

A Study of Functional Outcome of 95° Dynamic Hip Screw Fixation for Subtrochanteric Femur Fracture

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Abstract: *Subtrochanteric femur fracture has always been a challenging fracture as regard to functional outcome owing to number of problems like high stress concentration, comminution making maintenance of reduction and fixation difficult. ¹Also there is lack of a universally accepted implant for the fixation of this fracture. We studied functional outcome of 20 patients with subtrochanteric femur fracture treated with 95° Dynamic Hip Screw fixation at SSG Hospital Baroda, Gujarat, India between March 2015 to February 2016. There were 17 males & 3 females, mean age 48.8 years with 10 had simple fall and 10 had injury due to vehicular accident, fall from height or assault. Data were analysed radiographically by AO classification² and clinically by operative time, blood loss, union time, complications and Modified Harris Hip Score⁵. Average 6-7 months follow up showed union of all (100%), Harris Hip Score were excellent 10 (50%), good 6 (30%), fair 2 (10%), poor 2 (10%) With Average score 85.4 (Good), making 95° Dynamic Hip Screw a very practical implant for fixation of subtrochanteric fractures with excellent to good functional outcomes. Less periosteal stripping and medial cortical alignment intra-operatively with initial protected weight bearing period had crucial role in functional outcome.*

Keywords: subtrochanteric fracture, 95° DHS, Harris Hip Score, Functional Outcome, Rehabilitation

1. Introduction

Subtrochanteric fractures present considerable challenge in management with clinical, structural, anatomical and biomechanical characteristics that distinguish them from intertrochanteric fractures. Subtrochanteric fractures comprise about 10 to 34% of hip fractures¹. Difficult reduction, Narrow medullary canal, osteoporosis, comminution with metaphyseal and diaphyseal involvement along with malunion, delayed or nonunion due to stress concentration are complicating factors.

Variety of implants are available for subtrochanteric femur fracture fixation but no implant is universally accepted¹. Intramedullary implants like proximal femoral nail, gamma nail is less capable to bear biomechanical stresses exerted during healing phase of such fractures (as the lever arm is moved medially). They are not very suitable for subtrochanteric fractures with an intertrochanteric extension³, where 95° DHS or condylar blade fixation achieved better results. The 95° DHS was introduced as an alternative to the condylar blade plate (CBP) with the screw replacing the blade portion of the plate. The introduction of the 95° DHS, simplified fixation, due to its less exacting technique compared to the CBP⁴. It requires only two-plane alignment while the CBP requires three-plane alignment.

Thus technically 95° DHS has distinct advantages over other implant, equally important is the impact of this implant on functional outcome. So our aim is to determine the functional outcome of 95° DHS in subtrochanteric femur fracture fixation.

2. Materials and Methods

We studied functional outcome of 20 patients with subtrochanteric femur fracture treated with 95° Dynamic Hip Screw fixation at SSG Hospital Baroda, Gujarat, India between March 2015 to February 2016

a) Preoperative work up

Each patient with injury around Hip was examined thoroughly for local and systemic examination to rule out any associated injury. X-ray pelvis with both Hips with affected hip AP was taken to assess the fracture pattern. In necessary cases 3D CT hip were also done.

Fractures were classified according to AO classification². They were temporary immobilized by Proximal tibial skeletal traction by Steinmann pin under local anaesthesia. Preoperative templating was done to make a rough estimate of the length, size and number of required implants.

b) Operative technique

After anaesthesia patient positioned on a radiolucent traction table. The fracture was reduced under image intensifier guidance. All patients were given a dose of preoperative IV antibiotic. After standard painting and draping 15-20 cm incision was made from the tip of trochanter downwards along the shaft femur as needed for atleast 8 distal cortices to be fixed. Tensor fascia lata cut with scissors. Vastus lateralis was reflected upward by 'L' shaped incision over its origin on trochanter. Roughly 2- 2.5cm below the lateral aspect of tip of the trochanter guide pin inserted in 95°angle through neck into the head of the femur under image

intensifier in inferior quadrant in AP view and in central quadrant in lateral view upto subchondral region. Then reaming with triple reamer was done over guide pin to the predetermined mark followed by tapping and placement of Richard screw, its position & length confirmed under image intensifier. Adequate size plate passed on the Richard screw and on the shaft femur held together by femur holding clamp, reduction again checked under image intensifier. Inter-fragment screw placed for butterfly fragment if required and at least 4 distal cortical screws with one or two simple cancellous screws in proximal fragment. Top screw fastened over Richard screw. Final position checked under image intensifier in both AP and lateral view. Thorough wash given, wound closed in layers over negative suction drain and sterile dressing done.

c) Post operative protocol

Intra-venous antibiotics were given to all patients for first 72 hours then oral antibiotics till suture removal on 12th post-operative day. Dressing done on 3rd, 6th and 12th post-operative days.

Patients were taught static quadriceps exercises in the immediate postoperative period. Knee bending exercises, high sitting and active Quadriceps strengthening exercises were started from 3rd post-operative day, as soon as patient were comfortable with it.

Postoperative protected weight bearing with crutch walking were started after 3-4 days according to comfort of patient. In patients who were not compliant weight bearing was delayed for further period. Patients were discharged after suture removal.

d) Follow up regime

Follow-up were done 4 weekly and examined clinically and radiographically allowed partial weight bearing followed by full weight bearing according to union status.



Pre-op Immediate Post-op



Final Follow-up AP Final Follow-up Lateral

3. Observations

In this study of 20 patients the mean age group was 48.8 years with age ranging from 24-75 years, 17 (85%) were males and 3 (15%) were females, 10 (50%) were labourers 5 (25%) were farmers and rest 5 (25%) were housewife, student or shopkeeper. 12 (60%) had left side and 8 (40%) had right side fracture, 10 (50%) had simple fall and rest 10 (50%) had fall from height, vehicular accident or assault.

There were 5 (25%) cases of type A1, 4 (20%) of A2, 4 (20%) of B1, 6 (30%) of B2 and 1 (5%) of B3 type and no cases of type A3 or type C. 15 (75%) got admitted within 24 hours of injury rest took >24 hours to come to hospital. 3 (15%) patients were operated in <5 days while most 14 (70%) were operated from 5-10 days and 3 (15%) were operated after 10 days due to non working of image intensifier during that period. 12 (60%) had to stay for 2-4 weeks period at hospital, 5 (25%) could be discharged in <2 weeks while 3 (15%) had to stay for >4weeks at hospital due to delayed surgery. All patients were x-rayed at each 4 weekly visit and fracture united radiologically at 12 weeks in 3 (15%), 12-16 weeks in 6 (30%), 16-20 weeks in 7 (35%) and took >20 weeks in 4 (20%) patients.

4. Complications

1 (5%) patient had superficial infection at suture line, which was controlled with antibiotics without need for debridement. 3 (15%) patients had implant related complications all were due to premature weight bearing against advice, out of which 1 had bending of plate who was offered revision surgery but patient was comfortable and refused surgery, 1 had back out of screw treated conservatively with serial observation and 1 had breaking of screw with back out of plate which occurred due to re-trauma patient underwent revision surgery with longer plate and with proper rehabilitation fracture healed nicely. No any other complication was found.

5. Functional Results

Functional outcome were analysed according to modified Harris hip score⁵. At final follow up 16 patients had none 4 (20%) to slight 12 (60%) pain, 17 patients had none 3 (15%) to slight 14 (70%) limp, 16 patients could walk without

support 11 (55%) or needed cane for long distance walk 5 (25%), 19 patients could walk unlimited distance 11 (55%) or at least 1km 8 (60%), 19 patients could climb stairs with 5 (25%) or without 14 (70%) using a railing, 18 (90%) could sit in any chair comfortably, 16 (80%) could wear foot wear easily and 4 (20%) with difficulty, 19 (95%) were able to enter public transport on their own, only 1 (5%) had limb length discrepancy >3.2cms and 1 (5%) had fixed flexion deformity of 20°, 17 (85%) patients were able to squat easily, 19 could sit crossed leg with ease 15 (75%) or with difficulty 4 (20%).

At final follow-up average modified Harris hip score was 85.4 with 10 (50%) had excellent results, 6 (30%) had good, 2 (10%) had fair and 2 (10%) had poor results. 1 patient with poor result had general debility and did not have enough strength to get up despite fracture had united, 1 patient with poor result had pre-existing severe osteoarthritis of the operated hip and had jagged movement in all directions, patient was explained about need of future hip replacement on as needed basis.

Table 1: Complications

Complication	Mohamed Mansour Elzohairy ⁶	Our study
Cut through	1(3.2%)	0
Plate bending	1(3.2%)	1(5%)
Screw breaking	0	1(5%)
Loss of fixation	1(3.2%)	0
Screw backout	0	1(5%)
superficial infection	2(6.4%)	1(5%)

Table 2: Harris Hip Score

Final results	Mohamed mansour elzohairy ⁶	Our study
Excellent (90-100)	45.16%	50%
Good (80-89)	32.25%	30%
Fair (70-79)	12.90%	10%
Poor (<70)	9.67%	10%

6. Discussion

The complexity of the subtrochanteric fracture has always lead to debate regarding the implant to be used, where intramedullary implant has a distinct advantage of preserving the biological environment, it also has a disadvantage of learning curve and requirement intact greater trochanter. In intramedullary nailing the lever arm has shifted more medially raising the biomechanical stress on implant which requires medial cortex continuity, achieving the medial cortex continuity is not feasible in a closed procedure (nailing). While the plating has advantage of anatomical reduction and achieving of medial cortex continuity, the plate on a comminuted lateral cortex also acts as a buttress. The earlier more popular condylar blade plate has steep learning curve and requires expertise for its use as the blade insertion requires three dimensional accuracy, the need which is only two dimensional in 95° DHS proximal screw insertion. While the sliding hip screw principle is well established in intertrochanteric fracture, in subtrochanteric fracture it is not possible to put proximal fragment screw with simple DHS for providing best rotational stability which is possible feature in 95° DHS. Thus biomechanically 95° DHS is practically very sound implant for the purpose of subtrochanteric femur fracture

fixation, still the impact on the functional outcome should be determined which was the aim of our study.

From our study it was evident that rehabilitation is an important aspect of overall success of 95° DHS in subtrochanteric femur fracture. Premature weight bearing and non compliance to the protected weight bearing protocol has been associated with implant related complications, like bending of plate, breaking of screw, back out of plate and screw. However initial period of protected weight bearing for at least 3-4 weeks and further more, depending the pre-operative fracture pattern, amount of comminution, stability of reduction and fixation and post-operative progress as evaluated by 4 weekly x-ray followed by 3-4 weeks of partial weight bearing followed by full weight bearing can lead to very good functional outcome. However it is of equal importance to start early ambulation with crutch walking and protected weight bearing to prevent prolonged bed rest related complications. Also that quadriceps strengthening exercise should be started early in post-operative period to make limb capable of walking by the time fracture has united enough to allow weight bearing. That was average 4 weeks in our study.

Most of the patients in our study had excellent to good functional outcome with 2 patients had fair result, but all of them were able to carry out their daily living activity without any significant disturbance. Only 1 patient with poor result had gross difficulty in daily living because of age related (75years) general debility although his fracture had united. 1 patient had pre-existing severe osteoarthritis of the operated hip had poor functional score but patient was satisfied as compared to pre trauma work status.

This results are comparable to that found in study by Mohamed Mansour Elzohairy⁶, Egypt showing the reproducibility of the functional outcome. The comparison is made in the table.

7. Conclusion

Hence we can conclude that 95° Dynamic Hip Screw fixation gives excellent functional outcome in subtrochanteric femur fracture. However to gain better results it is necessary to strictly follow post-operative rehabilitation protocol to avoid implant related complications.

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