurch was not present at 6 months of follow up. In short the PFN is a better implant with distinct advantages over the DHS^[8]. With adequate surgical technique, the advantages of the PFN increases and the complication rate decreases.

Conclusion

Proximal femoral nail has all the advantaged of an intramedullary device such as closed technique which retains the fracture haematoma, decreases the blood loss, minimises soft tissue dissection and wound complications.

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