Research Paper

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Results of Proximal Femoral Nailing in Ipsilateral Fractures of Neck and Shaft of Femur- A Prospective Study of Fourteen Cases.

Medical Science

KEYWORDS : Proximal femoral nail, Freidman & Wyman criteria, Cephalo-medullary nail.

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ABSTRACT

Background: Concurrent ipsilateral fractures of neck and shaft of femur is an infrequently encountered combination. Amongst many treatment modalities, we studied the outcome of Proximal Femoral Nailing in such cases.

Materials & Methods: Fourteen consecutive cases of simultaneous fractures of neck and shaft of the same femur were operated with long PFN and followed up for 18 months.

Results: Patients included mainly young active males suffering high velocity trauma. Average operating time was 86 minutes. Average union time was 12 weeks for the neck and 23 weeks for shaft fracture. Good outcome was achieved in 71.4% and fair in 28.6% as per Freidman & Wyman criteria. Complications included: delayed union (n=1) knee stiffness (n=1), coxa vara (n=1), shortening (n=1).

Conclusion: Closed nailing with proximal femoral nail is the treatment of choice for simultaneous fractures of neck and shaft of the same femur, promising a good overall outcome.

Introduction

With increasing incidence of high energy trauma, some difficult-to-treat entities have emerged in the field of orthopedic traumatology, particularly amongst young active individuals. Simultaneous fractures of the neck and shaft of the same femur is one such entity whose incidence has increased over the years. According to recent literature, it accounts for 1-9% of all femoral fractures (Chaturvedi, 1993; Freidman, 1986; Haas,1995). Associated injuries like abdominal, thoracic, spinal and brain injuries make the management of such cases even more difficult (Keel, 2005). Management modalities consist of a diverse array of options (Alho, 1997). Dual implant options include: a) Cancellous screws, with plates;b) SHS with plates ; c) DFN with cancellous screws/SHS; d) Interlock nail with cancellous screws. Owing to associated polytrauma, and the need to curtail surgical time and dissection, the current inclination is towards the use of a single implant which can address two fractures simultaneously (Alho, 1996). It is in these situations where long proximal femoral nail holds a great promise. We prospectively studied 14 such cases at our institute with the primary objective of assessing the outcome of Proximal Femoral Nailing in such difficult cases (Bali, 2013; Lin, 2002).

Materials & methods

Consecutive fourteen patients presenting with simultaneous ipsilateral femoral shaft and neck fractures between March 2013 to March 2014 were included for the study. Inclusion criteria consisted of such fractures of 3 weeks or less duration and who gave full consent for the study (Figure: 1). Patients presenting late (>3 weeks) after the injury were excluded as the prognosis of the femoral neck fracture worsens significantly after this period of time. Also compound fractures were excluded from the study. Fractures were

Table:1	
Characteristics of the Total Patient Group (n = 14)	
Characteristic	Value
Age (in years)	3112
Sex (M : F)	12 : 2
Time since trauma (in hours)	2822
Fracture neck AO Classification	
31-B1	7
31-B2	3
31-B3	4
Fracture Shaft AO Classification	
32- A2	5
32- B2	7
32- C1	2

classified according to AO classification (Table- I).We performed proximal femoral nailing with long PFN in all cases. After anaesthesia the patient was placed in radiolucent table with traction apparatus attached to both feet and the affected limb kept in adduction. Position of the fragments were checked in both the planes under image intensification. Every attempt at closed nailing was made, including percutaneous devices before opening the fracture site in difficult cases. With a longitudinal incision over the greater trochanter, the trochanteric tip was identified and an entry point made. After making an opening with the awl, guide wire was inserted and negotiated across the shaft fracture, after achieving reduction. Next, an appropriately sized PFN with interference fit, was inserted after reaming followed by distal locking under fluoroscopy so as to stabilize the shaft fragments into a single unit. Screws were introduced in dynamic or static mode according to the fracture stability. Next, closed reduction of the neck fracture was attempted under fluoroscopy.

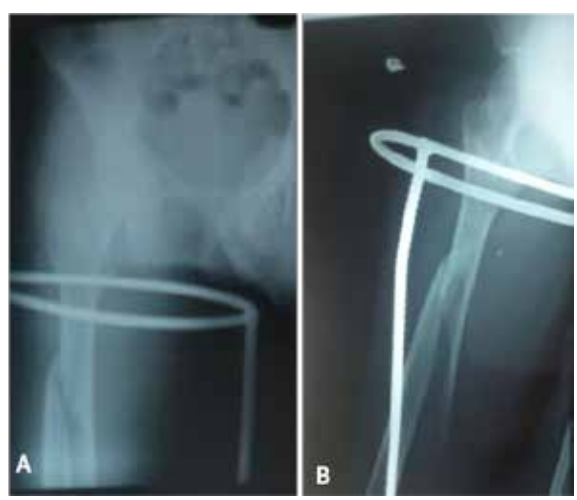

***Fig:1 (A&B)**. Initial Radiographs of a 27 year old male patient showing ipsilateral fractures of neck and shaft of femur.*

To accomplish this, the proximal jig was removed and the limb abducted temporarily, if need arose. After achieving reduction, temporary fixation with k-wires were done and the original

configuration of the limb and jig was restored. The position and depth of the nail was adjusted (sometimes with reapplication of distal screws) so as to align the proximal screw holes with the neck of femur. Now, the neck fracture was definitively fixed with two cephalomedullary screws of appropriate length (Figure 2).

Postoperatively, patients were followed up at 2weeks, and then monthly for 8 months followed by two-monthly visits till 18 months. Partial weight bearing was allowed at six weeks and full weight bearing once union occurred.

Assessment of functional status was done with Freidman & Wyman Criteria. Statistical analysis was done using Paired t tests, chi-square test, Fischer exact tests. The statistical significance was set at p value of 0.01 (99% confidence interval).

Results:

Patient cohort consisted of young adults, the mean age being 3112 years. Males

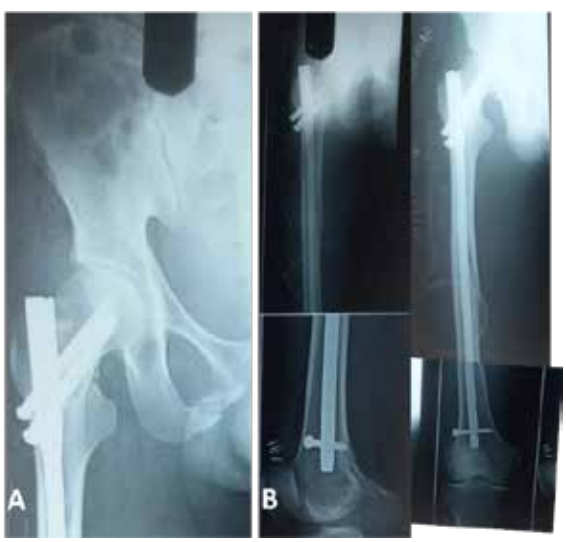

***Fig:2 (A&B)**. Post-operative Radiographs showing PFN in situ.*

out-numbered females (12 to 2). The mean time elapsed since trauma at presentation was 2822 hours and at surgery was 11837 hours. Associated injuries were present in 57.1% (n=8) cases. The mean duration of surgery was 8616 minutes. According to the Freidman & Wyman Criteria, 71.4% achieved good outcome, while the rest achieved fair outcome. There were no cases of poor outcome. The average time to union in fracture of the femoral neck was 124 weeks and 276 weeks for the shaft fracture.

One patient had coxa vara with a neck shaft angle of 105^0. However the fracture achieved union in 16 weeks. Consequent limb shortening was 1 cm, which was managed with shoe raise. In another case, no bridging callus was seen for 24 weeks at the shaft fracture site. Subsequently autologous cancellous bone grafting was done following which the fracture united in another 10 weeks. In our series, none of the patients suffered avascular necrosis of the femoral head, non-union, implant failure or infection.

By the end of the study period, all the cases had returned to their original jobs.

Discussion:

Ipsilateral dual fractures of neck and shaft of femur occur due to an axially directed force along the flexed femur, as typically seen in a dash-board injury. That may be the reason of high proportion of young active males with such injuries in the present study. There is a high likelihood of the proximal fracture being overlooked, as has been reported in many literature (Alho, 1997; Shuler, 1997).

Traditionally, management of such difficult fractures has been tried with dual implants (Haas, 1995). Plates for the shaft fracture and multiple cancellous screws have been used frequently because of the ease of the procedure and better reduction so achieved, but only at the cost of the biological integrity, risking all the consequent complications like infection, delayed or non-union, knee stiffness , implant failure and refractures. Retrograde nailing with screw osteosynthesis is a good technique where both fractures can be independently and optimally reduced and fixed (Anup, 2002). Proponents of the technique advocate that avoiding antegrade nailing prevents the abductor weakness, Trendelenberg gait and heterotropic ossification. However we did not encounter any of these complications in our series. Moreover, exposure of the knee joint with subsequent knee stiffness that often ensues and a high rate of non-union are issues inherent to this procedure. Miss-a-nail technique with an antegrade nail and multiple cancellous screws has been used frequently but high incidence of mal-reduction of the neck fracture is a concern. The proximal femoral nail allows simultaneous fixation of both the fractures, with minimal soft tissue stripping. The 6^0 mediolateral angle at the proximal end has the advantage of trochanteric entry point rather than the piriformis fossa preserving the blood supply to the head of femur. Two screw fixation through the nail has been shown to have better biomechanical stability than multiple peripheral screws. Presence of the nail in the central position prevents excessive collapse at the proximal fracture site. However, the procedure is technically demanding with a steep learning curve. AVN is a concern but with the advent of newer trochanteric-entry-point nails, the incidence has been lowered. In our study, there was no case of AVN as in few other studies (Tsarouhas, 2011). But a longer period of follow up is required for a dedicated assessment of the same.

Many studies across the globe have showed good results with Proximal femoral nailing in multilevel femoral fractures (Gadegone, 2013; Hoover, 1992).The present study, all the cases achieved union at expected time depending upon the fracture morphology and age etc. (Tsarouhas, 2011). One patient who suffered from delayed union was a heavy smoker and could not abstain even during convalescence period. However, with bone grafting, he promptly responded and progressed to union. Another patient developed coxa vara , because of initial malreduction resulting in 1 cm shortening. With shoe raise, he could perform his daily activities and was subjectively satisfied with the ultimate outcome. At the end of 18 months, the mean range of motion at the hip was 935 % of the contralateral side while that of knee was 884%. None of the patients complained of hip or knee pain even on squatting. The power and the muscle girth at thigh equalled that of the contralateral side at the end of the study period.

Conclusion:

The combination of interlocked intramedullary nail and the twin cehalomedullary screws is a sound solution to simultaneous fractures in the neck and shaft of the same femur. This construct in the form of Proximal Femoral Nail has thus optimised the treatment of these fractures, preserving the biology of fracture healing. The present study has shown high success rates with promising performance and predictably good outcomes of this versatile implant.

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