Original Research Paper

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Surgery

EVALUATION OF CLINICAL OUTCOME OF UNSTABLE INTERTROCHANTERIC FRACTURES TREATED BY PROXIMAL FEMORAL NAIL VS. PROXIMAL FEMORAL LOCKING COMPRESSION PLATE

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ABSTRACT **Introduction:** Confusion still continues in unstable intertrochanteric fractures of femur fixation regarding which implant is better. In this study we compare the clinical outcome of these type of fractures treated by now days routinely used short proximal femoral nails with that of newly introduced PFLCP. Materials and method: This is randomized prospective comparative study of 48 patients in comparable two study groups; the first group of 24 patients operated with short proximal femoral nail (group 1 n=24) and second group of patients operated with proximal femoral locking compression plate (group 2 n=24). Patients were followed for at least one year or until union. **Results:** More intra operative difficulties were encountered during PFLCP procedure than PFN. Longer skin incision, extensive soft tissue dissection, more operative time, greater blood loss these factors in PFLCP group made this group to be associated with higher incidences of superficial and deep infection. Violation of fracture hematoma, more disturbances at local biology in PFLCP group took more time to heal. **Conclusion:** Although both implants are effective in management of unstable patterns of intertrochanteric fractures each has its own advantages or disadvantages but PFN has less intra operative difficulties and better post operative rehabilitation than PFLCP though not statistically significant functional and anatomical outcomes were found to be better with PFN.

KEYWORDS :

INTRODUCTION

Intertrochanteric region extends from the extracapsular neck region to the region along the lesser trochanter region which lies to the development of the medullary canal1.Incidence of hip and proximal femoral fractures is fairly common in a geriatric population2. The frequency of intertrochanteric fractures has increased primarily due to increasing the life span and more sedentary life style brought on by urbanization. It constitutes 11.6% of total fractures. Complications associated with prolonged bed rest or immobilization in elderly population makes conservative treatment less favorable in them3. Operative treatment has now become treatment of choice because it allows early mobilization and rehabilitation4. Dynamic hip screw (DHS) with side plate became gold standard treatment for hip fracture fixation during decades of 1980 to 2000 but its role in the unstable intertrochanteric fracture patterns was questionable to its high complication rate which was as high as 3 to 15%5,6. 'Screw cut out', medialization of shaft, penetration of joint by screw, implant failure were its few complications. Hence in late nineties (1996), proximal femoral nail (PFN) was introduced as intramedullary fixation device by AO/ASIF7. It has advantages over extramedullary DHS as it is not dependent of screw fixation of plate to lateral cortex, has short movement arm and shaft fixation is nearer to centre of rotation of hip. Also, the intramedullary devices minimize soft tissue dissection and thereby reduce surgical trauma, blood loss, infection and wound complications[8,9].

The new implant introduced for fixation of intertrochanteric fracture is proximal femoral locking compression plate (PFLCP)10. In this study, we have compared the clinical outcome of unstable intertrochanteric fractures treated by PFN and PFLCP. This study would help in assessing implant choice in unstable intertrochanteric fractures.

Material and methods

48 patients were included in this study. All fresh cases (less than 3 weeks old) of unstable (4 part fractures, reverse intertrochanteric, subtrochanteric extensions of fracture line, comminuted postero-medial cortex) intertrochanteric fractures, ages>50 years and agreement to attend the planned follow up examinations were included. Infected open fractures, pathological fractures and patients having poor general condition were excluded in this study. This study was recognized by ethical committee of our hospital. There were two groups 24 patients each operated with PFN and PFLCP respectively. Patient's distribution in both study groups was done using randomization table.

All patients were operated using a traction table under C-arm guidance then same post operative protocols were followed for both study groups. Patients were followed at regular intervals. Any infection, functional status, time taken for fracture union were noted. Modified Harris hip score system was used to evaluate functional outcome of the patients.

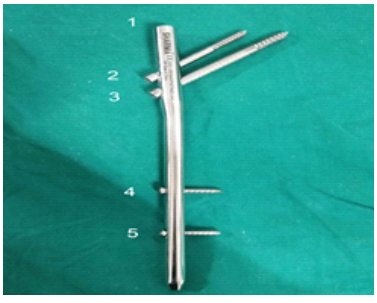

Figure 1: 1) Short Proximal Femoral Nail with 14mm proximal diameter, 6 degree mediolateral valgus and tapered tip 2) 6.5mm derotation screw 3) 8mm lag screw 4) 4.9mm cortical screw in static mode 5) 4.9mm cortical screw in dynamic mode

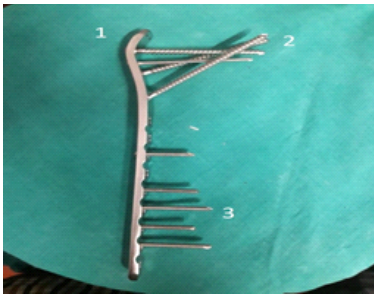

Figure 2: 1) Proximal Femoral Locking Compression Plate 2) 6.5mm derotation screw 3) 4.9mm cortical locking screws

Results

48 patients were followed up for median period of 18 months (12-30 months). Median age of PFN group was 68 years (50-82 years) and PFLCP group of was 67 years (54-80 years). 35 patients were female and 13 were male. 40 patients had injury due to low velocity trauma. Both groups were found to be comparable.

Intraoperative parameters (Table 1)

Following intraoperative parameters were looked for amount of blood loss, number of fluoroscopic exposures, length of incision required,

duration of surgery. The median blood loss for PFN surgery was 90ml (60-170ml) and that of PFLCP surgery was 160 ml (100-300ml) which was statistically significant. Length of incision used in PFN group was 8.2cm while that of PFLCP group was 15.8cm (p value <0.05). Among PFN group, close reduction was achieved in 20 cases, 4 cases required open reduction. On the other hand, all the cases in PFLCP group were opened to access the fracture site. Median operative time for PFN surgery was 45 minutes and for PFLCP surgery was 65 min.

Post operative parameters (Table 2)
In our study, average duration of hospital stay was 6 days in PFN group and 10 days in DHS group. The median radiological union time for PFLCP was 14 weeks and PFN group was 10 weeks which was statistically significant (p<0.05). 3 patients of PFLCP group had deep seated infection for which implant had to be removed. 1 patient of PFN group has superficial infection which was settled with IV antibiotics treatment. One patient of PFLCP group had fracture of femoral shaft just distal to distal end of plate. One of the patients of PFN group had 'Z' deformity of head screw. 3 patients among the PFLCP group had varus deformity of neck and one had limb length discrepancy (shortening by 1 cm) post operatively. In PFN group, only one had varus deformity of neck. 'P' value is not significant.

Functional outcomes of all patients were evaluated using modified Harris Hip Scoring System fallowing results were noted. (Table 3 and 4)

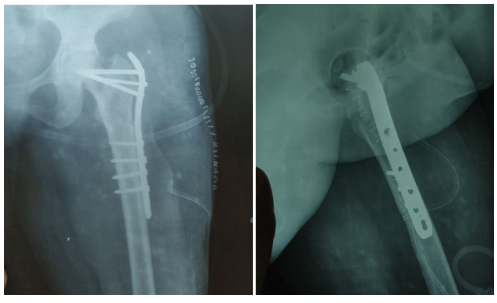

Figure 3: Postoperative xray of patient operated with Proximal Femoral Locking Compression Plate

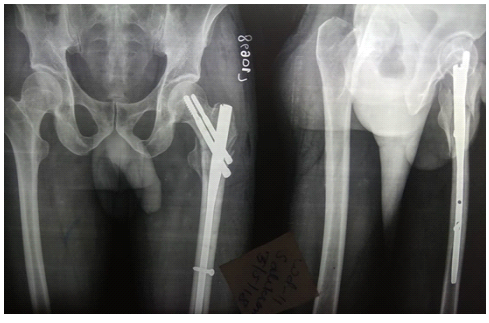

Figure 4: Postoperative xray of patient operated with Short Proximal Femoral Nail

DISCUSSION

The successful treatment of intertrochanteric fractures depends on many factors such as general health of the patient, age, concurrent medical treatment, time from the fracture to the treatment and the stability of the fixation11. Controversy still exists as to what fixation method should be used in intertrochanteric fractures particularly in unstable pattern fractures where complication rates are high12. Variety of implants are available which are mostly divided in two groups i.e. load bearing and load sharing. Load bearing implants are extramedullary implants and load sharing implants are intramedullary13. Stable patterns of intertrochanteric fractures can treated by both intramedullary as well as extramedullary implants but for unstable fracture patterns e.g. in case several fracture fragments, impaired bone quality, subtrochanteric extension of fracture line, comminuted postero-medial cortex previously used extramedullary implant (DHS) had its own limitation hence new extramedullary implant has been introduced i.e. PFLCP14.

In last two decades, the cephalomedullary femoral reconstructions nails with trochanteric entry points have gained popularity. These cephalomedullary nais have shown to be biomechanically stronger than extramedullary implants15,16,17. Anterior thigh pain and fracture of the femoral shaft were specifically associated with Gamma nail. The PFN has shown to be associated with no femoral shaft fractures due to smaller distal shaft diameter which reduces the stress concentration at the tip.

In this study, in PFN group fracture reduction was achieved by close reduction means which was possible in most of the cases but PFLCP group required open reduction in all cases. Direct access to fracture fragments made fracture reduction relatively easy in PFLCP group than PFN group but once reduction was achieved pre-operatively insertion of PFN and head screws with help of external jig was relatively far easy than PFLCP group. Seating of PFLCP to contour of proximal femur did not always allow for optimum placement of screws through femoral head and neck18. In order have optimally placed screws sometimes plate would remain prominent at tip of greater trochanter limiting hip abduction. Thus optimal placing of screws along with plate is time consuming and requires more radiographic exposure and learning curve of PFLCP procedure is more prolonged than PFN.

Conclusion

Although both implants are effective in management of unstable patterns of intertrochanteric fractures, each has its own advantages or disadvantages but PFN has less intra operative difficulties and better post operative rehabilitation than PFLCP though not statistically significant functional and anatomical outcomes were found to be better with PFN.

Table 1: Pre-operative comparison of the two groups

Pre-operative measures	PFN (n=24)	PFLCP(n=24)
Average age in years	68	67
Sex (M/F)	10/14	8/16
Mode of injury (high velocity/low velocity)	8/16	2/22

Table 2: Comparison of Intra-operative parameters the two groups

Pre-operative measures	PFN (n=24)	PFLCP(n=24)
Length of incision in cm	8.2	15.8
Blood loss in ml	90	160
Duration of operation in min.	45	65
No. of radiographic exposures	14	22

Table 3: Comparison of Post-operative parameters the two groups

Pre-operative measures	PFN (n=24)	PFLCP (n=24)
Infection (Superficial/Deep)	0/3	1/0
Hospital stay (days)	6	10
Varus deformity of head and neck	3	1
Limb length discrepancy	3	1
Implant failure	1	1
Average Radiological union time in weeks	10	14

Table 4: Comparison of functional results the two groups

Functional Results	PFN (n=24)	PFLCP (n=24)
Excellent	75%	58.2%
Good	12.3%	15.7%
Fair	12.2%	24.8%
Poor	0.4%	1.2%
'p' value 0.5 (not significant)		

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