Comparison of extramedullary and intramedullary devices for treatment of subtrochanteric femoral fractures at tertiary level center

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【**Abstract**】**Objective:** The treatment of subtrochanteric fractures is challenging and treatment modalities and implants are constantly evolving. This study attempts to revisit and compare extramedullary vs. intramedullary devices in relatively young population.

Methods: Thirty patients with subtrochanteric fractures were enrolled and treated with extramedullary or intramedullary devices and follow-up continued one year for clinico-radiological assessment.

Results: The mean age of patients was 37.53 years. Most were males between 21-40 years old. The dominant mode of injury was traffic accidents (66%). Fractures were classified according to Russell-Taylor classification. Forty percent were Russell-Taylor type IA, 37% type IB and 23% type IIA. Average time to surgery was 3.6 days from the time of admission to hospital. Mean duration of surgery was 45 minutes for intramedullary device (group A) and 105 minutes for extramedullary device (group B). Average blood loss was 100 ml in group A and 200 ml in group B. Mean duration of radiation exposure was 130 seconds and 140 seconds for groups A and B, while average duration of hospital stay was 12 days and 16 days respectively. Excellent results were seen in 47% of cases in group A and 33% of cases in group B.

Conclusion: Intramedullary device is a reliable implant for subtrochanteric fractures. It has high rates of union with minimal soft-tissue damage. Intramedullary fixation has biological and biomechanical advantages, but surgery is technically demanding. Gradual learning and patience is needed to make this method truly rewarding.

Key words: ***Subtrochanteric fractures; Intramedullary; Dynamic hip screw***

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Subtrochanteric fractures can be described as those occurring below the lesser trochanter to 5 cm distally in the shaft of the femur.[1] They occur at the junction between the trabecular bone and the cortical bone where the mechanical stresses are highest in the femur and constitute about 10 to 34 percent of all hip fractures.[2] Subtrochanteric fractures have a bimodal age distribution. In young adults, they are frequently caused by high energy trauma and in old age, a fall is the usual cause. Pathological and periprosthetic fractures constitute a good number of the aging population.[1]

Due to high stress concentration as well as bending and rotational forces, this region has thick cortical bone with less vascularity, which leads to relatively increased chances for healing disturbances. It is difficult to treat these fractures conservatively and surgical management is the current standard of care.[3] Surgical fixation maintains good anatomical alignment, limb length and avoids complications of prolonged bed rest as early mobilization and weight bearing is possible with the implants presently available.

Still, there is a high incidence of complications like nonunion, delayed union, implant failure, delay in weight bearing, loss of alignment, coax, vara, shortening and rotational deformity.[4] The challenge of treating subtrochanteric fractures can be gauged from the fact that there is a dearth of implants available and they are still evolving. Basically, the implants include extramedullary and intramedullary devices. Only recently, due to better understanding of biology, reduction techniques and biomechanically

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improved implants, we have been able to address these fractures with relative consistency.[5]

In this study, we propose to compare extramedullary devices with intramedullary devices for the management of these complex fractures.

METHODS

The present study included thirty adult patients aged 20-50 years with subtrochanteric fractures who were treated with intramedullary devices (group A) or extramedullary devices (group B) in the orthopedics department of our hospital from October 2008 to December 2010. All subtrochanteric fractures either alone or with intertrochanteric extension were included in the study. We excluded pathological fractures, fractures in children, fracture with concurrent ipsilateral lower limb injuries, pelvis or spine injuries and fractures older than 3 weeks.

After the patient was admitted, necessary clinical details were recorded in a list prepared for this study. The fractures were classified according to Russell-Taylor classification.[6] Patients were evaluated for associated injuries and treated accordingly. They were operated on on elective basis after anesthesia clearance. For intramedullary implant, determination of nail diameter was done by measuring the diameter of femur at the level of isthmus on an AP radiograph taking into account the magnification; determination of the neck-shaft angle was done on the normal side in AP radiograph using goniometer; and length of the nail was decided according to the level of the fracture.

Surgical technique

Proximal femoral nail (PFN) Patient was positioned supine on fracture table with adduction of the injured limb by 15 degrees and reduction done under an image intensifier. Using standard lateral approach, entry point was determined, and then guide wire was put in, followed by proximal reaming and PFN insertion. Neck screw and hip pin were inserted and distal locking was done (Figure 1).

Dynamic hip screw (DHS) Positioning and fracture reduction procedures were the same as for PFN. Lateral incision was used with plane developed between vastus lateralis and intermuscular septum. Entry point was determined and DHS was inserted using standard AO technique (Figure 2).[7]

Dynamic condylar screw (DCS) Patient positioning, fracture reduction and surgical approach were the same as for DHS. Lateral cortex was predrilled with 2 mm drill bit. Guide wire was placed in the femur to enter slightly anterior to the midpoint of the greater trochanter, near the vastus ridge using DCS drill guide. The precise level at which the guide wire enters the femur was determined preoperatively. In the AP view, the wire should lie in the center of the neck and in the inferior half of the femoral head. Triple reaming was done with DCS triple reamer and DCS plate was seated with an impactor. Two 6.5 mm cancellous bone screws were inserted through the proximal round holes of the DCS plate, using lag screw technique. DCS plate was fixed to the femur with 4.5 mm cortical screws.[8] Closure of the wound was done in layers and compression bandage was applied.

Postoperatively, active toe movements were encouraged. Antibiotics were continued for 3 days. Patients were encouraged to sit in bed the next day. They were taught static quadricep exercises and knee mobilization. Gait training was imparted before discharge. Suture removal was done on the 14th postoperative day. Follow up was done at 6 week intervals for serial clinical and radiological evaluation untill union and final visit was performed at the end of 1 year.

RESULTS

In this study, 78% of patients were male and 22% were female with the mean age of 37.53 years. The right femur was affected in 73% of cases and left femur in 27% of cases. The most common mode of injury in our series was motor vehicle accidents, accounting for 67% of cases, followed by fall from height in 23% of cases. According to the Russell-Taylor classification, there were 12 cases of type IA, 11 cases of type IB and 7 cases of type IIA.[6] Associated injuries were present in 10% of cases. Two patients had fracture of distal radius, one was treated conservatively and the other with ligamentotaxis. Another patient had a fracture