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Outcome of proximal femoral locking compression plate (PFLP) in intertrochanteric femur fracture

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Abstract
Introduction: The trochanteric femur fracture are relatively common injuries. The most important goal of operative treatment is strong, stable fixation of the fracture fragment. Osteoporosis and severe communition makes fixation difficult with conventional methods leading to complications like varus malunion, implant failure and shortening. Proximal femoral nail has its own complication like screw backout, cut through etc. Hence we conducted a study to evaluate the outcome of proximal femoral locking compression plate.
Materials: A prospective study of 40 cases of trochanter femur fracture from 2011 and 2017 treated with proximal femoral locking compression plate (PFLCP) was done. Patients were followed up at 1month, 3 month, 6month, 1 year and 2 year, Results were evaluated using Harris Hip Score and radiological union.
Results: All the fractures united at final follow up, radiological union was noted at 16 weeks in 31 patients (76%) and remaining 9 patients showed radiological union at 20 weeks (24%). Out of 40 patients in our study 38 had normal union with only 2 patient had union in varus. No valgus deformity noted in our series. In all 40 cases there was no non-union, avascular necrosis or secondary osteoarthritis noted. In our study, 19 patients had excellent results, 15 patients had good results, 4 patients had poor result according to Harris Hip score.
Conclusion: The procedure offers, faster mobilization, rapid return to activities of daily living, improves the quality of life and gave a long term solution in patients with trochanteric fracture of femur.

Keywords: proximal femoral, compression plate, intertrochanteric femur fracture

Introduction
The trochanteric femur fracture are relatively common injuries. The Intertrochanteric fractures in younger individuals are usually the result of a high-energy injury, such as a motor vehicle accident (MVA) or fall from a height. Ninety percent of intertrochanteric fractures in the elderly result from a simple fall. In elderly patients with intertrochanteric fractures most of them have considerable osteopenia, with the quality of bone for the purchase of fixation within the femoral head and neck less than desirable hence it is important that the internal fixation device be placed in that part of the head and neck where the quality of bone is good and the implant and bone fixation should be rigid and stable. The most important goal of operative treatment is strong, stable fixation of the fracture fragment the primary goal of treatment is early mobilization to avoid secondary complications which may arise due to conservative treatment and other co-morbid complications of prolonged immobilization. Osteoporosis and severe communition makes fixation difficult with conventional methods like sliding hip screw. Common complications are varus malunion, implant failure and shortening. Trochanteric lateral plate is superior to a compression hip screw to support the lateral aspect of the greater trochanter in unstable fractures. This aids in resisting lateral sliding of the proximal fragment and maintaining an anatomical reduction. Proximal femoral nail has its own complication like screw backout, cut through etc. Hence we conducted a study to evaluate the outcome of proximal femoral locking compression plate.

Materials and Methods
A prospective study of 40 cases of intertrochanteric and subtrochanteric fracture from 2011

and 2017 treated with proximal femoral locking compression plate (PFLCP) was done. Intra capsular Fracture neck of femur, Patients less then 18 yrs of age, Patients not willing for the surgery, patients medically unfit for surgery were excluded from the study. Patients were followed up at 1month, 3 month, 6month, 1 year and 2 year, Results were evaluated using Harris Hip Score and radiological union.

Results

In our study, the mean age was 51.47 years. Minimum age was 19 years and maximum age was 85 years about 29% cases are in age group of 18 to 40, 24% are in between 51 to 60. Of the 40 cases 27 were male (67%) and 13 were female (33%). 19 patients (47.61%) had RTA as a cause of injury and 15 patients (38.09%) had trivial trauma.4 patients (9.52%) fall from height and only 2 patient (4.76%) had fall from bike. 25 patients (62%) had right-sided fracture and 15 patients (38%) had left-sided fracture.

In our study it is noted that except 9 patient most of our 40 patient did not had any associated injuries. The most common associated medical problem was HTN in 6 cases (14%), followed by DM in 4 cases (10%) and Anaemia and pulmonary. TB in 2 case (5%) each.

Boyd and Griffins[1] classifications for trochanteric fractures was used in the study. In our study, 19 patients presented with Type II fractures and 4 patients with Type III fractures making total of 23 IT fractures. Seinsheinmer's Classification is used for Subtrochanteric fracture of which 6 patients are of type 3A and 11 patients are of type 4.

Table 1: Type of M and F

Type	M	F
intertrochanteric	12	11
subtrochanteric	15	02
Grand Total	27	13

Radiological union was noted at 16 weeks in 31 patients (76%) and remaining 9 patients showed radiological union at 20 weeks (24%). Out of 40 patients in our study 38 (95%) had normal union with only 2 patient (5%) had union in varus. No valgus deformity noted in our series. In all 40 cases there was no non union, avascular necrosis or secondary osteoarthritis noted.

Out of 40 patients in our study 31 patients (76%) can able to sit cross-legged and can squat on ground without any problem only 10 patients (24%) cannot able to sit cross-legged and can squat on ground. Functional outcome for walking is considered 31 patients (76%) are able to walk without support and only 9 patients (24%) cannot able to walk without support.

The functional results were graded according to Harris Hip Scoring System. In our study, 19 patients (47%) had excellent results, 15 patients (38%) had good results, 4 patients (10%) had poor result, and 2 case failed (5%) she is an elderly female of 85 years with limited activity both preoperatively due to physiological age and general weakness.

Table 2: Complications

Complication	No of Patients	%
None	28	71%
Screw Breakage	2	5%
Screw Backout	2	5%
Plate Backout	2	5%
Superficial Infection	6	14%
Total	40	

There was postoperative superficial infection in 6 patients (14%) who had serous discharge. They responded to oral antibiotic for 5 days and regular dressings, 2 patients had proximal screw backout, another 2 patients had breakage of screw head in proximal locking screws and 2 patients had distal plate backout post.

Discussion

Fixation of intertrochanteric fracture has evolved through various implant devices whereas dynamic hip screw is the most practiced and established implant followed by proximal femoral nail which is an Intramedullary device. Intramedullary (IM) devices like the PFN device and Gamma nails were not commonly used locally as they are associated with an unacceptable rate of cutout and femoral shaft fractures. The implants have their own limitations in comminuted fractures especially with lateral cortex fractures, subtrocahnteric fractures and with co exsisting osteopenia.

The PF-LCP was introduced in the 21st century as a new implant that allows angular-stable plating for the treatment of complex, comminuted and osteoporotic fractures of proximal femur [3].

The concept this new implant in fixation offers considerable advantages. The plate is anatomically contoured to the lateral surface of the proximal femur. Anatomically precontoured locking plates have revolutionized the care of many fractures including the proximal femur; provision of side specificity accommodates the anteversion. They are available in different lengths to span major length of diaphysis. Locking principle helps in fixation in Osteoporotic fractures. Thus PF-LCP represents a feasible alternative for the treatment of comminuted, unstable inter and sub trochanteric fractures. The PF-LCP permits stable fixation of unstable fractures and promotes aggressive early motion.

Inter trochanteric fractures and sub trochanteric fractures have been considered in this study. 23 cases were intertrochanteric fractures. The remaining 17 cases were subtrochanteric fracture.

Trochanteric fractures occur mainly in adults and showed the same patterns but the mean age differed in few depending on the number of the fractures studied. The mean age observed in our study was 51.5 years. The youngest in our study was 19 years and the oldest was 85 years old. We had 43% of patients below 50 years of which most of them had a history of RTA or significant injury.

Boyd and Griffins[1] classifications for trochanteric fractures is used in the study. In our study, 19 patients presented with Type II fractures and 4 patients with Type III fractures making total of 23 intertorchanteric fractures, which is found to be statistically significant. Seinsheinmer's Classification is used for Subtrochanteric fracture of which 6 patients are of type 3A and 11 patients are of type 4.

9 patients in our series had associated injuries. The injuries were fracture of both pubic rami, distal radius fractures, multiple rib fractures, 3rd & 4th metacarpal fractures in different patients. All the associated fractures were managed appropriately. Co morbid conditions observed was hypertension in 6 cases (14%), diabetes mellitus in 4 cases (10%), two case of Anemia (5%) and pulmonary tuberculosis (5%) which were treated accordingly.

Associated complications in our study were comparable with other studies. There was an incidence of postoperative superficial infection in 6 patients (19%). They had serous discharge and responded to oral antibiotics with regular dressings. No deep infection was seen, 2 patients had

breakage of screw head in proximal locking screws during ambulatory period but without any complaints. The fractures united well hence no treatment done. This finding was found to be statistically significant. Guo-Chun Zha [15] al in there study reported a case of breakage of the implant and a case of non-union at the 3-month follow up.

Radiological union was noted at 16 weeks in 31 patients (76%) and remaining 9 patients showed radiological union at 20 weeks (24%) with 38 patients (95%) having normal union with only 2 patient (5%) had union in varus which is an finding significant statistically. In study by Guo-Chun, Zha ZeLin Chen [15] *et al* in 2011 of the total of 110 patients (72 females and 38 males) the union rate was 95% (99/104), 98% (98/100) and 100% (94/94) at the 12 weeks. In all our 40 cases there was no non union, or avascular necrosis or secondary osteoarthritis.

Post operative weight bearing status was dependant on fracture pattern, Stability at fixation, osteoporosis, and general well being of the patient. Compliance of the patient was also taken into consideration. Touch down weight bearing to Partial weight bearing was allowed from day 1 to 8 weeks. Further partial weight bearing to full weight bearing was allowed between 8 weeks to 12 weeks depending upon the fracture healing and other associated factors. In our series 31 patients started partial weight bearing till 8weeks and 9 patients started delayed partial weight bearing at 12 weeks. Full weight bearing started at 16 weeks in 31 patients and 9 patients started at 20 weeks.

The functional results were graded according to Harris Hip Scoring System. In our study, 19 patients (48%) had excellent results, 15 patients (38%) had good results, 4 patients (10%) had poor result, and 2 case was considered as failure (5%). This particular patient is an elderly female of 85 years and her pre injury activities of daily life were grossly limited and dependant and her mobility was not independent. In their study, WANG Wei-lin [13] *et al*. 2011 showed that Harris hip function score was excellent in 24 cases, good in 20 cases, and poor in 4 cases. Minghua XI E Wenweiet [12] in 2011observed an Harris score results were excellent (≥90 score) in 22 cases, 12 cases showed good (80～89score). The good to excellent rate was 100% in their cases.

Fig 1: Pre op radiograph

Fig 2: Immediate post op Radiograph

Conclusion

In the present study of PF-LCP, performed for trochanteric fracture of femur in 40 patients, the procedure offered an excellent pain free mobile hip, with easy rehabilitation and rapid return to functional level, when standard techniques were used.

The potential of the PF-LCP in varied indications shows its versatility. Although not free of complications our study has demonstrated excellent results. The procedure offers, faster mobilization, rapid return to activities of daily living, improves the quality of life and gave a long term solution in patients with trochanteric fracture of femur. Larger studies with longer follow up will further validate the procedure.

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