

Iatrogenic Femoral Neck Fracture during Antegrade

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ABSTRACT:

Femur shaft fractures are common trauma condition dealt by an Orthopaedician.

Femoral antegrade nailing has become the gold standard treatment for such fractures. Fracture neck of femur while doing an antegrade nailing is a known complication.

We present a case of femur shaft fracture who sustained an iatrogenic ipsilateral femur neck fracture, treated by miss-the-nail technique screw fixation.

The femur neck as well as the shaft fracture united completely within 4 months.

We also discuss the causes, prevention and management of such fractures in detail.

Key-words:- Iatrogenic Fracture Neck of Femur, Antegrade nailing, miss-the-nail technique.

I. INTRODUCTION

The gold standard treatment for femur shaft fractures are intramedullary interlocking nailing. The antegrade nailing can be done either through a piriformis entry or trochanteric entry. However the chance of femur neck fracture through a piriformis entry is 1%¹.

The other technical aspects which contribute to femoral neck fracture are determining the precise entry point¹, creating multiple trial drill holes^{2,3,4}, forceful introduction of the AWL^{1,5}, the orientation of the AWL and the orientation of nail at insertion¹ and diameter of the nail³.

II. CASE REPORT

We came across a 35 year old male patient who sustained Road traffic accident and was diagnosed to have left femur shaft fracture at the middle third. The general work-up of the patient was done and the BMI was measured to be 30kg/m². Patient was taken up for antegrade nailing of the femur shaft using piriformis entry point. Intra-op the patient was put supine on fracture table under S.A. Intra operatively finding the exact piriformis fossa was difficult due to obesity. Fracture was well reduced and a nail of size 11mm x 400 was inserted, after reaming with 12 mm reamer. Post operative Xray showed a displaced intracapsular femur neck fracture, Pauwel grade III.

After planning the patient was taken up for percutaneous 6.5mm cannulated cancellous screw fixation via miss-the-nail technique. Patient was placed on a fracture table and neck fracture was reduced by minimal traction and internal rotation. Percutaneous incisions were made and 4 mm guide pin passed from the lateral cortex to the head of the femur, anterior to the nail. Drilling done over the guide pin and then a 6.5mm screw was fixed with washer. Another 6.5mm screw was placed slightly proximal in a similar fashion.

Post operatively the patient was kept Non-weight bearing till 6 weeks. During this period only static and dynamic quadriceps exercises were started.

After 6 weeks toe touch weight bearing was allowed and full weight bearing after 12 weeks. Fracture showed complete union at the neck and shaft at the end of 4 months.

Patient was followed up for a period of 12 months. Patient had no symptoms of pain or difficulty in walking, climbing stairs or sitting crossed leg. There was no signs of avascular necrosis.



Fig 1: Xray showing only shaft femur fracture of left femur



Fig 2: Blue arrow shows Neck Femur fracture after Antegrade nailing

III. DISCUSSION

Various studies show that femur neck fracture detected during antegrade nailing are either because they were missed pre operatively or due to technical errors while performing nailing. Femur neck fractures occur as a complication of nailing in about 1%.

In our study, after detecting the neck fracture, the causes were evaluated retrospectively which are as listed below:

- i. Determining the precise piriformis fossa was difficult as the patient was obese.
- ii. Multiple entry holes were made with the AWL.
- iii. AWL was malletted which might have caused a stress riser in the region
- iv. While introducing the nail, final 2-3cm were malletted which must have further weakened the area which already had a stress riser.

Christie and Court-Brown⁴ reported four extracapsular FNFs during closed femoral intramedullary nailing, which were attributed to an excessively lateral insertion point in the trochanteric area and to the oblique insertion of the nail.

Khan et al¹ found three patients with postoperatively identified FNF. All were treated conservatively (due to minimal displacement) and resulted in various malunions in two cases. He attributed the fracture to forceful insertion of the initiating awl in the wrong direction and the use of multiple entry points ..

Schweiger et al⁶ stated that antegrade femoral nails, introduced both into the piriformis entry point or laterally, do not induce higher strains if correspondingly designed nails are implanted the correct way. Deviations from these ideal insertion points are associated with higher strains and sometimes fractures in the proximal femur.

Based on this experience we prepared a list of points worth noting in order to prevent this complication. It is as follows:

- i. Choose the correct entry point for the specific nail (ie piriformis or trochanter)
- ii. Locate the precise entry point anatomy before introducing the AWL
- iii. Avoid multiple entry holes
- iv. If at any point further proceeding of the AWL or nail is difficult, do not use a mallet to hammer. Take out the nail and ream further if required.
- v. Do not proceed the AWL in a different direction other than nail's path
- vi. Ream the proximal femur till lesser trochanter so that the wider proximal part of nail can be accommodated without much force.

The various treatment options for fracture neck of femur while nailing are, a. open/closed lag screw fixation by miss-the-nail technique, b. addressing the neck and shaft fracture separately by using sliding hip screw fixation for the neck and then retrograde nailing for the fracture shaft, c. to remove the antegrade nail and then fix the neck and shaft using a cephalomedullary fixation (Proximal femoral nailing).

In our case, we opted for percutaneous lag screw fixation by miss-the-nail technique for reasons mentioned below:

- i. Minimally invasive procedure.
- ii. The FNF reduction was achieved easily with minimal traction and internal rotation.
- iii. The procedure is of short duration decreasing the patient morbidity
- iv. Can avoid the expense of using any other implant.

Decision of addressing the neck and shaft fracture separately using a sliding hip screw and retrograde nailing was deferred in order to prevent opening the knee joint for the entry of retrograde nail and to avoid long duration of surgery. Also when two implants cross at some point there may be chance of stress riser.

Since reduction was easy to achieve, the option of removing the nail and addressing both the fracture with a cephalomedullary nail was thought unnecessary because once the antegrade nail is removed, reducing the neck fracture with an ipsilateral shaft fracture is difficult, though PFN may be a more stable fixation.

Hence miss-the-nail technique proved to be reliable from our experience when the reduction is easily achieved and there is enough space around the nail to accommodate at least two 6.5mm cannulated cancellous screws. The advantage is that it is a short duration procedure and will not increase the treatment cost for the patient. But final decision has to be made by the treating surgeon.

If the surgeon feels that reduction is difficult or the stability of the lag screw are not sufficient then he should opt for the other methods of fixation.

IV. CONCLUSION:

From our experience, in case a femur shaft nailing is complicated by ipsilateral neck of femur fracture then miss-the-nail technique should be tried before opting for other treatment methods.

Conflicts:

No conflicts of interest in publishing this paper.

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