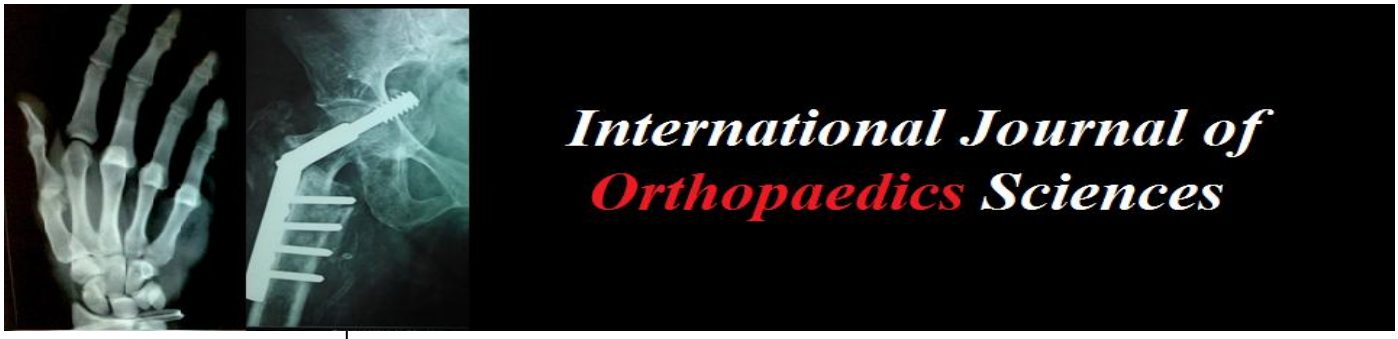

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Results of DHS and bone grafting in primary nonunion of intertrochanteric patients in a rural setup

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Abstract
Introduction: Intertrochanteric fractures commonly result in malunion and coxa vara if untreated. Primary nonunion of intertrochanteric fractures is a rare occurrence in young individuals. Treatment methods preserving the femoral head has better longevity than hip arthroplasty Literature regarding the outcome of dynamic hip screw fixation and bone grafting in these patients is limited.
Methods: 15 patients who underwent DHS fixation with bone grafting for primary nonunion of intertrochanteric fractures in young patients were studied retrospectively. Their epidemiological profile, neck shaft angle, limb length, visual analog scale and modified harris hip score were recorded and compared. Time to union and complications were noted. Statistical analysis was done with paired student t test.
Results: Average time to fracture union was 18 weeks. Limb length and neck shaft angle improved from 3.6cm shortening, 105 degrees to 0.5cm and 129 degrees respectively. Modified harris hip score showed statistically significant improvemet from 24.5 to 73.8.
Conclusion: DHS is a good surgical option in primary nonunion of intertrochanteric fractures in patients with good bone stock. Because native femoral head is being retained, activities of daily living in these patients become near normal.

Keywords: Nonunion intertrochanteric fracture, DHS, valgus fixation, femoral head preservation

Introduction
Intertrochanteric fractures of hip occur in the metaphyseal portion of the proximal femur with rich blood supply. Their end result with conservative or operative fixation is usually union in varus or proper alignment. Nonunion of intertrochanteric fractures is rare occurrence. It can occur due to improper immobilization, inadequate immobilization, unstable fixation, unstable fracture patterns and poor bone quality like osteoporosis. The incidence of nonunion in intertrochanteric fractures is reported to be 1-2%.
Hip arthroplasty is the treatment of choice in nonunions with poor bone quality and failed internal fixation. Preservation of femoral head is preferred in younger individuals with good bonestock. Primary nonunions can unite with fracture stabilization and bone grafting like any other nonunion. There is a paucity of studies which evaluate the functional outcome of primary nonunions being stabilized with DHS and bone grafted. This study is directed to find the results of such a femoral head retaining method particularly useful in Indian population.
A large number of patients in the rural areas seek treatment from traditional bonesetters, who mainly use local herbal application and inadequate splinting in the treatment of these fractures. Consequently, many fractures result in malunion and a few in nonunion. Most of the reported nonunions have followed unsuccessful attempts at operative stabilization of fractures. The factors resulting in primary nonunion have not been dealt with in any study due to the rarity of nonunions and because of ethical issues.

Materials and Methods
15 patients with primary nonunion of intertrochanteric fractures were retrospectively studied in Chengelpet medical college. Study was undertaken from January 2010 to January 2015. Fractures more than 4 months from the time of injury and found mobile in stress Xrays, unable to do full weight bearing were diagnosed as nonunion.

Patients with nonunion due to improper treatment and who refused hemiarthroplasty were included in the study. Patients with previous hip surgery, severe osteoporosis, infection at fracture site, significant medical problems making them unfit for surgical treatment were excluded. Their epidemiological data were recorded. The fracture type based on AO classification, their lifestyle and socioeconomic status, their medical illnesses were noted. All patients were evaluated with anteroposterior stress x-rays in abduction-adduction, and lateral view. Limb length discrepancy, neck shaft angle and presence of osteoporosis were assessed. The study was approved by the institutional review board and informed consent was obtained from all patients.

All patients were operated under C-arm guidance, in supine position and affected limb in foot traction. Through lateral approach to proximal femur, fracture ends were exposed. Intervening fibrous tissues were removed and freshening of fracture ends was done. Fracture alignment was achieved by adjusting the traction apparatus. Bone graft taken from ipsilateral iliac crest was placed in-between fracture ends. Guidewire was passed in inferior position in AP view and central in lateral view of image intensifier. Another transfixation wire was passed proximal to the first wire. Triple reaming was done and lag screw of measured length was inserted. 4 holed DHS side plate of 135 degree angle was positioned over the lag screw. The medial opening of fracture site which occurs at this stage was filled with corticocancellous bone grafts of iliac crest. 4 cortex screws were inserted. Wound was closed in layers. Patients were started on non-weight bearing gait training and quadriceps exercises from day one. Partial weight bearing with walker was started from 4 weeks. Full weight bearing was initiated after patient becomes painless at fracture site and radiologically fracture appears united. Patients were followed every 4 weeks till fracture union and every 6 months thereafter till the last follow-up. At every review, clinically and radiologically patients were evaluated. Modified Harris hip score was used to assess them. The comparison of the pre and postoperative clinical scores and their statistical analysis using the paired student's t-test.

Results

15 patients were operated, out of which 9 were males and 6 were females. Mean age of patients was 37 years (45-75). All patients belonged to poor socioeconomic status with no access to western type of toilets.

Based on AO classification types 8 fractures were of 31A2 type, 5 were 31A1 type and 2 were 31A3 type. Mean pre-operative shortening was 3.6cm (range 2.1-4.3). Mean neck shaft angle measured 105 degrees (range 95º-117º). All patients had stiff hip following native bandaging of fracture.

Average operating time and average blood loss were 95 minutes and 350 ml respectively. All fractures united. The average duration to fracture union was 18 weeks (range 12-24 weeks). Mean postop shortening was 0.5cm (0-1cm). Modified Harris hip score was recorded in all patients and it had improved from average preop value of 24.5 to postop value of 73.8.The neck shaft angle had improved to a mean value of 129 degrees. The limb length difference measured only 0.8cm (range 0.5-1.5cm).

One patient had implant failure with varus. Patient did not opt for resurgery. One patient had superficial wound infection which was treated with wound debridement, serial dressings and appropriate antibiotics.

Discussion

The number of proximal femoral fractures has increased in the past few decades exponentially in the age category of 50 years and older due to aging population and the increase in the proportion of post-menopausal or senile osteoporosis. It is less common in younger adults. Kyle *et al*. reported that early weight bearing and ambulation are important factors which improve the results in intertrochanteric fractures after fixation [1].

Nonunion of intertrochanteric fractures is relatively rare compared to that of intracapsular fractures, the reason being the cancellous bone in intertrochanteric region is very well vascularized [3]. But its effects are disabling in adults of working group due to its resultant limitation of movements, shortening and deformity. A diagnosis of primary intertrochanteric nonunion is made when at least 15 weeks after the fracture there is radiological evidence of a fracture line, with either no callus (atrophic) or with callus that does not bridge the fracture site (hypertrophic) and mobility of the fragments on examination under an image intensifier.

Varus malunion or nonunion is the most frequent biomechanical complication following treatment of unstable trochanteric fractures [12, 13]. Displacement to varus alignment results in limb shortening, imbalance of gluteal muscles and limp and overloading of the knee joint and lumbar spine. This is accompanied by pain and later by the development of osteoarthritic changes.

Fractures of the proximal femur are subjected to intense mechanical forces in small segments of bone, which reach 1250 lb/cm2 of compression on the medial side and 1000 lb/cm2 of tension on the lateral side, thus requiring implants with trustworthy fixation [9]. Union of these fractures depends mostly on anatomical reduction and maintenance of the blood supply of the proximal femur, through the medial branch of the femoral circumflex artery. The various etiological factors proven for nonunion of these fractures are unstable fracture patterns like reverse oblique type, severe posteromedial comminution, those with inadequate posteromedial support, poor internal fixation and poor bone quality [2]. Loss of posteromedial support is a feature of unstable fracture [7, 8].

Most of our people in rural areas undertake native treatment from traditional bonesetters. This most often leads to varus malunion and occasionally nonunion. Considering their needs and daily activities, they opt for a mobile hip with ability to squat and sit cross-legged. Arthroplasty in these young active individuals have their own set of complications like loosening, limitation of activities, need for revision surgeries. These people will accept some shortening and an occasional analgesic rather than an arthroplasty due to financial constraints.

The dynamic hip screw introduced by Clawson in 1960 revolutionized the management of unstable intertrochanteric fractures. It allows controlled compression of the fracture site with reduced incidences of screw cut out and implant breakage associated with a nail plate. Sliding is an important aspect of DHS fixation because it permits impaction of fracture fragments and promotes healing[4]. Placement of screw head close to subchondral bone increases stability of fixation [1, 6].

When the intertrochanteric fracture is fixed along the physiological weight bearing lines, it allows strong vertical compression of fracture fragments eliminating the shear forces. If maximum bone to bone contact is achieved during fixation, the structural strength of the implant supplements that of the reduced fracture [9]. Though 150 degree side plate

needs lesser forces to initiate sliding and hence produces more impaction at fracture site, valgus hips are more prone to osteoarthritis. 135 degree side plates are easy to apply and restore the natural neck shaft angle. Side plate failure is very rare with conventional sliding hip screws and Spivak *et al* reported 3 cases of fatigue failure were related to femoral shortening and varus malalignment [5].

Intramedullary fixation by nailing is more useful in unstable and reverse oblique patterns because it has better axial telescoping and rotational stability as it is a load shearing device [11]. The proximal femoral nail and intramedullary hip screw have their own complications like increased radiation risk, high cost and higher learning curve [14, 15, 16]. The disadvantages of arthroplasty include more extensive surgery and the frequent necessity to use calcar replacing [10, 17].

Literature regarding primary nonunion of intertrochanteric fractures is rare because they frequently end in malunion than nonunion. With iliopsoas pulling the lesser trochanter proximally and anteromedially, the posteromedial support of the fracture is lost leading to instability. The adductor muscles play an important role in the varus displacement of these fractures. All these factors lead to mechanical failure of implants due to increased bone stresses when the posteromedial support is not maintained.

With stable fixation and improved biomechanics at nonunion site, good results are achieved in these cases. Sarathy *et al*. reported results of seven nonunion of intertrochanteric fractures after native bandaging treated by valgus osteotomy, medial displacement and 130° blade plate fixation. In treatment of nonunion from fixation failures of intertrochanteric fractures, DHS with cementation, medial displacement osteotomy, valgization, and blade plate fixation have all been reported. These studies confirm that union can be achieved both in primary nonunions and nonunions after implant failure with revision internal fixation in patients with good remaining bone stock [19].

135° DHS resulted in valgization of the femoral neck–shaft junction because all our cases had a preoperative varus nonunion. The medial opening after valgization is filled with corticocancellous bone graft always. Partial weight bearing creates a micromovement in the dynamic systems which increases union rate. The strength of fixation depends on screw positioning and bone quality. Early weight bearing is an important factor to reduce complications of prolonged immobilization like complex regional pain syndrome.

To conclude, DHS is an excellent option in adults with primary nonunion of intertrochanteric fractures as a method of preserving the proximal femur. It gives good results in individuals with good bone quality in a cost effective way in rural population.

References

1. Kyle RF, Gustilo RB, Premer RF. Analysis of 622 intertrochanteric hip fractures. J Bone Joint Surg Am. 1979; 61:216-21.
2. Baker HR. Ununited intertrochanteric fractures of the femur. Clin Orthop Relat Res. 1960; 18:209-20.
3. Sarathy MP, Madhavan P, Ravichandran KM. Nonunion of intertrochanteric fractures of the femur. J Bone Joint Surg Br. 1994; 77:90-2.
4. Hardy D, Descamps P, Krallis P. Use of an intramedullary hip screw compared with a compression hip screw with a plate for intertrochanteric femoral fractures. A prospective randomized study of one hundred patients. J Bone Joint Surg Am. 1998; 80:618e630.
5. Spivak JM, Zuckerman JD, Kumme FJ. Fatigue failure of sliding hip screw in hip fractures a report of three cases. J Orthop Trauma. 1991; 3:325e331.
6. Esser MP, Kassab JY, Jones DH. Trochanteric fractures of the femur. A randomized prospective trial comparing the Jewett nail-plate with the dynamic hip screw. J Bone Joint Surg Br. 1986; 68:557-60.
7. Chang WS, Zuckerman JD, Kummer FJ, Frankel VH. Biomechanical evaluation of anatomic reduction versus medial displacement osteotomy in unstable intertrochanteric fractures. Clin Orthop Relat Res. 1987; 225:141-6.
8. Desjardins AL, Roy A, Paiement G, Newman N, Pedlow F, Desloges D *et al*. Unstable intertrochanteric fracture of the femur. A prospective randomised study comparing anatomical reduction and medial displacement osteotomy. J Bone Joint Surg Br. 1993; 75:445-7.
9. Gundle R, Gargan MF, Simpson AH. How to minimize failures of fixation of unstable intertrochanteric fractures. Injury. 1995; 26:611-4.
10. Rosenfeld RT, Schwartz DR, Alter AH. Prosthetic replacement for trochanteric fractures of the femur. J Bone Joint Surg Am. 1973; 55:420.
11. Boyd HB, Griffin LL. Classification & treatment of intertrochanteric fractures. Arch Surg. 1949; 58:853e866.
12. Kuntscher G. A new method of treatment of pertrochanteric fractures. Proc R Soc Med. 1970; 63:1120.
13. Evans EM. The treatment of trochanteric fracture of femur. J Bone Joint Surg (Br).1949; 31:190-203.
14. Goldhaggen PR, O'connor DR, Schumarze D *et al*. Prospective comparative study of compression hip screw in the Gamma nail. J Orthop Trauma. 1994; 8:367-72.
15. Radford PJ, Needoff M, Webb JK. A prospective prolonged comparison of the dynamic hip screw and the Gamma locking nail. J Bone Joint Surg (Br). 1993; 75B:789-93.
16. Bridle SH, Patel AD, Bircher M. Fixation of intertro-chanteric fractures of the femur-a ramdomized perspective comparison of the Gamma nail and dynamic hip screw. J Bone Joint Surg (Br). 1991; 73:330-334.
17. Green S, Moore T, Proano F. Bipolar prosthetic replacement for the management of unstable intertrochanteric hip fractures in the elderly. Clin Orthop. 1987; 224:169-77.
18. Anglen JO. Intertrochanteric osteotomy for failed internal fixation of femoral neck fracture. Clin Orthop. 1997; 341:175-182.