Original Article

A prospective study of a long proximal femoral nail in reverse oblique and subtrochanteric fractures

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Subtrochanteric fracture is common among elderly population.Dilemma for treatment modalities of Subtrochanteric fracture has been there for decades. In this prospective study total 30 cases (12 Reverse oblique & 18 Subtrochanteric fractures) were treated with long proximal femoral nailing from year 2014 to 2017. Patients of age 18 years & above were included (male: female= 6:24).Clinical and functional outcomes were assessed according to Harris hip score. Out of 30 cases 24 patients had a good outcome, 5 patients had fair outcome and 1 patient had poor outcome due to difficulty in squatting and sitting cross-legged. Radiologically all fractures were united. [*J Indian Med Assoc* 2019; **117(10):** 20-2]

Key words **: Proximal Femoral Nail, Subtrochanteric Fracture.**

The incidence of proximal femoral fractures is rising with increased involvement of elderly osteoporotic patients due to high life expectancy[1] and an increasing number of high-velocity trauma occurring due to road traffic accidents. It is one of the common causes of morbidity & mortality in elderly patients[2,3]. Intertrochanteric and subtrochanteric fractures make up of about 50% of hip fractures[4-6]. Reverse oblique trochanteric fractures have inherent instability[7,8]. The biomechanical test has confirmed that in subtrochanteric region axial loading through the hip joint creates a large moment arm, with significant lateral tensile stress and medial compressive load[9]. This biomechanical characteristic along with poor vascularity caused by the predominance of cortical bone and variance of muscular pull by abductors and adductors creating torsional effects that lead to significant rotational shear forces– all these are responsible for the difficulty in reduction and internal fixation leading to malunion, delayed union and mechanical failure of implants[2,10].The preferred treatment of choice in both these fractures is operative and the goal of treatment is to achieve stable acceptable reduction with relatively rigid internal fixation for early ambulation and to prevent the dangers associated with prolonged recumbancy[11]. The objective of this series is to study the functional outcome of patients with Reverse oblique & Subtrochanteric proximal femoral fractures treated with a long proximal femoral nail.

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Materials and Methods

In this prospective study total 30 cases (12 Reverse oblique & 18 Subtrochanteric fractures) were treated with long proximal femoral nailing from year 2014 to 2017. Patients of age 18 years & above were included (male: female = 6:24). Road traffic accident was a common mechanism of injury in young patients while domestic fall was more common in the elderly. Medically unfit, terminally ill & patients unwilling to operate were excluded. The average duration between admission & operation was 6 days. Pre-operative upper tibial skeletal traction was given in 10 patients in whom there was delay in surgical intervention due to medical problems. All patients underwent spinal or epidural anaesthesia and were placed in a fracture table in the supine position. The affected limb was kept inadducted position and trunk of the patient was pushed 10 to 15° to the contralateral side to make greater trochanter more prominent. Closed reduction was tried under image intensifier control before making an entry point for nail. Adequacy of reduction was assessed by the restoration of posteromedial cortex and neck shaft angle to normal in both anteroposterior and lateral view. 8 cases of reverse oblique and 10 cases of subtrochanteric fractures required open reduction. In some cases of unstable or long oblique fracture pattern stabilization with stainless steel wire circlage were needed. A 5 cm incision was taken from the tip of the greater trochanter proximally. The entry point was on the tip of the greater trochanter. A guidewire was passed through the tip of the trochanter distally. Reaming was done over the guidewire according to the planned nail. The nail of appropriate size (between 10 and 12 mm) and of adequate length (between 38 and 42 cm) was implanted manually. The nail was inserted, keeping the proximal holes of the nail parallel to the femoral neck. Two parallel guide wires were passed into the femoral neck such

that inferior guide wire was placed just above the calcar deep in the subchondral bone. Strict parallel placement of guide wires was observed in both AP & Lateral view. Reaming over guide was done by step-drill and lag screw of 8.0 mm and anti-rotation screw of 6.4 mm were introduced. Depending upon the fracture configuration and stability, the distal static and dynamic locking was done.

All patients received prophylactic antibiotic doses and postoperative thromboprophylaxis. Non weight bearing physiotherapy was started from first postoperative day. Clinical and radiological assessments were done during follow ups at 2 weeks, 6 weeks, 3 months, 6 months, 9 months and 1 year Patients were allowed to bear weight from 4 to 6 weeks depending on postoperative serial X rays.

Fig 1 — Pre-op and post op radiograph showing Long PFN in reverse oblique intertrochanteric fracture

Results

Clinical and functional outcomes were assessed according to Harris hip score. Out of 30 cases, 24 patients had a good outcome, 5 patients had fair outcome and 1 patient had poor outcome due to difficulty in squatting and sitting cross-legged. Radiologically all fractures were united. Average fractureunion time was 16 weeks (12-20 weeks). Delayed union was observed in two patients. There was no case of non-union or AVN of femoral head. Two patients had Cut out/Z effect without loss of reduction and 1 patient had Cut out/Z effect with loss of reduction (varus malalignment). The later case was managed by implant removal, deformity correction, bone grafting and DCS plating. Reverse Z effect was seen in 1 case but it did not affect the functions of patient. Only 1 patient of reverse oblique trochanteric fracture had shortening >2 cm who was managed by shoe raise. None of the patients had implant breakage. Postoperatively, 2 patients developed superficial wound infection, one in either group which were resolved with change in injectable antibiotics according to culture sensitivity.

Discussion

Fractures of the proximal femur are challenging injuries for the orthopaedics surgeon. There are mainly two types of internal fixation- extramedullary and intramedullary devices. Initially extramedullary device, namely Sliding Hip Screw (SHS) was used widely for peritrochenteric fracture management. However, studies have reported that these load bearing implants are inappropriate for these unstable fractures as they tend to fail under strong stresses resulting from bending movements and compressive forces generated by body weight[2,7]. Moreover, they require larger surgical exposure leading to more blood loss and more chances of wound infection[8]. On the contrary intramedullary implants, being load sharing, are placed close to the mechanical axis and are considered biomechanically more stable than extramedullary implants. They also facilitate early mobilization and require less surgical exposure leading to less blood loos, less chances of wound infection and short operating time[2,3,7]. In the range of intramedullary implants, initially, reconstruction nails were used. But, it has an entry portal through piriformis fossa which is much more difficult than that through the tip of trochanter[3]. There also exists the risk of split fracture of the femoral neck and damage to blood supply of femoral head during the process of entry hole making, reaming, and nail insertion through the fossa piriformis fossa[7]. To avoid these complications proximal femoral nail was introduced by AO/ASIF in1997[2]. It has entry portal through tip of greater trochanter and has following advantages– (i) provision of anti rotation screw along with lagscrew proximally, (ii) variable length which can span fracture,(iii) fluting tip reducing the possibility of fracture below the tip of nail and (iv) small valgus angle[3]. But short proximal femoral nail has increased chances of shaft femur fracture distal to nail as there is abrupt change in stiffness of construct. This disadvantage of short PFN was overcome by long PFN where femur fracture distal to nail was avoided. But, there are certain points which need to be emphasized about long proximal femoral nail –(i) prior to nail insertion anatomical reduction is mandatory (ii) proper entry portal through tip of greater trochanter[3,8]. If entry is too lateral – it can cause splintering of lateral cortex & implant failure[12]. On the other hand, if entry point shifted medially, the awl might slip into the pyriformis fossa and damage blood supply to femoral headleading to a vascular necrosis of femoral head[7].Thus considering results from our series-

long proximal femoral nail can be considered as reliable implant for fixation of subtrochanteric & reverse oblique fractures. However, our series do have limitations like small sample size, short follow up period of one year, lack of comparison group.

Conclusion

Long proximal femoral nail can be considered as reliable implant for subtrochanteric & reverse oblique fractures.However proper fracture reduction and correct entry point is the key for successful outcome.

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