



Comparitive Analysis of Outcome of Proximal Femoral Nail Antirotation II (PFNA-II) and Dynamic Hip Screw (DHS) in the Management of Intertrochanteric Fractures of Femur

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Received: 09 July 2022

Revised: 23 August 2022

Accepted: 01 September 2022

Published: 22 October 2022

Abstract

Background: To compare the clinical and radiological outcomes of patients with intertrochanteric fractures treated with PFNA-II versus DHS.

Material & Methods: 50 adult patients with inter-trochanteric fractures, >20 years old, were randomly distributed into the PFNA-II and DHS groups. DHS with side-plate and proximal femoral nail A-II of appropriate size was used. The patients were regularly followed up till 1 year post-operatively. The clinical, radiological and functional evaluations were done at regular intervals. The peri-operative, early and delayed complications were recorded, and the final outcome of either group was evaluated using the Harris Hip Score.

Results: In the DHS group, the mean Harris Hip Score was slightly lower than that of the PFNA-II group at six month follow-up. However, at the 1 year follow-up, both the groups achieved similar Harris Hip Scores.

Conclusion: PFNA-II provides a significantly shorter operative time with a smaller incision that leads to lesser blood loss and wound-related complications. However, the incidence of procedural errors was significantly higher in PFNA-II when compared with DHS as it is a technically more demanding procedure that leads to more implant failures and consequent re-operations.

Keywords:-Intertrochanteric Fractures, Proximal Femoral Nail A-II(PFNA-II), Dynamic Hip Screw(DHS), Harris Hip Score(HHS).

INTRODUCTION

Intertrochanteric fracture incidence has been increasing since there is now higher life expectancy and rising incidence of road side

accidents. For a hip fracture at the age of 50 the lifetime risk is 15-17% for females and 5-6% for males,^[1] more than half of which are inter-trochanteric injuries. Men have less incidence of these fractures has compared to women,

probably due to factors like a wider pelvis in women predisposing to tendency of coxa vara, women being less active develop osteopenia and osteoporosis which is further accelerated by post menopausal changes.^[2] Most of these trochanteric fractures occur due to direct trauma and major proportion of it is caused by simple fall.^[3]

Even under the best conditions of management, Inter-trochanteric fractures of femur carries with it, its usual toll of morbidity and mortality, and have presented with great challenges to orthopaedic surgeons, since patients need to be bedridden for prolonged periods of time viz venous thrombosis, pulmonary embolism, atelectasis, pressure sores and renal calculi formation.^[4] These factors result in an enormous cost to the healthcare system.^[5,6]

Commonly used implants for the fixation of these fractures are cephalo-medullary nails (PFN, PFNA-II, Gamma Nails), angular blade plates and sliding hip screw (DHS).^[7,8]

MATERIAL AND METHODS

This study was conducted during the time period from January 2020 to December 2021, which included 50 adult patients (25 patients operated with PFNA-II and 25 patients operated with DHS) with age >20 years with intertrochanteric fractures admitted in Guru Nanak Dev Hospital, Amritsar.

Inclusion Criteria

- Fractures without any neurovascular deficit.
- Fractures without any extension into the neighbouring joint.

Exclusion Criteria

- Age < 20 years.
- Polytrauma patients.
- Compound fractures.
- Fractures >3 weeks old.
- Pathologic fractures.
- Patients with co-morbidities.

Following admission every patient was thoroughly assessed for any associated injury and a detailed musculoskeletal examination was done along with relevant history. Radiographs were done for pelvis including both hips antero-posterior view and also of ipsilateral femur including the knee joint. Skin/skeletal traction was applied to immobilize the limb and necessary blood investigations were done for anaesthetic clearance for surgery. Patients were listed for surgery only after anaesthetic clearance and investigations like echocardiography were done as and when required. 25 patients each were surgically treated with PFNA-II and DHS during the course of our study.

Following Data Was Recorded

- Demographics.
- Type of fracture.
- Operative time.
- Final result as per Harris Hip Score.
- Post-operative complications (if any).

RESULTS

In our study, 50 patients were considered (25 each for PFNA-II and DHS). Maximum and minimum age for PFNA-II in the study was 29 and 78 years respectively, with mean age of 57.3 years. Maximum and minimum age for DHS in the study was 33 and 74 years respectively, with

mean age of 59.1 years. In the study, females outnumbered males. Out of 25 cases operated with PFNA-II, there were 18 females (72%) and 7 males (28%). Out of the 25 cases operated with DHS, there were 16 females (64%) and 9 males (36%).

In our study, most of patients of PFNA-II group 17 (68%) suffered injury due to fall (low velocity trauma) and the remaining patients 8 (32%) suffered injury because of high velocity trauma (RTA). For the DHS group, majority of the patients 19(76%) suffered injury due to fall (low velocity trauma) and rest of the patients 6 (24%) suffered injury because of high velocity trauma (RTA).

In this study, as per Boyd and Griffin classification, for the PFNA-II group, type I

fractures constitute 68% of the fractures whereas type II constitute 32% of the fractures. For DHS group, type I fractures constitute 60% while type II fractures constitute 40%. Mean surgical time for PFNA-II group was 74.30 minutes and for the DHS group the mean operative time 82.90 minutes. Majority of the patients were mobilized by 2nd post-operative day and were subsequently discharged by 7th post-operative day. Majority of the patients were able to fully bear weight by 12-15 weeks for both PFNA-II and DHS. According to the Harris Hip Scoring, excellent to good results were achieved in 96% cases for PFNA-II group and 88% cases for DHS group. Remaining cases had fair results in our study.

Table 1: Distribution as per age

Age(Years)	PFNA-II		DHS	
	Number of Patients	%	Number of Patients	%
21-30	1	4	1	4
31-40	2	8	2	8
41-50	6	24	2	8
51-60	12	48	7	28
61-70	4	16	13	52
TOTAL	25	100	25	100
MEAN	57.3		62.1	

Table 2: Gender Distribution

Gender	PFNA-II		DHS	
	Number of Patients	%	Number of Patients	%
Male	7	28	16	64
Females	18	72	9	36

Table 3: Mechanism of injury

Mechanism of injury	PFNA-II		DHS	
	Number of Patients	%	Number of Patients	%
Fall	17	68	19	76
RTA	8	32	6	24

Table 4: Radiological union time (weeks)

Fracture union(wks)	PFNA-II		DHS	
	No. of cases	%age	No. of cases	%age
12-13	11	44	10	40
14-15	13	52	12	48
16-18	1	4	3	12
Total	25	100	25	100
Mean	13.76±1.2		14.6±1.3	
Minimum	12		13	
Maximum	17		17	

Table 5: Final Outcome as per Modified Harris Hip Score

Results	PFNA-II		DHS	
	Number of Patients	%	Number of Patients	%
Excellent	13	52	10	40
Good	11	44	13	52
Fair	1	4	2	8
Poor	0	0	0	0
Total	25	100	25	100

DISCUSSION

High velocity trauma fractures are frequently associated with comminution, posing a threat for significant soft tissue damage (even in closed fractures) as well as devascularization of the fracture fragments.^[9] Muscle forces along with torsion forces at the hip create torsional effects that predispose to remarkable shear force. In day to day activities, up to 6 times the body weight is transmitted across the proximal femur.^[10]

In this study, bony union was achieved in all the 50 patients(100%). Patients were examined in every OPD visit along with radiographs in both Antero-Posterior and lateral views until 1 year after injury. The fracture union time ranged between 12 to 17 weeks post-operatively. In this study, the average fracture union time was 13.76 weeks and 14.6 weeks for PFNA-II and

DHS respectively. Nutritional supplementaton like a high protein diet and vitamins and minerals were provided post-operatively. Osteoporotic and high risk patients for fracture were recommended bisphosphonates. Kaplan et al. noted an average time for consolidation of fracture to 4 months, independent of the implant used. Bride et al. reported fracture union with gamma nail and dynamic hip screw (DHS) to be six months.^[11] Patients were followed up for 1 year, and the outcome was assessed using the Harris Hip Scoring system. Excellent to Good outcome in HHS was achieved in 96% of the subjects operated with PFNA-II and 92% of the subjects with DHS, while rest of the patients demonstrated fair outcomes. The course of rehabilitation was analysed on monthly basis in the OPD, during which they showed remarkable improvements in quality of un-assisted walking.

The complication rate of PFNA-II and the associated requirement of a revision procedure ranges from 3% to 28% in the previous literature.^[12,13] In a prospective study involving 55 subjects treated with PFN, Boldin et al. reported a complication rate of 21.8% (n=12).^[14] Corresponding to the previous literature, our study showed that the rate of delayed complications following the operative procedure was 14%. In our study, 1 patient with PFNA-II demonstrated abductor lurch, which progressively improved with time and physical therapy. In a cadaveric study by Egol et al., 17mm entry point of gamma nail through the greater trochanter would remove an average of one-fourth of gluteus medius insertion.^[15] The entry point for PFNA-II is 15 mm, which may lead to injury to the gluteus medius insertion. The limb length discrepancy and varus collapse also leads to the lurch in these patients. We observed a shortening of 1.5 cm in a case treated with PFNA-II and shortening of 2.5 cm in another case treated with DHS. The shortening was neutralized using sole raises in these cases. In our study, only one patient operated with DHS developed surgical site infection and was managed well with oral antibiotics. Important

factors affecting the course of wound healing include pre-operative nutritional status, blood sugar levels, hypertension, and venous stasis. Edwards et al. conducted a study of over 3686 cases where operations lasting >240 minutes carried a significantly higher risk of developing SSI (p=0.02). The treatment cost also remarkably increased with wound infection.^[16]

CONCLUSIONS

The present study concludes that although 1 year Harris Hip Score for both DHS and PFNA-II are similar outcomes, the additional benefit of achieving a closed reduction, lesser operative duration, lower blood loss, biology preservation, lower soft tissue injury, and early post operative rehabilitation favour the use of PFNA-II. It further provides adequate clinical and functional outcomes in terms of fixation and healing which can further be enhanced by superior pre-operative planning, proper entry point technique, and meticulous placement of the device in both AP and lateral view. Therefore PFNA-II is a more suitable implant for intertrochanteric fractures.

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- Source of Support: Nil, Conflict of Interest: None declared