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Comparative study of long versus short proximal femoral nail antirotation 2 in trochanteric femur fracture in old age

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ABSTRACT

Introduction

Trochanteric fractures are one of the most common injuries in old age patients . Intramedullary devices like the proximal femoral nail have been reported to have an advantage in such fractures as their placement allowed the implant to lie closer to the mechanical axis of the extremity. The present study was designed to compare the results of short proximal femoral nail anti rotational and long proximal femoral nail anti rotational in treatment of trochanteric fracture femur.

Material and method

In prospective comparative trochanteric fracture femur study 60 patients were enrolled which were randomized into 2 groups. Group I (n=30) patients were operated with Long PFNA2 and Group II (n=30) patients were operated with Short PFNA2.

Result

The mean age for the short PFNA2 group was 68.83 years (range: 60-80 years) and 67.7 years (range: 60-79 years) for the long PFNA2 group.

The amount of mean blood loss was significantly greater in the long PFN-A2 group (188.6ml vs. 134.4ml, $p < 0.001$). The mean duration of operative procedure 64.27 minutes in the short PFN-A2 group as compared to 84.13. minutes in the long PFN-A group ($p < 0.001$) showed significant difference. Conclusion we believe that intramedullary nail fixation of intertrochanteric fractures in the elderly has good clinical result.In this study, we found that using a short PFNA 2 revealed less duration of surgery, less amount of blood loss as compared to long PFNA2.They showed no significant difference in terms of fracture union.

Key words: Intertrochanteric fracture, short PFN, long PFN

I. INTRODUCTION

Trochanteric fractures are one of the most common injuries sustained predominantly in patients over sixty years of age. They are three to four times more common in women who are osteoporotic ,trivial fall being them most common mechanism of injury[1,2].

Proximal femoral fractures in elderly are usually resulting from minimal to moderate physical trauma so bone significantly weakened by osteoporosis. In younger patients ,proximal femoral fractures are usually there result of high energy physical trauma. However pathologic fractures are common cause of trochanteric fracture which characterized by un-usual fracture patterns.

Surgery has been them a in stay of the treatment for these fractures to allow early mobilization of the patient. A variety of internal fixation device have been used for treatment of these fractures ,like DHS, PFN, TFN, PFNA, DCS, Proximal Femoral Locking Plates, Blade Plate etc.

Among the surgical treatment, dynamic hip screw(DHS) as extra medullary power transmission system and proximal femoral nail (PFN) as intramedullary stabilization and standard in the treatment of trochanteric femoral fractures, particularly in elderly patients.

Stable fractures can be very well treated with dynamic hip screw alone with good results proven by various studies. It is the unstable fractures which are difficult to manage with dynamic hip screw alone. Rates of complications like screw cut out, shortening of limb, varus deformity of proximal femur and even non-union are higher in unstable fractures as compared with stable fractures[3].

Intramedullary devices like the proximal femoral nail have been reported to have an advantage in such fractures as their placement allowed the implant to lie closer to the mechanical axis of the extremity[4].

Intra medullary nails are purposed to have superior bio-mechanical properties to the dynamic hip screw when used in the treatment of inter trochanteric fractures of the femur. Osteosynthesis with the PFN features the advantage so high rotational stability of the head neck fragment, an undreamed implantation technique and the possibility of static or dynamic distal locking. Static locking prevent varus collapse in inter trochanteric fracture and dynamic distal locking increase dynamization in sub trochanteric fracture.

The present study was designed to compare the results of short proximal femoral nail anti rotationaI and long proximal femoral nail anti rotationaI in treatment of trochanteric fracture femur.

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II. MATERIAL AND METHOD

This was a Prospective Randomised Comparative Study between short proximal femoral nail antirotation 2 and long proximal femoral nail antirotation 2 fixation for the treatment of trochanteric femoral fractures of both genders admitted in orthopaedic wards of SMS Medical College Jaipur Rajasthan. (during the study period between April2018 to June2019).The patients were divided into two groups:

- GroupI- 30 Patients treated with short PFNA2
- GroupII- 30 Patients treated with long PFNA2

Inclusion Criteria

- Patients with age 60-80years
- Pertrochanteric fracture sustained after trauma
- Close I/Tfemur fracture
- Patient consenting to study

Exclusion Criteria

- Poly trauma patients
- Patients with pathological fractures
- Patients with concomitant sub-trochanteric or shaft femur fractures
- Patients with vascular injury
- Medically or anaesthetically unfit patient

Patients were operated as soon as the medical conditions allowed and fit for anaesthesia. We used pre-operative (prophylactic) antibiotics in all the cases.

Post operatively patients were maintained pain free by use of analgesics like NSAIDs, Opioid analgesics for initial few days and there after when required. All patients were allowed to sit up on the bed next day. They were taught quadriceps strengthening exercises and were encouraged to sit on the side of the bed within next days. Patients were made to ambulate as early as possible to prevent DVT and pressure sores.

III. STATISTICAL ANALYSIS

Statistic analysis was performed with the SPSS, version21 for Windows statistical Soft ware\Package (SPSSinc.,Chicago,IL,USA). The Categorical data was presented as numbers (percent) and were compared among groups using Chi-square test. The quantitative data was presented as mean an d standard deviation and were compared by students t-test. Probability was considered to be significant if less than 0.05

IV. OBSERVATIONS AND RESULT

60 patients underwent surgery in this study. There were 30 patients each in the short and long PFNA groups. The patient characteristics of both groups was not significantly different (Table 1). The mean age for the short PFNA group was 68.83 years (range: 60-80 years) and 67.7 years (range: 60-79 years) for the long PFNA2 group. There were 31-A1 and 31-A2 fractures most commonly in both groups . Most patients in both groups were operated upon within third days of sustaining the injury. All procedures were performed closed . The amount of mean blood loss was significantly greater in the long PFN-A2 group (188.6ml vs. 134.4ml, $p < 0.001$). The mean duration of operative procedure 64.27 minutes in the short PFN-A2 group as compared to 84.13. minutes in the long PFN-A group ($p < 0.001$) showed significant difference (Table1). The x ray exposer was significantly high in long PFN-A2 group (36 min. vs. 22 min., $P< 0.001$). There were no significant difference in bony union (table 1).

Table 1 pre, intra and postoperative data

Variable	Short PFN 2	Long PFN2	P	Remark
Number of case	30	30		
Age Mean +/-	68.83±5.86	67.7±5.11	0.604	No significant
Sex M\F	15/15	13/17	0.79	No significant
AO fracture type A1/A2/A3	11/13/6	11/15/4	0.762	No significant

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X ray exposer duration(minutes) Mean +/	22.9±3.9	36.6±3.75	<0.001	Significant
Duration of surgery (minutes) Mean +/- SD	64.27 ±9.40	84.13±8.47	<0.001	Significant
Intra-operative blood loss (ml) Mean +/	134.4±29.96	188.6±32.35	<0.001	Significant
Bone union(months) Mean +/- SD	3.70±0.44	3.82±0.22	0.187	No significant
Postoperative thigh pain	1	0	1.00	No significant

V. DISCUSSION

In my study patients belonged to mean age 68.83±5.86 in short PFN A2 and 67.7±5.11 in long PFN A2 group. The other study Evan , also showed similar age group[5]. The space between bony trabeculae is enlarged and loaded with fat calcar is thin as advance age, this is explained why trochanteric region is the most common site of senile osteoporosis as the age advances and hence the common site for fracture in elderly.

In comparison between the efficacies of PFN with Dynamic Hip Screw (DHS), it has been convincingly reported that a PFN is a better implant. Not only is the PFN a biomechanically superior implant, but also the patients with PFN mobilised earlier than those who had a DHS[6,7] . Aguado-Maestro et al., in their study patients of pertrochanteric fractures treated with PFNA, state that the helical blade system reduced the rate of cut through and cut out in pertrochanteric fractures and accurate placement of the helical blade was a key parameter to avoid mechanical failures [8,9].

Patients who underwent short PFNA2 procedures in the current study had lesser bleeding as compared to the long PFNA2 group. This was a significant finding (p=<0.001). Proximal reaming and insertion of a longer nail leading to opening of the medullary canal leads to increased blood loss. Most of the time, such a blood loss is concealed[10] .

Longer nails are recommended in elderly patients with significant osteoarthritis, because the entry point is more anatomically aligned as compared to the short nails. The operating surgeon is advised to refrain from hammering the nail in, however gentle the hammering process may be [11].

The x ray exposure shots in the long PFNA2 group was significantly higher as compared to that of the short PFNA2 group. This was similar to the series by Simmenmacher R et al who also found a significant difference in the fluoroscopy exposure shots in their series[12]. Multiple failed attempts at distal locking in long PFN A2 performed by free hand techniquecreate more fluoroscopy exposure shots and a stress riser in femoral shaft for iatrogenic fracture.

Patients who underwent short PFNA2 procedures in the current study had less duration of surgery as compared to the long. PFNA2 group. This was a significant finding (p=< 0.001)because Multiple failed attempts at distal locking and reaming in long PFN A2 was increased duration of surgery[12].

The mean duration of bony union in short PFNA2 3.70 months and in long PFNA2 3.82 months.

There was no difference noted between a bone union. B. Hari Krishnan was also found similar result in their study[13].

Based the our current study, we believe that intramedullary nail fixation of intertrochanteric fractures in the osteoporotic bone has good result, especially in early ambulation, reduce bedridden-related complications like bed sore and improvement of quality of life. Long and short PFNA2 have comparative clinical effects, though short nail has certain advantages in terms of duration of surgery and intraoperative blood loss. The postoperative complications thigh pain in short PFNA2 revealed not much significant differences.

VI. CONCLUSION

Based on the results of the our current study, we believe that intramedullary nail fixation of intertrochanteric fractures in the elderly has good clinical result.In this study, we found that using a short PFNA 2 revealed less duration of surgery, less amount of blood loss and less numbers of x ray exposure shots . Based on these findings ,we conclude that short PFNA2 device is a better implant than long PFNA 2 in trochanteric femur fracture.

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