

Management of Non-United Subtrochanteric fractures Using Augmentataion Plates.

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ABSTRACT

Background: Subtrochanteric fractures are more susceptible to nonunion than any other fractures in the neighboring areas, like intertrochanteric region. Accordingly, the researchers feel that rigid and tough fixation is important to create a steady condition for healing of non-united cases of subtrochanteric fractures. The usage of an intramedullary device with fixation of augmentation plate is a well-known technique for management of nonunion cases of diaphysis fractures of femur and tibia. The present study was conducted to evaluate the effectiveness of managing subtrochanteric nonunions with augmentation plates.

Methods: The study was conducted in the department of orthopedics for a period of 2 years. The area 5 cm distal to the lower border of lesser trochanter is the subtrochanteric area. Non united fractures were the fractures that completely failed to heal within 9 months. The demographic details of patients, the time of fixation device used for prior surgery, the type of surgery, the time elapsed were noted amongst all the patients. All subjects were called for regular follow up, and union was judged on the basis of painless ambulation and the presence of bridging callus on anteroposterior and lateral radiographs. All the data obtained was arranged in a tabulated form and analyzed statistically. **Results:** All the patients achieved clinical and radiographic union at a mean duration of 6.8 months. Superficial infection and bursitis were amongst the complication encountered by 2 patients. Gamma nails was used as prior treatment in 3 subjects, interlocking nailing was used by 4 subjects, proximal femoral nailing by 2 patients and dynamic hip screw by 1 patient. **Conclusion:** From the present study we can say that the use of intramedullary device, bone grafts and augmentation side plating can be relied upon for the management of nonunions.

Keywords: Auagmentation. Nonunion. fracture. subtrochanteric.

INTRODUCTION

Fractures of the subtrochanteric region account for 10% to 30% of all the fractures of hip.^[1] This area has unique mechanical and biological features that make fracture union problematic. Mechanically, the proximal femur bears marvelous varus stress. Biologically, it is majorly Made up of cortical bone, which attains bony incorporation slowly.^[2,3] Thus, these fractures are more susceptible to nonunion than any other fractures in the neighboring areas, like intertrochanteric region. Even when modern techniques are used, the complication rate of nonunion is seen in approximately 7%–20% of cases.^[4-7] Studies have illustrated that intramedullary strategies can achieve higher rate of union with

fewer complications than extramedullary devices like blade plate.^[8,9] This could be due to the closed nailing method, which causes lesser soft tissue disruption and more promising mechanical properties. Accordingly, the researchers feel that rigid and tough fixation is important to create a steady condition for healing of non-united cases of subtrochanteric fractures. Although an intramedullary device helps as a load-sharing fixator and gives higher resistance to failure rates, it could only give relative stability at the metaphyseal-diaphyseal intersection area. Plating at the lateral side of this location serves as a tension band that gives compressive force and enhances resistance to the varus load. The usage of an intramedullary device with fixation of augmentation plate is a well-known technique for management of nonunion cases of diaphysis fractures of femur and tibia.^[10-12] The present study was conducted to evaluate the effectiveness of managing subtrochanteric nonunions with augmentation plates.

MATERIALS AND METHODS

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The study was conducted in the department of orthopedics for a period of 2 years. The study was approved by the institutional ethical board and all the subjects were informed about the study and a written consent was obtained from all in their vernacular language. The study included 10 cases of non-united subtrochanteric fractures. The area 5 cm distal to the lower border of lesser trochanter is the subtrochanteric area. Non united fractures were the fractures that completely failed to heal within 9 months. Septic nonunions, atypical fractures and pathological fractures were excluded from the study. Fractures managed by extramedullary devices were also excluded from the study. The demographic details of patients, the time of fixation device used for prior surgery, the type of surgery, the time elapsed were noted amongst all the patients. For revision surgery, subjects were kept in the lateral decubitus form on a radiolucent table that permitted for fluoroscopic examination. From direct lateral approach to proximal femur, an incision was made. If required, this incision was included into a previous incision. Previous intramedullary devices that were well positioned, fixated and acceptably aligned were still maintained. In subjects with broken or loosened implants or devices, the implants were totally removed. The debridement of the non-united site was carried out thoroughly and recanalization was done through both ends with a flexible drill. Intramedullary nailing was then done. A dynamic compression plate of 4-5mm was then contoured and kept on the lateral position, and distal locking screws were put with free-hand

technique. To enhance compression at the Non-united position, the distal locking screw of the nail was extracted before the placement of side plate. Minimum of one distal static locking screw was positioned. A copious bone graft reaped from the iliac crest was put to the non-united site at the end of surgery. Subjects were encouraged to ambulate using partial weight bearing postoperatively on the repaired hip for initial 4 weeks. All subjects were called for regular follow up, and union was judged on the basis of painless ambulation and the presence of bridging callus on anteroposterior and lateral radiographs. All the data obtained was arranged in a tabulated form and analyzed statistically.

RESULTS

All the patients achieved clinical and radiographic union at a mean duration of 6.8 months. Superficial infection and bursitis were amongst the complication encountered by 2 patients. Rest of the patients had no complications. The type of nonunion was atrophic in most of the patients with 4 patients having oligotrophic non-union. Compression plates along with nails was used amongst 2 patients. All the subjects were ambulated at their most recent follow up. The mean time elapsed for fracture non-union was 6.2 months. Gamma nails was used as prior treatment in 3 subjects, interlocking nailing was used by 4 subjects, proximal femoral nailing by 2 patients and dynamic hip screw by 1 patient. [Table 1]

Table 1: Patient demographics

Case No.	Age/Gender	Prior treatment	Nonunion type	Time elapsed	Treatment	Time to union	Complications
1	36/male	Gamma nail	Atrophic	11	Dynamic compression plate	9	infection
2	69/male	Gamma nail	Oligotrophic	16	Dynamic compression plate, nail	5	
3	27/female	Proximal femoral nail	Atrophic	10	Dynamic compression plate	5	
4	72/female	Dynamic hip screw	Atrophic	10	Dynamic compression plate	4	
5	79/male	Gamma nail	Atrophic	11	Dynamic compression plate	17	brusitis
6	38/male	Interlocking nailing	Atrophic	20	Dynamic compression plate	5	
7	24/male	Interlocking nailing	Oligotrophic	11	Dynamic compression plate	7	
8	56/female	Interlocking nailing	Oligotrophic	10	Dynamic compression plate	6	
9	63/female	Proximal femoral nail	Oligotrophic	14	Dynamic compression plate, nail	6	
10	43/male	Interlocking nailing	atrophic	9	Dynamic compression plate	4	

DISCUSSION

The treatment of nonunion of subtrochanteric fracture is more thought-

provoking than the management of a fresh fracture due to bone loss, retained implants, lack of reduction, and the negotiated osteogenic potential of the surrounding tissue.^[13-15] Over the

past various years, the “diamond concept,” which is a comprehensive strategy for evaluating and managing fracture nonunion, has been introduced. This concept underlines the usefulness of a mechanical environment and improved biological environment for atrophic nonunion.^[16-18] The treatment of nonunion of subtrochanteric fracture is tough due to malalignment, loss of bone, broken implants, and improper vascularity. Charnley and Zickel explained successful treatment with revision nailing for nonunion of subtrochanteric fracture, different methods to manage this complication have been described. However, there remains a lack of agreement regarding the best treatment approach for this task.^[13] According to study by Barquet et al. they managed 26 subjects with a long Gamma nail and the partial usage of bone grafts; good healing was finally seen amongst 25 of patients, with a mean healing duration of 7 months.^[19] The authors concluded that a long duration of protected weight bearing is crucial following fixation using an extramedullary device; this task could be difficult or mere impossible for the elderly subjects. In our study, All the patients achieved clinical and radiographic union at a mean duration of 6.8 months. Superficial infection and bursitis were amongst the complication encountered by 2 patients. Rest of the patients had no complications. The type of nonunion was atrophic in most of the patients with 4 patients having oligotrophic nonunion. Compression plates along with nails was used amongst 2 patients. All the subjects were ambulated at their most recent follow up. The mean time elapsed for fracture non-union was 6.2 months. Gamma nails was used as prior treatment in 3 subjects, interlocking nailing was used by 4 subjects, proximal femoral nailing by 2 patients and dynamic hip screw by 1 patient. According to de Vries et al. they treated 33 patients of subtrochanteric nonunion, out of which 32 cases were managed by blade plates and the use of bone grafts; good healing was observed in these cases, with an average union time of 5 months.^[20] These investigators recommended that alignment correction and compression of fracture site are more practicable with plating compared to nailing.^[9] amongst them experienced a complication after the operation; those were blade tip protrusion and breakage of implant breakage. Because of these 5 subjects required reintervention.

CONCLUSION

There has been no ideal treatment for the management of subtrochanteric non-united fracture. Treatment varies amongst patient to patient and the type and reason of nonunion. From the present study we can

say that the use of intramedullary device, bone grafts and augmentation side plating can be relied upon for the management of nonunions. Though there are also few complications, but the outcome was fairly good.

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