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Original Research Article.

Role of Variable Angle Hip Screw in Trochanteric Fracture of Femur: A Prospective Study

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ABSTRACT

Objective: To assess the functional outcome (clinical and radiological) of Variable angle hip screw (VHS) in trochanteric fractures of femur.

Materials and Methods: The study comprised of 30 patients, with follow up at regular intervals. According to Jensen and Michaelsen's modification of Evan's classification, 16 patients were of stable patterns and 14 were of unstable patterns. Parameters which were evaluated during folow-up included time to partial weight bearing, time to full weight bearing, radiological union, mobility of the patient at 3 months and at 6 months postoperatively.

Results: Duration of surgery was <50 min in 14(46.7%) patients, 51-60 min in 11 (36.7%) patients in and >60 min in 5 (16.6%) patients. Mean duration of surgery was 55 min. Range of duration of surgery was 48-78 min. In both stable and unstable fractures, majority of patients achieved partial weight bearing at 3-4 weeks and full weight bearing at 14-16 weeks and the difference was not significant. For Unstable group Radiological union was achieved after 14 weeks in 50% of patients whereas in Stable group all patients achieved radiological union before 14 weeks and the difference was statistically significant (X^2=12.293, df=3, p=0.008). No significant difference was found among both the groups in mobility at 3 months and at 6 months. According to Modified Schatzker-Lambert score done at 6 months after surgery; excellent result occurred in 23 cases (76.7%) , good result occurred in 5 cases (16.7%),fair result occurred in 2 cases (6.6%)Difference in Modified Schatzker- Lambert Score for both groups was statistically significant (X^2=7.028, df=2, p=0.03).

Conclusion: Variable angle hip screw (VHS) can be considered an effective method of treating trochanteric fractures in terms of functional outcome.

Key words: Intertrochanteric Fracture, VHS, Modified Schatzker- Lambert Score.

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INTRODUCTION

Trochanteric fractures are generally a common terminology used to describe pertrochanteric, intertrochanteric, subtrochanteric and intertrochanteric with subtrochanteric extension. Out of these the most common fractures seen are intertrochanteric fractures. The incidence of trochanteric fractures is common in elderly people and their number has increased significantly in recent years due to advancing age.[1,2] Dynamic Hip Screw is widely accepted in the treatment of intertrochanteric fractures of the proximal femur.[3] It utilizes controlled impaction during weight bearing to stabilize the fracture, thus facilitating healing.[4] The potential disadvantages of Dynamic Hip Screw are limb shortening and fracture deformity. In Dynamic Hip Screw one has to be precise in insertion of guide wire. If angle is not correct, the barrel plate is difficult to adjust and fracture can be fixed in varus or valgus.[5] In severely comminuted fracture (extreme medial and greater trochenter comminution, where anatomical reduction is difficult), optimum placement of dynamic hip screw is difficult. To overcome this problem variable hip screw (VHS) has been developed.

Variable hip screw (VHS)[6] is a sliding hip device that allows angular adjustment of side plate barrel to conform to different neck shaft angle. It also allows for compression and valgus reduction of fractures after fixation is achieved by permitting changes in the side plate barrel angle. The adjustable nature of the plate accommodate for the variability of screw placement with in the femoral head. Other potential advantages of Variable hip screw (VHS) are the reduced inventory; it allows fracture adjustment

once implant is inserted; allows angular adjustment of side plate barrel to conform to different neck shaft angle and also allows free hand guide pin insertion and facilitates a centre guide pin location within the femoral head. The study was aimed to assess the functional outcome (clinical and radiological) of Variable hip screw (VHS) in trochanteric fractures of femur.

METHODOLOGY

The study was a prospective study and the patients were followed up in OPD on 2nd, 4th, 6th, 12th weeks and again at 6th month. The study was conducted at the Central Institute of Orthopaedics, VMMC and Safdarjung hospital, New Delhi from October 2011 to April 2013. The patients attending the Orthopaedics Emergency and the Out Patient Department of Central Institute of Orthopaedics, Safdarjung Hospital, with trochanteric fractures were included in the study after thorough clinical and radiological examination. A detailed clinical examination was done to rule out any injury to head, abdominal injuries and other life threatening injuries. 30 patients with Closed trochanteric fractures of femur; age > 18 years (skeletal maturity) and whose fracture was <3 week old were included in the study. Other patients with < 18 years of age; fracture older than 3 weeks; other fracture in the same limb; open fracture; presence of local infection; severe osteoporotic bones; other associated injuries like neurovascular injury in the effected limb; trauma involving vital organs of the body and associated co-morbid preoperative condition that hampers mobility of the patient were excluded from the study. Each patient was duly counseled and an informed consent was obtained. After admission the patients were worked up clinically and radiologically and underwent routine investigations and pre anesthetic checkup. X-ray of the effected hip with thigh, both Antero-posterior and lateral views and x-ray of pelvis with both hips was obtained and carefully examined for comminution and stability, quality of bone, sub-trochanteric extension and neck shaft angle in contralateral hip. The fracture was classified according to the Jensen and Michaelsen's Classification of Trochanteric Fractures. Patients were kept on skeletal/ skin traction on B B splint till surgery. Pre-operative prophylactic antibiotics, 3rd generation cephalosporin and amino glycosides were given to all patients.

Procedure

The surgery was performed under GA or spinal anaesthesia. After anaesthesia, the patient was placed on a radiolucent fracture table. Anatomical reduction was achieved by traction, abduction of 20° and internal rotation for stable fractures. Anatomical reduction was confirmed in anteroposterior and lateral views under image intensifier. After painting and draping of the part; incision was made using the vastus lateralis splinting approach. Lateral skin incision was made from proximal edge of greater trochanter. Subcutaneous tissue, tensor fasia lata were cut in line of incision and vastus lateralis was splint to expose flair of greater trochanter and upper part of shaft of femur. Drill hole was made 1.5cms below the trochantric flair and guide wire was passed according to the degree of antiversion and position of guide wire was confirmed under image intensifier. A central or inferior position of guide wire was kept in all fractures. The guide wire entered within a distance of 1cm from the articular surface of the femoral head. Reaming for leg screw with 7.9 mm reamer passed over the guide wire. The bone was reamed up to subcondral bone, 1cm from articular surface, with triple reamer which reamed the barrel for the distance of 3cm. The reamed hole was tapped up to full length and in osteoporotic bone tapping was done 1-2cms less of drilled hole to allow firm engagement of lag screw in subcondral bone. The correct length of lag screw was determined with a measuring gauge. The selected lag screw was 10 mm shorter than tapped and reamed length; which allowed 15 mm compression at fracture site. The lag screw was inserted with wrench. The barrel plate was slipped on to the lag screw and angle of barrel-plate was adjusted according to anatomical reduction position of the fracture; neck shaft angle measured pre-op in contralateral hip and fixed to the shaft of the femur with 4.5 mm cortical screws after drilling and tapping. The top screw was fixed to the lag screw and traction was released and final reduction was achieved with adjustable barrel plate. The wound was closed in layers over suction drain. Postoperative suction drain was removed after 48 to 72 hours.

Post op Evaluation

All Patients were given post op antibiotics 3rd generation cephalosporin and aminoglycoside. Immediate postoperative X-ray was reviewed for reduction; measurement of neck-shaft angle and TAD (Tip Apex Distance). Static quadriceps exercise were started on 2nd postoperative day and active quadriceps, hip flexion and knee flexion exercises were started on 5th to 7th postoperative days. Depending upon fixation, patient was mobilized with non-weight bearing crutches on 3rd and 4th post-operative day onwards. Partial weight bearing was started at 3-4 weeks and full weight bearing (depending on radiological union) was started at 10-12 weeks. Physiotherapy including knee joint range of movement exercises, isometric quadriceps exercises and ankle joint range of movement exercises were advised to all patients. Stitches were removed after 15 days of surgery in all cases and the patients were followed up in OPD on 2nd, 4th, 6th, 12th weeks and again at 6th month.

Clinico-radiological assessments of the patients were done in terms of Modified Schatzker-Lambert score for clinical and radiological assessment at the end of 6th month. The assessment was done in terms of duration of surgery, timing of early mobilization and full weight bearing, mobility at the end of 3 months and 6 months (Wheel chair bound/walking frame/ stick/ no aid) and complications with technical and implant failure. Radiological assessment was done for callus formation and bony union. The results were analyzed by Mean, SD, Proportion and Chi-Square test.

Table 1: Full Weight Bearing (FWB) in Unstable and stable I/T Fractures

FWB (weeks)	Unstable (%)	Stable (%)	Chi-square	P value
12-14 Weeks	1 (7.2)	6 (37.5)	X^2=4.846	0.244 (NS)
14-16 Weeks	10 (71.4)	9 (56.2)	df=3	
17-20 weeks	2 (14.2)	1 (6.3)		
>20weeks	1 (7.2)	0 (0.0)		

NS= not statistically significant

Table 2: Radiological Union in Unstable and Stable I/T Fractures

Radiological union at(weeks)	Unstable (%)	Stable (%)	Chi-square	P value
10 weeks	0 (0.0)	4 (25)	X^2=12.293	0.008*
12weeks	3 (21.4)	5 (31.3)	df=3	
14weeks	4 (28.6)	7 (43.7)		
>14weeks	7 (50)	0 (0.0)		

*Statistically significant

Table 3: Mobility at 3 months in Unstable and Stable I/T Fractures

Mobile with	Unstable (%)	Stable (%)	Chi-square	P value
No aid	4 (28.6)	6 (37.5)	X^2=0.268	0.875 (NS)
Stick	4 (28.6)	4 (25.0)	df=2	
Walking frame	6 (42.8)	6 (37.5)		

Table 4: Mobility at 6 months in Unstable and Stable I/T Fractures

Mobile with	Unstable (%)	Stable (%)	Chi-square	P value
No aid	10 (71.4)	16 (100)	X^2=3.092	0.079 (NS)
Stick	4 (28.6)	0 (0.0)	df=2	
Walking frame	0 (0.0)	0 (0.0)		

Table 5: Modified Schatzker- Lambert Score in Unstable and Stable I/T Fractures

Modified schatzkar-lambert score	Unstable (%)	Stable (%)	Chi-square	P value
Excellent	8 (57.2)	15 (93.7)	X^2=7.028	0.03*
Good	5 (35.7)	0 (0.0)	df=2	
Fair	1 (7.1)	1 (6.3)		

*Statistically significant

RESULTS

Out of 30 patients of extracapsular proximal femoral fractures; 16 were of stable intertrochanteric fracture (Type I+ Type II), 14 were of unstable intertrochanteric fracture (Type III, IV, and V). Majority of patients (30%) were from 41-50 years of age group and were males (76.7%). Mean Age was 47.56 years. Right side was commonly affected (66.7%). Most common made of injury was road traffic accidents (56.7%). The most common Fracture type (Jensen & Michaelsen's modification of Evan's classification) was type IV (26.7%). Duration of Surgery was <50 minutes for 46.7% patients and duration of hospital stay was 7-14 days among 50% of patients. Most common complaint we faced was pain (13.3%). Other complications were Malunion (varus > 5deg) (3.3%), Femur shortening (>1cm) (3.3%), Loss of flexion at Hip (> 10deg) (3.3%), Superficial infection (3.3%) and Loss of construct stability (3.3%).

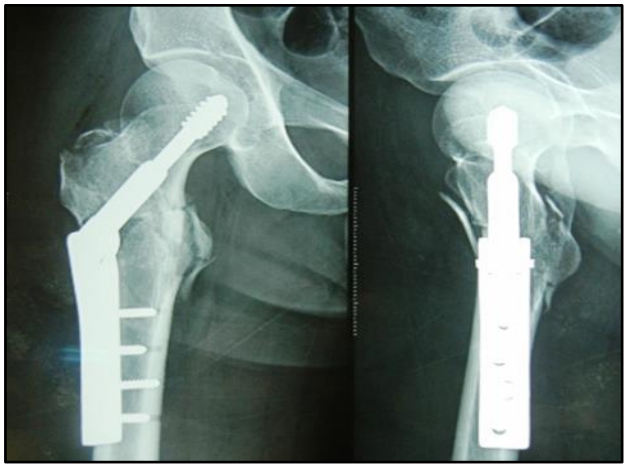
The neck shaft angle in contralateral hip varied between 125° to 142° and the Mean angle was 132°. The angle of fixation which was adjusted according to contralateral hip; remained same in both stable and unstable I/T fracture till union except in one case; where it was reduced by 10°. In both Stable (100%) and Unstable (71.4%) group majority of patients achieved partial weight bearing at 3-4 weeks and full weight bearing at 14-16 weeks and the difference was not significant (Table 1).

For Unstable group Radiological union was achieved after 14 weeks in 50% of patients whereas in Stable group all patients achieved radiological union before 14 weeks and the difference was statistically significant (X^2=12.293, df=3, p=0.008). (Table 2)

No significant difference was found among both the groups in mobility at 3 months and at 6 months. (Table 3 & 4) Difference in Modified Schatzker- Lambert Score for both groups was statistically significant (X^2=7.028, df=2, 0.03). (Table 5)

Pre-Operative X-Ray:

Immediate Post Op X-Ray:



At Two Weeks Follow-Up

At Six Weeks Follow-Up

At Eight Weeks Follow-Up

At 12 Weeks Follow-Up: Shows Union

DISCUSSION

In present study average duration of hospital stay was 8.5 days. Range of duration of hospital stay was 3-20 days. Average duration of hospitalization in other studies were 21days in a study done by Heyse-Moore G.H. et al[7] and 18 days in study done by Richard F Kyle[8] in patients of trochantric fracture of femur treated with DHS. Duration of stay in the hospital depend upon the easy access to post-operative rehabilitation center.

Results on full weight bearing in this study were comparable with the study conducted by Anand B[9]with 20% of the patients full weight bearing at 12 weeks,75% of the patients full weight bearing at 16-20 weeks and rest required >20 weeks for full weight bearing.

Varus deformity >5° was found in 1 patient and that was due to loss of construct stability, leading to decrease in barrel plate angle due to early unprotected full weight bearing before radiological union. Ultimately the fracture united with 10° of varus deformity and the patients was walking with limping at final follow-up. Similar results were found by Muhammed ayoub laghari et al[10] with varus deformity in one patient out of 45; Anand B[9] with 2 (10%) patients out of 20 and Khan et al[11]with 1% of the patients.

We had no case of fixation failure, in comparison to Redford et al[12] who had 3% and Butt et al[13] (1995) who had 12.5 % cases of fixation failure. This can be explained by the fact that in our study patients were of younger age with good bone stock in comparison to all these studies failure. Similar findings were noted by Muhammed ayoub laghari et al[10] with no patient with fixation failure mainly due to same age group of population studied.

According to Modified Schatzker- Lambert Score in I/T fractures fixed with VHS we found 76.7% (23 patients) with excellent results, 16.6% (5 patients) with good results, and 6.7 % (2 patients) with fair results whereas Muhammed ayoub laghari et al[13] (2006) found excellent results in 33 patients (73.3%), good in 5 patients (11.1%), fair in 3 patients (6.7%), poor in 1 patient (2.22%) according to Stinchfield hip assessment system in I/T fractures treated with DHS.

Variable angle hip screw is a relative new modality of internal fixation of trochanteric fractures and holds promise in the treatment of both stable and unstable trochanteric fracture with anatomical restoration of neck shaft angle. It requires further evaluation and validation, by randomized controlled trials.

CONCLUSION

Variable angle hip screw (VHS) can be considered an effective method of treating trochanteric fractures in terms of functional outcome.

REFERENCES

1. Kannus, Oarkkari J, Sievanen H et al. Epidemiology of hip fractures. Bone 1996; 18 (supplement): 37-63.
2. WM Gadegone and YS Salphale. Proximal femoral nail: an analysis of 100 cases of proximal femoral fracture with an average follows up of 1 year. Springer Int. Ortho 2007 June; 31(3): 403-08.
3. Davis TRC, Sher JL, Horsman A. Intertrochanteric femoral fractures: mechanical failure after internal fixation. J Bone Joint Surg 1990; 72 B: 26-31.
4. Moroni A, Faldini C, Pegreffi F, Kim AH, Vannini F, Giannini S. Dynamic hip screw compared with external fixation for treatment of osteoporotic pertrochanteric fracture: a prospective randomized study. J Bone Joint Surg Am 2005; 87; 753-9.
5. Rockwood and Green's. Fracture in adults. Vol 2, 6th ed, 2006; 1800-02.
6. Chaim SH, Mukherjee DP, Ogden AL et al. A biomechanical study of femoral neck fracture fixation with a VHS Vari-Angle hip fixation system. Am J Orhtop 2002; [supplement 1]: 22-4.
7. Heyse-Moore G.H. et al. Treatment of Intertrochanteric Fractures of the Femur: A comparison of the Richard's Screw plate with the Jewett Nail Plate; Journal of Bone and Joint Surgery, 1983, 65B: 262-7.
8. Kyle RF, Wright TM, Burstein AH. Biomechanical analysis of the sliding characteristics of Compression hip screws. J Bone Joint Surg 1980; 62(A): 1308- 14.
9. Anand B. Jabshetty. Management of the intertrochentric fracture by DHS fixation. Indian J. Sci. Technol. Dec 2011; Vol 4:1681-84.
10. Laghari MA, Makhdullah A et al. Intertrochanteric femoral fractures treated by Dynamic Hip Screw. The Journal of Pakistan Orthopaedic Association February 2006; 18(1), 29-36.
11. Khan N, Askar Z, Ahmed I, Durrani Z, Khan MA, Hakeem A, Faheem Ullah. Intertrochanteric fractures of femur; outcome of dynamic hip screw in elderly patients. Professional Med J Jun 2010; 17(2): 328-33.
12. Radford PJ, Needoff M, Webb JK a prospective randomized comparison of dynamic hip screw and Gamma nail. J Bone Joint Surg 1993;75- B 789-39.
13. Butt MS comparison of dynamic hip screw and gamma nail Aprospective randomized trial injury International Journal of Care of Injured 1995 ;26:615-8.

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