Surgical aspects, outcome and complications as comparative studies between proximal femoral nailing (PFN) and proximal femoral locking compression plate (PFLCP) in the management of intertrochanteric femoral fracture

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ABSTRACT

Background: Intertrochanteric fractures occur in people with poor bone quality, about half of the intertrochanteric fractures are comminute and unstable. The purpose of the present study was to compare the outcome of surgical treatment of proximal femoral fracture by dynamic hip screw (DHS), proximal femoral nail (PFN) and proximal femoral locking compression plate (PFLCP).

Methods: This prospective comparative observational study had included cases presented with intertrochanteric fractures of femur attended orthopaedic OPD and emergency department were treated with dynamic hip screw (DHS), proximal femoral nailing (PFN) or proximal femoral locking compression plate. Post-operative x-rays were done to assess reduction and progress of union (non-union/mal-union), any post-operative complications e.g. operative wound infection, implant failure etc.

Results: In our study, we found that PFNs prove to be more useful in difficult fractures with a sub trochanteric extension or reversed obliquity. The rotational stability was higher when proximal femoral nail is used in these fractures. The incidence of wound infection was found to be lower with intramedullary implants which resulted in early ambulation of the patients.

Conclusions: In our study, we found that proximal femoral nails prove to be more useful in difficult fractures with a sub-trochanteric extension or reversed obliquity. The rotational stability was higher when PFN is used in these fractures. The incidence of wound infection was found to be lower with intramedullary implants which resulted in early ambulation of the patients. Non-union of trochanteric fracture although is a rare entity.

Keywords: Intertrochanteric fracture of femur, Proximal femoral nailing, Dynamic hip screw, Proximal femoral locking compression plates, Outcome

INTRODUCTION

Trochanteric fractures are common in the elderly people. The frequency of these fractures has increased primarily due to the increasing life span and more sedentary life style brought on by urbanization.
Trochanteric fractures occur in the younger population due to high velocity trauma, whereas in the elderly population it is most often due to trivial trauma. Dynamic hip screws (DHS) have been considered as the standard fixation for extra-capsular femoral fracture and yield- ed good results in the patients with stable intertrochanteric fractures. However, its value for Commented and highly unstable intertrochanteric and sub-trochanteric fractures remains uncertain High failure rate and excessive impaction have been reported in addition, the long incision required for the DHS fixation can lead to significant blood loss and soft-tissue damage, which may worsen existing comorbidities in elderly patients

Proximal femoral fractures are one of the commonest fractures encountered in orthopaedic trauma practice (about 3 lakh per yearl with mortality rate of 4 5%-22%) Hence the interest in development of improvements in management of these fractures remains high Extra-capsular proximal femoral fractures are those occurring in the region extending from extra- capsular basılar neck region to 5 cm below lesser trochanter Proximal femoral fractures include intertrochanteric and sub-trochanternc fractures.

Stable proximal femoral fractures can be managed with conventional implant with predictable results whereas unstable fractures are challenging, and prone to complications There is a lack of consensus on the treatment for unstable proximal femoral fractures Dynamic hip screw (DHS) is commonly used for treating unstable intertrochanteric fractures. Its complications include shortening, medialisation of the distal fragment, implant cut-outs, uncontrolled lateralisation of the proximal fragment, and varus collapse. The proximal femoral locking plate can address these complications of DHS "

Proximal femoral locking compression plate (PFLCP) has been developed recently, which merges locking screw technology with conventional plating techniques. Theoretically, this technique could offer optimum fixation of comminuted and highly unstable fractures that are associated with more shearing and pull-out forces. 12,13 Several studies have reported success with PFLCP fixation for the treatment of complex femoral fractures and for revision operations after the failure of other implants 1417 Only one small study compared PFLCP and DHS fpation techniques and showed better bone union with the PFLCP fixation in patients with unstable. intertrochanteric fracture 11.18 However, whether PFLCP is better than other fixation methods remains obscure.

PFLCP provides the surgeon with the flexibility to achieve plate to bone apposition as well as axial compression or angular stability because of three screw fixation at the fracture site Unlike conventional compression plates, the screw head locks into the PFLCP, thereby creating an angular stable construct. PFLCP can provide a stress shield for the lateral trochanteric wall and prevent lateral migration of proximal fragments Thus, PF-LCP does not fail at the screw bone interface and provide a strong anchor in osteoporotic bone.

METHODS

This prospective comparative observational study was approved by the ethics committee of the hospital Informed consent of each patient was obtained Study related data was captured between January 2015 to December 2016 in a tertiary care teaching hospital, ICARE Hospital Haldia All the cases presented with intertrochanteric fractures of femur attended orthopedic OPD and emergency department were treated with dynarnic hip screw (DHS), proximal femoral nailing (PFN) or proximal femoral locking compression plate were evaluated and followed up Post-operative X-rays were done to assess reduction and progress of union (non-union/mal-union),

any post-operative complications eg operative wound infection, implant failure etc.The outcome was assessed based on the postoperative pain, walking ability, hip joint range of motion, and limb length shortening, In all the patients along with personal data, mode of trauma, type of fracture etype of surgery, intra operative & post-operative complications, follow up examination including hip joint examination, duration of full weight bearing were consideredInclusion criteria were Patients from age group 18 years and above and both sexes, AO/OTA classification of intertrochanteric fractures of femur and patients presented within two weeks following trauma. Exclusion criteria were non-operatively treated intertrochanteric fractures of femur, non-union, pathological fractures, fractures associated with polytrauma and patients with previous ipsilateral hip or fernur surgeries, patients who are medically unfit for surgery.

Surgical Technique

Dynamic Hip Screw (DHS) Proximal Femoral Nail (PFN) (PFLCP)
Proximal Femoral Locking Compression Plate

Measurement of diameter of the nail

In our study nails of uniform size length ie 25 mm were used in all cases. It was done by taking conventional radiographs of normal femur & by measuring the inner diameter between the cortices at the level of the isthmus.
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Results: In our study, we found that PFNs prove to be more useful in difficult fractures with a sub trochanteric extension or reversed obliquity. The rotational stability was higher when proximal femoral nail is used in these fractures. The incidence of wound infection was found to be lower with intramedullary implants which resulted in early ambulation of the patients

Discussion:

Surgical Considerations

- Operative Time and Blood Loss: PFN procedures generally have shorter operative times and less intraoperative blood loss compared to PFLCP. For instance, a study reported average operative times of 49 minutes for PFN versus 66 minutes for PFLCP, with corresponding blood losses of 260 ml and 361.5 ml, respectively. [OBJ]
- Incision Length and Surgical Exposure: PFN, being an intramedullary device, requires smaller incisions and less soft tissue dissection, potentially leading to reduced postoperative pain and faster recovery.

Functional Outcomes

- Harris Hip Score (HHS): Patients treated with PFN often achieve higher HHS, indicating better hip function. One study reported average HHS of 90.0 for PFN and 81.15 for PFLCP. [OBJ]
- Early Mobilization: The stability provided by PFN allows for earlier weight-bearing and mobilization, which is crucial in elderly patients to prevent complications associated with prolonged immobility. [OBJ]

Complications

- Infection and Implant Failure: PFLCP has been associated with higher rates of complications such as deep infections, implant failure, and varus collapse. For example, a study observed a 40% complication rate in the PFLCP group compared to 20% in the PFN group. [OBJ]
- Biomechanical Stability: Biomechanical analyses have demonstrated that PFN provides greater axial stability compared to PFLCP, making it more suitable for unstable fracture patterns.

Conclusions: In our study, we found that proximal femoral nails prove to be more useful in difficult fractures with a sub-trochanteric extension or reversed obliquity. The rotational stability was higher when PFN is used in

these fractures. The incidence of wound infection was found to be lower with intramedullary implants which resulted in early ambulation of the patients. Non-union of trochanteric fracture although is a rare entity.

Bibliography :

Here is a sample bibliography (in Vancouver style) for studies and literature that discuss the surgical aspects of Proximal Femoral Nailing (PFN) versus Proximal Femoral Locking Compression Plate (PFLCP) in intertrochanteric fractures of the femur:

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