

ORIGINAL ARTICLE**ASSESSMENT OF VARUS COLLAPSE PREVENTION IN PATIENTS WHO UNDERWENT SUBTROCHANTERIC FRACTURE FIXATION BY ELASTIC NAILS: A RETROSPECTIVE STUDY.**

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ABSTRACT:

Background: In today's scenario, the frequency of occurrence of intertrochanteric fractures is relatively common injury. Because of significantly increased life expectancy of the general population during the past few decades, many epidemiological studies have shown increasing incidence of proximal femoral fractures. Various studies on intramedullary devices have shown that there are complications with nail to make screw cut out, proximal femoral fracture, significant varus collapse, higher reoperation rates, and wound infection. Hence; we retrospectively analyzed the varus collapse in patients who underwent Subtrochanteric Fracture Fixation by elastic nails. **Materials & Methods:** The present study included 32 non-osteoporotic patients from age group of 15 years to 50 years having unstable subtrochanteric fractures. All these patients were treated by negotiating appropriate numbers and size of elastic nails. The surgical operations were performed under general or spinal anaesthesia, with the patients set in the supine position on the fracture table. Fractures were reduced under traction, manipulating proximal fragment by Steinmann pin and C-arm fluoroscopy. All the patients were asked to come back to the hospital for follow-up at 6 weeks, 12 weeks, 6 months, 1 year and 2 years after their operation and radiographic examination was carried out at each visit. All the result was analyzed by SPSS software. **Results:** Mean age of the patients was 45.6 years while mean weight of the patients was 64.8 Kg. More than 90% of fractures were united in three to four months without fixation loss. 4 patients had complications like proximal or distal migration of nails, infection and bursa. **Conclusion:** For subtrochanteric fractures, long PFN or long gamma nail is a reliable implant having high rate of bone union.

Key words: Fractures, Fixation, Intertrochanteric

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INTRODUCTION

Subtrochanteric fractures are relatively common injury. Many epidemiological studies have shown increasing incidence of proximal femoral fractures, which is because of significantly increased life expectancy of the general population during the past few decades. More than 90% of hip fractures in elderly are proximal femoral fractures with complication rate of 20-30% and mortality rate of about 17%.¹⁻³ Most subtrochanteric femoral fractures occur in elderly individuals as a result of mild to moderate trauma due to osteoporotic bones while in younger patients, these fractures usually result from high-energy trauma. Operative treatment is the best

option in most of the cases of subtrochanteric fractures. Conventional implants like dynamic hip screw, angular blade plates, proximal femoral nailor elastic nails can be used for the successful treatment of stable intertrochanteric femoral fractures.^{4, 5} However, till today, in view of complications like varus collapse, Z effect, implants cut out and technical difficulties, people still prefer angular blade plate or dynamic hip screw (DHS) as the gold standard as there are contradictory reports regarding the superiority of one over the other. Various studies on intramedullary devices have shown that there are complications with nail to make screw cut out, proximal femoral fracture, higher reoperation rates,

wound infection.^{6, 7} Hence; we retrospectively analyzed the varus collapse in patients who underwent Subtrochanteric Fracture Fixation by elastic nails.

MATERIALS & METHODS

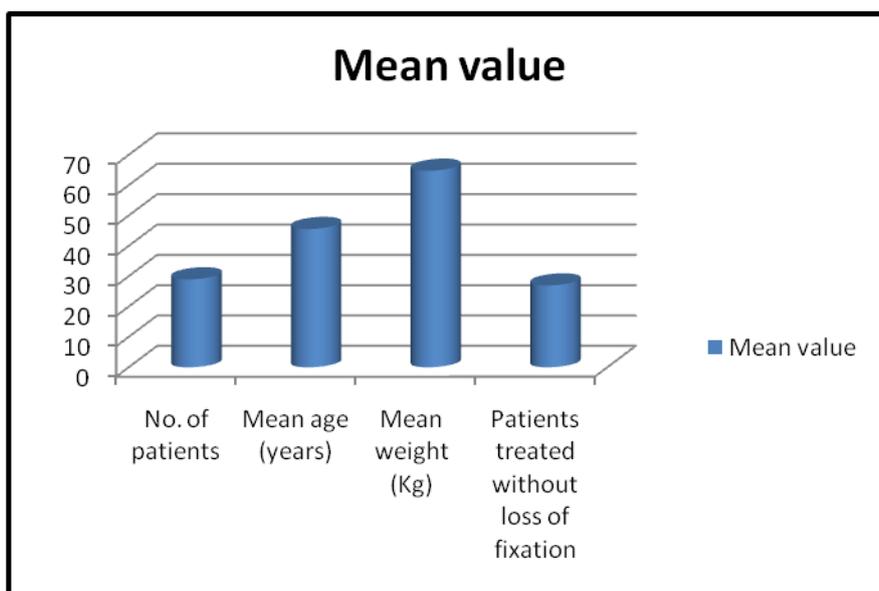
The present study was conducted in the department of orthopaedic surgery of the institution and included all the patients that underwent treatment of various Subtrochanteric Fracture by elastic (Ender) nails specially made of elastic alloy. 32 non-osteoporotic patients from age group of 15 years to 50 years having unstable subtrochanteric fractures from 2005 to 2014 were included in the present study. All these patients were treated by negotiating appropriate numbers and size of elastic nails in ‘Y’ configuration. The surgical operations were performed under general or spinal anaesthesia, with the patients set in the supine position on the fracture table. The injured limb was tied in 20 to 30-degree abduction and uninjured limb in as much abduction as possible for the ease IITV images and nail insertion. Fractures were reduced under traction, manipulating proximal fragment by Steinmann pin and C-arm fluoroscopy. A medially longitudinal incision of about 8 cm was made in medial femoral condylar region in middle of medial border of patella and adductor tubercle. The entry-hole on medial cortex, usually in posterior half, was made with a drill and awl under fluoroscopic monitoring. Steinman pin of 3 mm size is passed from trochanteric region percutaneously to de-rotate proximal fragment when necessary. All nails were given a shape on operation table as per the fracture configuration to stabilize fracture and induce dynamic valgus force. Using direct, indirect and smart techniques good anatomical reduction of fracture achieved. On distal lateral femoral side another 4 cm longitudinal incision is

made cutting fascia lata. With sharp small awl distal lateral entry hole is made at diaphyseal metaphyseal junction. First contoured nail usually of 4.5 mm is passed from medial condyle of femur to head of the femur. The second nail usually 4 mm is bent in specific shape, placed over the thigh and checked under IITV to get valgus force at fracture site. While maintaining reduction the second contoured nail is negotiated from lateral condyle to tip of trochanter. Thereafter similarly third contoured nail from medial side and if possible forth contoured nail from lateral side are negotiated. Postoperatively, the patients were encouraged to do active flexion and extension of the hip and knee of the affected side on the first day after pain subsides. For the patients with associated injuries, the rehabilitation programme was begun as tolerated. All the patients were asked to come back to the hospital for follow-up at 6 weeks, 12 weeks, 6 months, 1 year and 2 years after their operation and radiographic examination was carried out at each visit. All the result was analyzed by SPSS software. Chi-square test was used for assessment of level of significance.

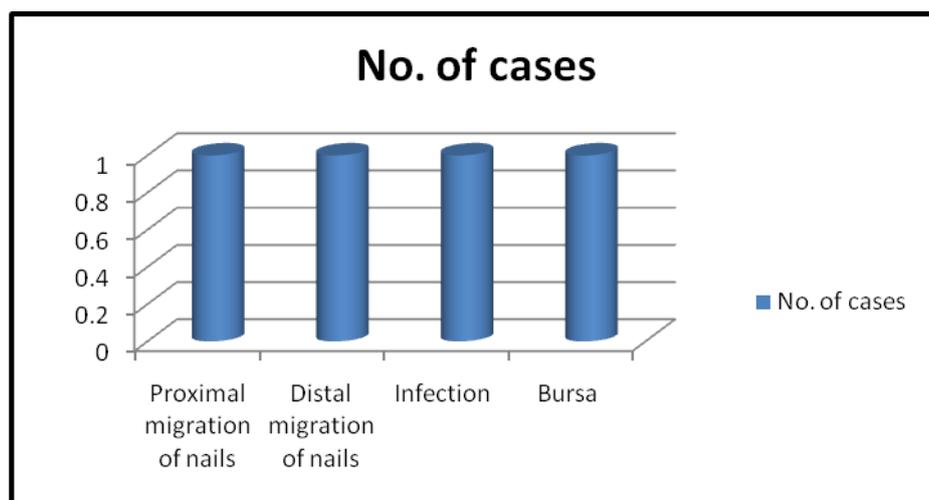
RESULTS

Mean age of the patients was 45.6 years while mean weight of the patients was 64.8 Kg. 27 (92%) fractures were united in 10 to 18 weeks without loss of reduction or fixation. 4 patients had complications like proximal or distal migration of nails, infection and bursa. One patient required change of implant. Harris hip score at 2 year follow-up was excellent in 24, good in six and fair in two patients respectively. Graph 1 highlights the demographic details of the patients.

Graph 1: Demographic and details of the patients



Graph 2: Analysis of complications of the procedures



DISCUSSION

Fractures in the subtrochanteric region are difficult to treat because of their anatomical and biomechanical features.^{7, 8} Restoration of femoral length and rotation and correction of femoral head and neck angulation to restore adequate abductor tension and strength are essential to regain maximal ambulatory capacity.⁹ This can be achieved with operative treatment, but no single implant is universally recommended.¹⁰ The angular blade plate and DHS has been a popular method of internal fixation for subtrochanteric fractures. It provides compression along the femoral neck, and if the reduced fracture is stable, load-sharing between the bone and implant can occur.^{11, 12} However, if the fracture is not stable, progressive medial displacement of the femoral shaft can occur, which may result in fixation failure and non-union. Failures increased sevenfold, if medialization of more than 1/3 of the femoral diameter at the fracture site occurred.¹³ Hence; we retrospectively analyzed the varus collapse in patients who underwent Subtrochanteric Fracture Fixation by elastic nails.

In the present study, we observed that high level of expertise and experience are needed to create effective dynamic stabilization. Failure to precise bending or placement leads to unhappy fixation. Skilful surgeon is able to arrange sequence of nails to be negotiated. Internal fixation of subtrochanteric fractures using precisely contoured elastic nails so as to induce dynamic valgus force, give good results.^{14, 15} Madsen et al compared the results after operative treatment of unstable per- and subtrochanteric fractures with the Gamma nail, compression hip screw (CHS), or dynamic hip screw with a laterally mounted trochanteric stabilizing plate (DHS/TSP). They analyzed One hundred seventy patients with unstable trochanteric femoral fractures surviving six months after operation. They observed that eighteen percent

of the patients in the Gamma group, 34 percent in the CHS group, and 9 percent in the DHS/TSP group suffered significant secondary fracture dislocation during the six months follow-up, leading to a varusmal union, lag screw cut out, or excessive lag screw sliding with medialization of the distal fracture fragment. From the results, they concluded that the TSP may be an aid in the treatment of these difficult fractures because the problem with femoral shaft fractures using the Gamma nail is avoided and the medialization of the distal fracture fragment frequently associated with the CHS is prevented.¹⁶ Babst et al evaluated whether the implantation of the modular trochanter stabilizing plate (TSP) in addition to the dynamic hip screw (DHS) prevents excessive telescoping and limb shortening in four-part and selected three-part trochanteric fractures. Forty-six consecutive patients with unstable intertrochanteric fractures were treated with an additional TSP superimposed on the regular DHS between July 1991 and July 1993. They observed that lateralization of the greater trochanter was successfully prevented in all fractures. From the results, they concluded that unstable pertrochanteric fractures with small or missing lateral cortical buttress, the addition of a TSP to the DHS effectively supports the unstable greater trochanter fragment and can prevent rotation of the head-neck fragment.¹⁷ Babst et al treated 17 patients with 4 part-fractures with a prototype of a modular trochanteric DHS buttress plate. With this additional implant the lateralisation of the greater trochanter could be prevented in all cases. This also leads to a limitation of the telescoping, with less shortening even with immediate full weight bearing. To study further scientific laboratorial equipment are required to understand counter forces arising from intramedullary placement of elastic nails.¹⁸

CONCLUSION

From the results, we concluded that for subtrochanteric fractures, fixation by contoured elastic nails is a reliable implant having high rate of bone union. Future research in this field is required.

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