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Proximal femoral locking plate: A good alternate in comminuted proximal femoral fractures

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Abstract
Introduction: Intertrochanteric and sub trochanteric fractures account for 50% of all fractures of the proximal femur. Surgical treatment is the preferred method in these fractures to reduce the complications of prolonged immobilization. Recently proximal femoral locking compression plate (PF-LCP) has been applied in the treatment of proximal femur fractures.
Materials and methods: This is a prospective type of study of 12 cases of comminuted inter trochanteric and sub trochanteric fractures of femur treated surgically with proximal femoral locking compression plate (PF-LCP). All the cases were operated electivley on regular operation theatre days**.**
Results: In age distribution, 6 (50%) patients were between 50-75years. The range of age was between 20-75 years, with mean age of 43.8years. In sex distribution, there were 8 (66%) males and 4(34%) females. Left lower limb was involved in 9 (75%) cases and right lower limb in 3 (25%) cases. In mode of injury, 8 cases (66%) were due to slip and fall and 4 cases (34%) were due to road traffic accident. Kickstand screw was used in 9(75%) cases and not used due to narrow femoral neck in 3(25%) cases. Proximal screw was back out two patients (16%). Varus collapse occurred in one patient (8%). Delayed union in two patients (16%).
Conclusion: The PF-LCP is appropriate for complex and unstable proximal femoral fractures with poor bone quality.

Keywords: Proximal femoral fractures, Proximal femoral locking compression plate (PF-LCP), Kickstand screw

Introduction
Intertrochanteric and sub trochanteric fractures account for 50% of all fractures of the proximal femur [1]. They are due to high energy trauma in the young patients, while in elderly patients, they are often caused by low energy trauma like slip and fall in osteoporotic bone. Surgical treatment is the preferred method in these fractures to reduce the complications of prolonged immobilization like deep vein thrombosis, pulmonary embolism, respiratory tract infections and bed sores. Different types implants used for fixation of these fractures fall into two main categories i.e, intramedullary and extramedullary. Extramedullary devices such as dynamic hip screws, dynamic condylar screws and 95° condylar blade-plates provide strong fixation in the cancellous bone of the neck and head with considerable rotational stability. Their disadvantages are extensive devascularization, longer operating time, higher infection rate, delayed weight bearing, shortening, medialisation of the distal fragment, implant cut-outs, uncontrolled lateralisation of the proximal fragment, and varus collapse. Intramedullary fixation is associated with short operative time and minimal blood loss and has better biomechanical properties when compared with extramedullary fixation. But they have their own technical difficulties and complications in comminuted proximal femur fractures. Recently proximal femoral locking compression plate (PF-LCP) has been applied in the treatment of comminuted proximal femur fracture including subtrochanteric fracture. Proximal femoral locking plates have the advantage of allowing multiple angular stable fixation points into the proximal femur, while leaving a smaller 'foot print' by preserving more bone stock after implantation compared with the use of large proximal lag screws. The PF-LCP is an angular-stable and limited contact plate specifically designed for treatment of comminuted

inter trochanteric and sub trochanteric fractures. The plate is anatomically pre contoured for the metaphysis of the proximal femur. The first three proximal threaded holes of the plate are designed for 6.5mm fully threaded cancellous locking screws that are inserted at 95°, 120° and 135° angle relation to the shaft of the femur. The third locking screw that is inserted at the level of the calcar and intersects with the most proximal screw, called as "kickstand screw". The remaining screw holes, which range from 4 to 16 in the PF-LCP, are LCP-combi-holes that allow the placement of either a conventional (4.5 mm) or a locking head screw (5.0 mm) at the level of the shaft. (Fig. 1).

Fig 1: Showing plate morphology.

The most distal hole allows the use of a Kirschner wire for temporary fixation to achieve correct positioning of the plate. Periloc plate from Smith and Nephew has got six screw holes into the femoral head which can accommodate 4.5mm, 5.7mm and 6.5mm size screws in the same hole which is of great advantage especially when we have thin neck of femur individuals. We used orthomax plate which has three holes in the proximal end for locking 6.5 mm cancellous screws.

Materials and methods

This is a prospective type of study of 12 cases of comminuted inter trochanteric and sub trochanteric fractures of femur treated surgically with proximal femoral locking compression plate (PF-LCP) which were admitted to NRI Medical College and Hospital, Chinakakani, Andhra Pradesh, between April 2014 to march 2017. All the patients of comminuted inter trochanteric and sub trochanteric fractures of femur with age between 20 to 75 years with medical fitness for surgery were included in the study. Simple two fragment inter trochanteric fractures, patients medically unfit for surgery and patients not willing for surgery were excluded from study. All the patients who brought to casuality and orthopaedic OPD were examined to rule out any associated injuries. All the patients were subjected for X rays which includes Xray pelvis with both hips antero posterior view and antero posterior and lateral views of concerned hip with thigh to confirm the fracture (Fig. 2) and below knee skin traction applied till getting fitness for surgery.

Fig 2: Pre operative x ray showing comminuted trochanteric fracture.

After surgical profile screening and getting fitness, all the patients were posted for surgery electively.

Operative technique

All the patients were operated under spinal anaesthesia using fracture table. Concerned lower limb scrubbed and draped.10 cm long skin incision was given starting from 2 cm above the greater trochanter on the lateral aspect of thigh and extended up to middle of the thigh depending on the fracture pattern. Tensor fascia lata cut and vastus lifted of femur. Open reduction of fracture fragments done and pre contoured proximal femoral locking compression plate placed which was preliminarily fixed to bone with K wires. Under C-arm guidance three guide pins passed into femoral neck at 95^0, 120^0 and $135^{0.}$ After drilling proximal fragment fixed with three 6.5 mm fully threaded cancellous screws and remaining distal holes fixed with 5mm cortical screws. Fracture reduction and position of screws confirmed under C-arm. After wound wash, wound closure done under negative suction drain. Post operatively patients were instructed to keep the limb elevated. Suction drain was removed after 48 hours. Post operative check xray (Fig.3) was taken.

Fig 3: Immediate post operative x ray showing good reduction with PFFL plate.

Antibiotics and analgesics were given to the patient till the time of suture removal. Sutures/staples were removed after the 10th post operative day depending on wound condition. Patients were followed post operatively at 6,10 and 14 weeks thereafter every 3 months up to 1 year(Fig.4). Weight bearing delayed until fracture union.

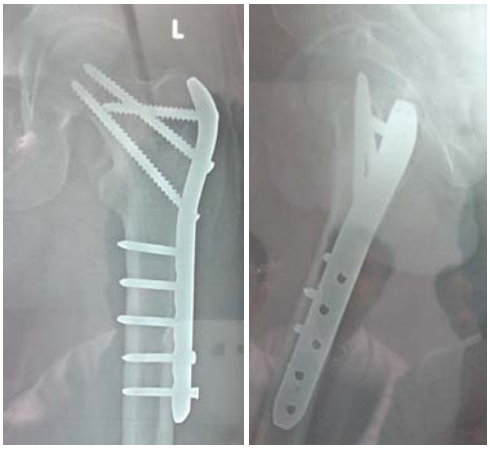

Fig 4: Six months old follw up x ray showing good union of fracture.

At follow up detailed clinical examination was done and patients were assessed subjectively for pain and range of movements (Fig.5).

Fig 5: Showing hip range of movements.

Presence of callus for evaluation of fracture union and complications (implant cut-out and varus collapse) assessed on radiographs. Hip function assessed using the Hospital for Special Surgery: Hip Rating System [2].

Results

The present study consists of 12 cases of comminuted inter trochanteric and sub trochanteric fractures of femur treated surgically with proximal femoral locking compression plate (PF-LCP). In age distribution, 6 (50%) patients were between 50-75 years. The range of age was between 20-75 years, with mean age of 43.8years. In sex distribution, there were 8 (66%) males and 4(34%) females. Left lower limb was involved in 9 (75%) cases and right lower limb in 3 (25%) cases. In mode of injury, 8 cases (66%) were due to slip and fall and 4 cases (34%) were due to road traffic accident. All the cases were operated electivley on regular operation theatre days. Kickstand screw was used in 9(75%) cases and not used due to narrow femoral neck in 3(25%) cases. Proximal screw back out occurred two patients (16%). Varus collapse occurred in one patient (8%). Delayed union in two patients (16%). In our study, radiological union was seen at 3 months to 5 months.

Table 1: Fracture pattern

Fracture pattern	Number of patients	Percentage
Intertrochanteric	8	66%
Sub trochanteric	4	34%

Table 2: Sex incidence

Sex	Number of patients	Percentage
Male	8	66%
Female	4	34%

Table 3: Side incidence.

Side	Number of Patients	Percentage
Right	3	25%
Left	9	75%

Table 4: Mode of injury

Mode of injury	Number of patients	percentage
Slip & Fall	8	66%
RTA	4	34%

Table 3: Side incidence.

Kick stand screw	Number of patients	percentage
Used	9	75%
Not used	3	25%

Table 5: Complications.

Complications	Number of patients	percentage
Proximal screw back out	2	16%
Varus collapse	1	8 %
Delayed union	2	16 %

Discussion

Treatment of complex proximal fractures challenging interms of achieving good reduction per operatively and maintenance of reduction and union at fracture post operatively. Early stabilisation of unstable intertrochanteric fractures with mechanically more stable implants enables earlier weight bearing, recovery of ambulatory function and prevents complications of prolonged immobilization like deep vein thrombosis, pulmonary embolism, respiratory tract infections and bed sores. In unstable intertrochanteric fractures, including fractures with a large posteromedial void, reverse

oblique fractures with subtrochanteric extension, and fractures with loss of lateral buttress (greater trochanter comminution) [3] it is important to achieve near-anatomic reduction and maintain it till union, but this is not feasible when a DHS is used, as intra- and post-operative collapse may occur and lead to shortening or medialisation of the shaft [4]. The screw may back out of the DHS side plate, owing to increased stresses at the screw plate junction. This problem can be managed using a non-collapsing implant with a locking neck and shaft screws. The greater trochanter is the only structure resisting proximal fragment lateralization. Using a DHS in a fracture without a lateral buttress inevitably leads to medialisation of the shaft, non-union, and screw cutout. In such fractures non collapsing proximal locking plate is useful. Dynamic sliding hip screw system and proximal femoral nail antirotation system enable controlled impaction of the interrochanteric fracture fragments, whereas the PF-LCP system locks the fracture in position without controlled collapse.

The use of a single large DHS lag screw necessitates reaming of lots of healthy cancellous bone, which is detrimental in osteoporotic hips. According to literature review the volume of bone reamed was 8586 mm^3 for one dynamic condylar screw or DHS lag screw (12.5 mm in diameter, 70 mm in length) and 6965 mm^3 for 3 locking screws (each 6.5 mm in diameter, 70 mm in length) placed through the proximal femoral locking plate. More bone is preserved in fixation using a locking plate. When a single DHS lag screw is used, there is either excessive co-axial collapse in unstable intertrochanteric fractures without a lateral wall or excessive bending stress at the lag screw-plate junction. In contrast, multidirectional locking screws decrease the stress concentrated at the screw-plate junction with a 95º screw preventing the collapse. Even with the trochanteric lateral buttress plate, there is excess stress on the plate screws that prevent medialisation. Hence, locking screws at the screw-plate construct are necessary. Proximal femoral locking plate is designed to have a lateral trochanteric buttress to prevent lateralisation of the proximal fragment. The proximal femoral locking plate is fixed with many multi-directional smaller diameter screws to hold the head at 95º and 135º directions and to preserve more cancellous bone. The amount of medialisation of shaft determines the length of the abductor lever arm. With medialisation, the length of the abductor lever arm decreases and leads to an abductor lurch and affects functional outcome. The use of PFLP prevents medialisation, thereby less effect on abductor lever arm and decreases abductor lurch. The PFLP with kickstand screw is biomechanically equivalent to the angled blade plate, but it allows for percutaneous insertion and avoids the potential morbidity of an extensile lateral approach of femur. The PF-LCP provided angular stability with greater degree of adjustment compared with angled blade plate, and offered the same variability while avoiding excessive bone removal compared with dynamic condylar screw. In our study 84%of fractures achieved union, 24% of fractures had complications. Compare with excellent results from previous studies (95-100% union rate) with less complication (1.8-12.5%). The complications in this study may be due to poor bone quality, early weight bearing of patient as well as lack of kickstand screw. The kickstand screw played an important role in preventing varus collapse of the construct [6]. In order to achieve good results from PF-LCP, the surgeon should focus on adequate plate length, near-anatomical reduction with or without circumferential wire in sub trochanteric fractures, good medial buttress of fracture site, use of kickstand screw, biologic friendly or sub muscular insertion of plate whenever possible.

Conclusion

The PF-LCP is appropriate for complex and unstable proximal femoral fractures with poor bone quality, lateral wall comminuted trochanteric fractures, and multi-fragmentary subtrochanteric fractures.

References

1. Koval KJ, Zuckermann JD. Handbook of Fractures, Lippincott Williams & Wilkins, 3rd edition, 2006.
2. Salvati EA, Wilson PD Jr. Long-term results of femoral-head replacement. J Bone Joint Surg Am. 1973; 55:516-24.
3. Kokoroghiannis C, Aktselis I, Deligeorgis A, Fragkomichalos E, Papadimas D, Pappadas I. Evolving concepts of stability and intramedullary fixation of intertrochanteric fractures-areview. Injury. 2012; 43:686-93.
4. Evans EM. The treatment of trochanteric fractures of the femur. J Bone Joint Surg Br. 1949; 31:190-203.
5. Zha GC, Chen ZL, Qi XB, Sun JY. Treatment of pertrochanteric fractures with a proximal femur locking compression plate. Injury. 2011; 42(11):1294-9.
6. Saini P, Kumar R, Shekhawat V, Joshi N, Bansal M, Kumar S. Biological fixation of comminuted sub trochanteric fractures with proximal femur locking compression plate. Injury. 2012; 29:345.