

Case Report

Long PFN in unstable subtrochantric fracture with absent lateral wall support in proximal fragment with delayed augmentation with encircalage wire and bone grafting

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ABSTRACT

In 1949 Boyd and Griffin Subtrochanteric fracture femur as a variant of peritrochanteric fracture with higher incidence of unsatisfactory result both in the elderly and young. Most of this fracture is with higher incidence of unsatisfactory result after operative treatment This single case study shows one of the unpredicted iotrogenic complications. Material and method: Patient is 78yr female patient with multiple co-morbid conditions with subtrochanetric fracture. Surgery was done with long PFN nail inserted with good purchase in head, reduction check under C-arm with in antero-posterior & lateral view shows little malreduction and nail is out of medulary cavity in proximal fragment. Revision in same sitting not possible due to some medical reasons. Revision surgery done after fitness and reduction held with encieclage wire and bone grafting done. Conclusion: Even without lateral wall support if there is good purchase of screws in head and shaft, there will be good union and good functional outcome.

Keywords: Subtrochanteric fracture, Peritrochanteric fracture, Bone grafting

INTRODUCTION

Subtrochanteric fractures are always gives challenges for surgical treatment regarding healing with better functional output. Overall incidence of this fracture is in between 10% to 34% of all hip fracture.^{1,2}

In 1949 Boyd and Griffin first illustrate Subtrochanteric fracture femur as a variant of peritrochanteric fracture with higher incidence of unsatisfactory result both in the elderly and young.¹ Grossly it is the fracture between lesser trochanter and the isthamus of the diaphysis. There are many classifications of this fracture, in this case report we are considering Seinsheimer¹ classification: subtrochanteric –intertrochanteric configuration and also Russell and Taylor classification based on lesser trochanteric continuity and fracture extension posteriorly on greater trochanter involving the piriformis fossa are

considered as they explain the probable cause of this iotrogenic complication^{3,4} [Figure 1].

Most of this fracture is with higher incidence of unsatisfactory result after operative treatment, the reason behind is probably the muscular forces which cause difficulty in reduction. Also the elderly patients are suffering from many co-morbid conditions, resulting in delay in operative procedure, in young most of the time the fracture is due to high velocity trauma or polytrauma which in turn may lead to compromise in the surgical outcome.⁵

Since long this fracture has been a source of debate among orthopaedic surgeons regarding the ideal treatment modality which persists till date with respect to selection of better implant according to configuration of the fracture, implants like DHS, DCS, short PFN, Long

PFN readily available and newer implants like proximal femoral locking plates and PFN-A coming up.^{3,4,5}

CASE REPORT

The patient is 78yr female patient with multiple comorbid condition taking treatment for that came with history of self fall in bathroom since then she had difficulty to stand and walk. with primary investigation she was diagnose as a case of subtrochanteric fracture [Figure2] with explaining the probable functional outcome and complication with respect to previous co-morbid conditions planning for surgery done after positive consent of the near relatives.



Figure 1: Pre-operative X-ray showing subtrochanteric femur fracture.



Figure 2: Immediate post-operative X-ray showing malreduction and nail in situ.

With all preoperative investigation and physician fitness patient posted for surgery with long proximal femoral nail following all standard protocol pt. taken in ot. pt. supine under epidural anaesthesia on fracture table with primary reduction done entry hole through tip of greater trochanter done guide wire pass through entry point and through fracture site after reaming nail inserted 2 neck screw inserted with good purchases in head and neck, two distal locking done, reduction check under c- arm with in antero-posterior & lateral view shows little malreduction and the nail is out of proximal fragment, that means nail does not have lateral wall support [Figure3]. Revision in same sitting not possible due to some medical problem, explained the situation to the relatives and they are convinced with the facts. They are agree for second

procedure and given consent for delayed secondary bone grafting after patient is physically fit.



Figure 3: Malreduction after first surgery (nail out of proximal fracture fragment, without lateral wall support).

Meanwhile she was on medical management and advice mobilization in bed and with walker to avoid further medical complication and then lost follow-up for three month. After three months she was walking with walker with leg in internal rotation and she was able to do her routine daily activity with some pain.

She was posted for surgery again following the routine standard protocol; not on fracture table with minimal fracture site incision. Fracture ends refreshed, proper reduction achieved with bone holding clamps and reduction hold with encirclage wire and sufficient corticocancellous bone graft from same side put [Figure4]. Wound closed in layers. Procedure was uneventful.



Figure 4: Intraoperative reduction of fracture during revision surgery (Nail still out of proximal fragment).



Figure 5: Complete union of fracture after 7 months.

She was advised rest for 3 weeks which she doesn't follow initial x-ray shows early signs of healing after 7 month there was complete union of fracture with good functional outcome [Figure5].

DISCUSSION

Most fractures of the subtrochanteric region of the femur not giving the satisfactory results when treated using contemporary methods of internal fixation.

Improved understanding of the anatomy and the biomechanics of this region has shifted treatment toward the use of intramedullary devices as the shorter-levered arm on the proximal fixation results in greater load sharing and less bending movement across the fracture and implant,^{2,3} reducing the rate of implant failure. The overall incidence of failure for any type of fixation and subsequent non-union of subtrochanteric fractures varies from 7% to 20%.⁴

Complications occur mainly in patients with poor bone quality, unfavourable fracture patterns and suboptimal positioning of the fixation implant of axial telescoping and rotational stability are essential in unstable proximal femoral fractures. An intramedullary implant inserted in a minimally invasive manner is better tolerated in the elderly.^{1,2,5}

Proximal femoral nailing is the standard treatment procedure for extra capsular trochanteric femoral fractures as well as subtrochanteric fracture reason behind is Proximal femoral nail is biomechanically stable under loading because of the shorter lever arm and also minimize soft-tissue dissection and thereby reduce surgical trauma, blood loss, infection, and wound complications.^{4,5}

Some documented complications with their causes.^{2,6,11,12}

Varus, procurvatum malreductions – Initially aligned fracture settled into varus procurvatum after removal from fracture table or with gross posteromedial comminutions and spiral fracture.

Iatrogenic femur fractures-due to anterior cortex perforation in a curved femur or due to displacements of comminution at fracture site when traction was reduced before distal locking to reduce fracture gap.

Primary loss of reduction. Proximal screw loosening with delayed union- Fracture had lateral wall comminution.

Trochanteric pain and weakness - Almost all the other cases had varying amount of discomfort.

Thigh pain restricting quadriceps rehabilitation- When using short PFN but can sometimes be associated with some unpredictable complications as described in our case study.

In PFN fixations, proper alignment between the 2 main fragments and proper placement of the lag screws in the femoral head should be ensured. Good reduction with minimal dissection, the use of appropriate nail length, and proper positioning of the nail and screws are necessary to avoid failure or revision.

In stable fractures axial loading leads to fracture impaction, whereas in unstable fractures such impaction does not occur, and medial displacement of the distal fragment of the fracture is common due to the instability. It has been found in literature that the PFN to have superior results in unstable as well as stable fractures.^{3,4,5,7} The high incidence of open reduction was mainly due to the complexity of fractures, and delayed operations. Late failures were mostly associated with implant failure secondary to non-union or infection. According to one study 77% of infected fractures ultimately united following intramedullary nail.^{2,7}

The intact lateral wall plays a key role in stabilisation of unstable trochanteric fractures by providing a lateral buttress for the proximal fragment, and its deficiency leads to excessive collapse and varus malpositioning.^{4,6} Therefore, maintaining the integrity of this structure should be an important objective in all stabilisation procedures for unstable trochanteric fractures. Moreover, up to 12% of unstable trochanteric fractures show radiologically identifiable rotation of the proximal fragment, when fixed with DHS alone, as DHS provides only single-point fixation over which the proximal fragment can rotate with the movement of hip. This can result in a significant number of nonunions and malunions due to poor bony contact between two fragments nailing.

CONCLUSION

Corticocancellous autogene graft is the best augmentation for bone healing at any age.^{9,10}

The precarious hold of PFN in the proximal fragment does not control the deforming forces. The control of rotational alignment is also more difficult with intramedullary implants and frequently is not mentioned in reports with such devices.^{3,5} Adjunct reduction techniques are often required to achieve fracture reductions and prevent varus malunions.^{3,5} and it has been proved both in clinical and biomechanical studies. While I Lei-Sheng Jiang, et al. reported 39% cerclage wiring. Müller et. al experimentally proved that additional wire cerclage could significantly decrease the failure of osteosynthesis (100 vs. 10%) after intramedullary nailing of subtrochanteric fractures using encirclage wiring over the nails. It was interesting to note that malreductions could be corrected even with the nail in-situ which suggested very poor and unstable fixation.¹¹

Nails which are placed through trochanteric portal or through piriformis can cause fracture of this entry portal

or can lead to further comminution or further displacement of fracture during nail insertion; that suggest it's not only the integrity of medial wall or lateral wall ,the technique is also equally important.

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