

Original ARTICLE

Comparative evaluation of results of surgical management of Inter-trochanteric femoral fractures treated by Proximal Femoral Nail (PFN) and Proximal Femoral Nail Antirotation (PFN-A)

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ABSTRACT

BACKGROUND: Inter-trochanteric fractures are one of the common reasons for the patients reporting to the orthopaedics department. Proximal femoral nail (PFN) is one of the common treatments employed for surgical treatment of inter-trochanteric fractures. Another line of treatment for such inter-trochanteric cases is proximal femoral nail-antirotation (PFN-A). Hence; the present study was undertaken for comparatively evaluating the results of surgical management of Inter-trochanteric femoral fractures treated by PFN and PFN-A.

MATERIALS & METHODS: A study was conducted on 30 adult patients with Intertrochanteric femoral fractures were assessed. 15 Patients each were randomly selected for PFN and PFN-A fixation. Pre-operative evaluation was done in all the patients. All the patients underwent surgical intervention according to their respective study groups. Postoperative follow-up was done in all the patients. All patients were advised regular follow up, initially at 3 weekly intervals, till 12th postoperative week and then at 6 weekly interval till the completion of 24 weeks postoperatively. All the results were compiled in Microsoft excel sheet and were analyzed by SPSS software.

RESULTS: The mean hospital stay of all patients of the PFN group and PFNA group was 14.27 days and 10.80 days respectively. The mean time of union for PFN group was 12.07 weeks whereas in the PFN A group mean time of union was 12.60 weeks. Only 1 patient (7%) had postoperative complications, as superficial wound infection in the PFN A group while no patient suffered from any post op complication in PFN group.

CONCLUSION: The functional outcomes achieved after treatment of unstable intertrochanteric fractures with both PFN and PFNA are satisfactory and comparable.

KEY WORDS: Inter-trochanteric femoral fractures, Proximal Femoral Nail, Proximal Femoral Nail Antirotation

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INTRODUCTION

Inter-trochanteric fractures are one of the common reasons for the patients reporting to the orthopaedics department. These fractures occur between the femur neck and shaft constituting the transitional bone composed of cortical and trabecular bone. Instability and fixation failures are a big challenge for the orthopedic surgeon.¹⁻³ Proximal femoral nail is one of the common treatments employed for surgical treatment of inter-trochanteric fractures. The advantages of using PFN for treatment of intertrochanteric hip fractures as compared with sliding hip screw are both mechanical and technical.^{4,5} Another line of treatment for such inter-trochanteric cases is proximal femoral nail-antirotation (PFN-A). The PFN-A offers lesser trauma during insertion, lesser fluoroscopic and surgical times, lesser duration of hospitalization and a lesser rate of post-operative failure.^{6,7} Hence; under the light of above mentioned, the present

study was undertaken for comparatively evaluating the results of surgical management of Inter-trochanteric femoral fractures treated by PFN and PFN-A.

MATERIALS & METHODS

A study was conducted on 30 adult patients (both male and female above the age of 50 years) with Intertrochanteric femoral fractures attending the Out Patient Department/Emergency of the Department of Orthopedics, AIMS Bathinda. Ethics consideration: Informed and written consent was taken from the participants before conducting the study. Certificate from the institutional Ethical Committee obtained. 15 Patients each were randomly selected for PFN and PFN-A fixation. All patients on admission were subjected to initial management and resuscitation as regards to shock, pain, splintage etc. Injuries of

Head/Abdomen/chest were treated at priority and the affected limb was immobilized with skin or skeletal traction over bohrerbraun splint. After initial resuscitation, patients were subjected to detailed history, relevant investigations and thorough clinical examinations as per the proforma attached. Pre-operative evaluation was done in all the patients. X-Ray of the fractured hip was taken along with the thigh and length and size of implant was determined depending upon the degree of comminution of fracture, medullary cavity, anterior femoral bow and quality of bone. Preoperative counseling of the patient and his relatives regarding the method of treatment and prognosis was done and consent for operation was taken. Patient was immunized against Tetanus. Local preparation of the part was done by shaving and appropriate broad spectrum antibiotics were given a night before the operation and continued thereafter intra and postoperatively. All the patients underwent surgical intervention according to their respective study groups.

Postoperative follow-up was done in all the patients. All patients were advised regular follow up, initially at 3 weekly intervals, till 12th postoperative week and then at 6 weekly interval till the completion of 24 weeks postoperatively. Further follow up was advised at 6 weekly intervals for the patients who showed complications associated with PFN and/or its technique. Weight bearing was gradually increased as per the radiological evaluation of the fractured site. The hip scoring was done as per the following: The score has a maximum of 100 points (best possible outcome) covering pain (1 item, 0–44 points), function (7 items, 0–47 points), absence of deformity (1 item, 4 points), and range of motion (2 items, 5 points). Gradations of the total score adjudge the outcome as excellent (90-100), good (80-90), fair (70-80) or poor (<70). All the results were compiled in Microsoft excel sheet and were analyzed by SPSS software. Chi-square test and Mann-Whitney U test were used for assessment of level of significance. p-value of less than 0.05 was taken as significant.

RESULTS

In the present study, the mean age of the patients of the PFN and PFNA was 64.53 years and 65.67 years respectively. Among the patients treated with PFN 53% of the patients were males and 47% were females whereas among the patients treated with PFN A 80% of the patients were males and 20% were females. The mean hospital stay of all patients off the PFN group and PFNA group was 14.27 days and 10.80 days respectively. The mean time of union for PFN group was 12.07 weeks whereas in the PFN A group mean time of union was 12.60 weeks.

In the current study only 1 patient (7%) had postoperative complications, as superficial wound infection in the PFN A group while no patient suffered from any post op complication in PFN group. In the present study, the mean total Harris hip score for both the groups was about 90. 11 patients (73%) had an excellent harris grade, 3 patients (20%) had a good harris grade and 1 patient (7%) had a fair harris grade in the PFN group. On the other hand among the PFN A group (87%) had an excellent harris grade and 2 patients (13%) had a good harris grade.

DISCUSSION

Benefits of surgery and complications of fixation depend a great deal on the choice of implant. Various sliding devices (example dynamic hip screw) used for fixing intertrochanteric femur fractures have high failure rates, typically in comminuted

Table 1: Age-wise distribution of patients

Age Group (years)	PFN	PFN A
<=60	8 (53 %)	6 (40 %)
61 – 70	4 (27 %)	3 (20 %)
71 – 80	1 (7 %)	4 (27 %)
>80	2 (13 %)	2 (13 %)
Total	15 (100 %)	15 (100 %)

Table 2: Gender-wise distribution of patients

Gender	PFN	PFN A
Male	8 (53 %)	12 (80 %)
Female	7 (47 %)	3 (20 %)
Total	15 (100 %)	15 (100 %)

Table 3: Comparison of mean hospital stay

Group	Mean	SD	Median	F	Sig
PFN	14.27	6.99	11.00	2.877	0.10
PFN A	10.80	3.71	10.00		1*
Total	12.53	5.78	11.00		

* Not Significant

Table 4: Comparison of mean hospital stay

Group	Mean	SD	Median	f	Sig
PFN	12.07	1.44	12.00	1.057	0.313*
PFN A	12.60	1.40	13.00		
Total	12.33	1.42	12.00		

* Not Significant

Table 5: Post-operative Complications

Post of Complication	PFN	PFN A
Wound Infection	0	1(7%)

Table 6: Comparison of postoperative Harris hip score

Group	Mean	SD	Median	f	Sig
PFN	90.87	6.19	92.00	0.349	0.559*
PFN A	92.07	4.86	94.00		
Total	91.47	5.50	92.50		

* Not Significant

Table 7: HARRIS Grade

HARRIS Grade	PFN	PFN A	p-value
Excellent	11 (73 %)	13 (87 %)	0.505
Fair	1 (7 %)	0 (0 %)	
Good	3 (20 %)	2 (13 %)	
Total	15 (100 %)	15 (100 %)	

fractures. A number of cases with early weight bearing led to screw penetration of head.^{7, 8} Such fractures have benefited from the use of intramedullary devices like the pfn. Because of their placement near the mechanical axis of the limb they decrease the lever arm as well as the bending movement on the implant. Intramedullary devices are also superior because there is minimal blood loss, early weight bearing and limb shortening is rarely reported.⁹ With the screw related complications of the PFN, and instances of failure of this system in osteoporotic bone, there was a need for an implant which could offer reliable and consistent performance in osteoporotic bone, and overcome the problem of screw migration encountered with the proximal femoral nail.¹⁰ Hence; the present study was undertaken for comparatively evaluating the results of surgical management of Intertrochanteric femoral fractures treated by PFN and PFNA.

In the present study, the mean age of the patients of the PFN and PFNA was 64.53 years and 65.67 years respectively. Among the patients treated with PFN 53% of the patients were males and 47% were females whereas among the patients treated with PFNA 80% of the patients were males and 20% were females. The mean hospital stay of all patients of the PFN group and PFNA group was 14.27 days and 10.80 days respectively. The mean time of union for PFN group was 12.07 weeks whereas in the PFNA group mean time of union was 12.60 weeks. Gardenbroek et al in their study compared implant position, early and late complications in two groups of patients with unstable intertrochanteric fractures, treated with the PFN and PFNA respectively. Their study showed that the risk of a secondary complication and need of a late re-operation is significantly higher with a PFN.¹¹ Stern et al performed a randomised control trial where elderly patients with low energy trochanteric fractures of all AO types were randomised into either a screw or a blade group. They found that there was no significant difference concerning mean tip-apex distance, percentage of patients with a tip-apex distance >25 mm, and patients with a centre-centre position of the cephalic implant. The rate of cut-out and re-operation was 1.5% in the helical blade.¹²

In the present study, only 1 patient (7%) had postoperative complications, as superficial wound infection in the PFN A group while no patient suffered from any post op complication in PFN group. In the present study, the mean total Harris hip score for both the groups was about 90. 11 patients (73%) had an excellent harris grade, 3 patients (20%) had a good harris grade and 1 patient (7%) had a fair harris grade in the PFN group. On the other hand among the PFNA group (87%) had an excellent harris grade and 2 patients (13%) had a good harris grade. Park et al treated forty patients of intertrochanteric fractures – seventeen with the PFN and twenty three with the PFNA. However, no significant differences were found between the two nails in terms of mean operation time, amount of bleeding, average union period, time to ambulation, or neck shaft angle changes. Kashid MR in 2016 studied 50 patients with unstable intertrochanteric fractures fulfilling inclusion and exclusion criteria, were randomized into 2 groups to undergo CRIF with either standard PFN (n=25) or PFNA (n=25). Post op complications like infection, non-union, cut out/z- effect, loss of reduction, re-operation and mortality rates didn't differ significantly between the groups. Post op functional recovery as evaluated by pain, use of walking aids and Harris hip scores were similar in both groups and concluded that PFNA significantly reduces the operative time, amount of blood loss and fluoroscopic imaging as compared to PFN. However PFNA offers

no significant benefits over PFN in terms of post-operative functional recovery or complications.¹⁴

CONCLUSION

The functional outcomes achieved after treatment of unstable intertrochanteric fractures with both PFN and PFNA are satisfactory and comparable. The PFNA is an easier implant to insert owing to a single device for proximal fixation, which translates into lesser surgical time as compared to the PFN.

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