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International Journal of Current Research
Vol. 7, Issue, 09, pp.20708-20711, September, 2015

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

OUTCOME OF DYNAMIC CONDYLAR SCREW FOR *SUBTROCHENTERIC* FEMORAL FRACTURES

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ARTICLE INFO

Article History:
Received 22nd June, 2015
Received in revised form
04th July, 2015
Accepted 25th August, 2015
Published online 30th September, 2015

Key words:

Subtrochenteric Fracture,
Proximal Femoral,
Dynamic Condylar Screw.

ABSTRACT

Background: The comminuted and/or long *subtrochenteric* femoral fractures are considered as a difficult fractures to treat. The objective of this study was to evaluate the success rate of dynamic condylar screw fixation for the treatment of these *subtrochenteric* fractures.

Methods: Total 30 consecutive patients of age 21 to 60 years with *subtrochenteric* fractures were included in our study. The type of fractures were classified according to AO- classification system and the patients were assessed using the Harris hip score.

Results: The cases were followed up from 9 to 15 months (mean 12 months). The time required to full weight bearing was 10 to 16 weeks (mean 14 weeks). No cases were lost to follow up. There were no cases of non-union or infection. There were two cases of implant failure due to early weight bearing and osteoporosis. With the exception of 2 implant failure cases(6.67%) , all the cases in our study had excellent (55. 3%) to good (40.0%) functional outcome. The mean Harris hip score was 86.

Conclusions: We came to the conclusion that dynamic condylar screw is valuable and practical method of fixation of *subtrochenteric* fractures. Minimum soft tissue damage, preservation of medial blood supply, and gentle manipulation of fracture fragments along with proper fixation techniques are of paramount importance to achieve good fracture healing and to avoid complications.

***Citation*:** Jaiswal Sagar Bharatlal, 2015. "Outcome of dynamic condylar screw for *subtrochenteric* femoral fractures", *International Journal of Current Research*, 7, (9), 20708-20711.

INTRODUCTION

Subtrochenteric fracture particularly when comminuted and/or long are very difficult to treat (Miclau, 1997; Celebi, 2006; Sienbenrock *et al*., 1998). These fractures constitute 15 -20% of all hip fractures (Kyle, 1995). The *subtrochenteric* area is notorious to undergo healing. This is attributed to the various anatomical and biomechanical factors in this area. The *subtrochenteric* bone is hard with slow healing potential. This area is subjected to a tremendous bending forces because of eccentric load application to the femoral head (Fig.1) (cochran gvb *et al*., 1980). The medial cortex in this area is subjected to the force of 1200pounds/ sq inch. In addition the great pull of muscle forces also produces a larger shear at the fracture site. Also these fractures are often caused by high energy trauma such as RTA & fall from large height and thus may have large comminution with extension to greater & intertrochenteric regions.

These factors necessitates the internal and biological fixation of these fractures. Various internal fixation devices are available to fix the *subtrochenteric* fractures (Celebi, 2006; Nikolaou, 2008; Kulkarni and Moran, 2003).

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Though the intramedullary devices requires less surgical exposure, enables early weight bearing and exerts less biomechanical stress but they are not suitable for *subtrochenteric* fractures particularly when comminuted and/or long, when associated with intertrochenteric extension (Sienbenrock *et al*., 1998; Kinast *et al*., 1989; Vaidya *et al*., 2003). Also intramedullary implants are associated with technical difficulties. Among the extramedullary implants the 95 degree dynamic condylar screw (DCS) fixation system is preferable to fix such difficult fractures. It has the advantages of ease of insertion, firm and stable fixation, great strength with greater resistance to load failure, less operative time as well as decreased duration of hospital stay. *Subtrochenteric* fracture internal fixation is associated with various complications like infection, implant failure & coxa vara, nonunion, delayed union and malunion (Kyle, 1995). So the aim of our study is to evaluate the result of 95 DCS fixation in *subtrochenteric* fractures in our circumstances.

MATERIALS AND METHODS

We treated 30 patients with *subtrochenteric* fractures from July 2013 to December 2014 with 95 DCS at Department of orthopaedics, SSG Hospital, Vadodara, Gujarat, India. We

included all the closed fractures in adults and in both sexes. The pathological fractures, open fractures and fractures in children were excluded from our study. There were 21 males (70%) and 9 females (30%) between 21-65 years (mean 44 years). 22 cases (73.33%) were because of RTA & 8 cases (2.67%) were due to fall. 18(60%) fractures were right sided and 12 (40%) being left sided. 4 cases(13.33%) were having associated injuries and treated accordingly. Any associated injury that threatens the life of the patient was treated first before definitive fracture fixation. AO classification was used to classify the fractures. No patients were lost to follow up and all of them evaluated for fracture union rate, implant failure, infection rate, and functional outcome. The Harris hip score was used for final evaluation.

After admission to hospital all patients were given skeletal traction to avoid pain and to prevent shortening and other soft tissue complication due to lack of immobilization. Patient were operated after routine laboratory work ups and pre-anaesthetic evaluation between, 2-14 days (mean 8 days) on a elective basis. 22 cases (73.33%) required spinal anaesthesia and 12 cases(26.67%) needed general anaesthesia. Preoperative planning was done on x-ray and all the armamentarium were kept ready beforehand. Orthopaedic Table with traction and supine position was used under image intensifier guidance. All cases were given prophylactic dose as a bolus to avoid infection.

Operative Technique

The standard lateral approach was used in all cases the length of incision being dependant on the fracture extent and the length of side plate to be applied. Proximal femur exposed with an inverted L - shape incision at the origin of vastus lateralis with 0.5 -1 cm margin attached at the origin for later repair. Rest of the fracture and the required extent of femoral shaft being exposed by reflecting the vastus lateralis from lateral intermascular septum. A guide pin was placed from greater trochenter to the femoral neck and head engaging the strong subchondral bone in the infero-posterior quadrant of the femoral head. A guide angle was used for this accurate placement. Anterior or posterior placement of the guide pin were avoided.

A condylar lag screw of appropriate length was then inserted over guide pin after reaming over guide pin using triple rimmer. A barrel plate of appropriate length was inserted so as to ensure at least four cortical screw in the distal fragment. In 12 patients (40%) cortical screw were used in a lag pattern to achieve interfragmentary stabilization. Intraoperatively all possible efforts were made to maintain the integrity of soft tissue envelope attached to the fracture fragments. Image intensifier was used for proper placement & conformation of the plate & screws, in both AP and Lateral views. Wound closed in layers and single suction drain was placed. Antibiotics continued for three day. Drain removed at 48 hrs and sutures were removed at 12 days postoperatively. In bed knee range of motion exercise were stared from third day or as the patient became pain free. DVT prophylaxis was given to every case. Toe touch weight bearing with crutches taught on 8th day in a less comminuted fracture otherwise at the end of 3rd week. Partial weight bearing allowed at 6th week and gradually increasing weight bearing thereafter. Patient were followed up 4 weekly for 6 months and 8 weekly thereafter till 12 month. Union assessed clinically with the extent of pain-free ability of the patient to weight bear and radiologically as disappearance of the fracture line & appearance of cortical continuity, at each follow up. Functional outcome were assessed using Harris hip score.

RESULTS

The age and sex distribution is graphically represented(fig 1,2). The fracture distribution according to AO classification is tabulated (Table 1). The duration of hospital stay was 7-14 days (mean 10 days).the follow up period was 9-15 months (mean 12 months). The time to full weight bearing was 10-16 weeks (mean 14 weeks). Union achieved in 28 of 30 cases (93.33%).

Table 1. AO Classification

TYPE	NO OF PATIENTS (%)
31.A	14 (46.6%)
32.B	10 (33.3%)
32.C	6 (20%)

The union time required was 12-20 weeks (mean16 weeks). We used bone graft in four cases (13.33%). No cases were lost to follow up. There were no cases of infection. We had two cases with implant failure (6.67%). Both the cases with implant failure had non union. One failure case was revised with exchange 95 DCS and the other revised with proximal femoral nail. Using Harris hip score for functional evaluation we had functional outcome as an excellent in 16 cases (53.33%) and as good in 12 cases(40%) as depicted (Table 2). The mean Harris hip score in our studywas86. We compared the result of our study with the other studies as shown (Table 3).

Table 2. Outcome According to Harris HIP Score

Excellent	16 (53.3%)
Good	12(40%)
Fair	0 (0%)
Poor	2 (6.6%) (IMPLANT FAILURE/REVISED)

DISCUSSION

Comminuted and unstable *subtrochenteric* fractures are increasing due increase in both the industrial as well as road traffic accidents. Treatment of these comminuted and long *subtrochenteric* fracture is a difficult task .Biological fixation method in these fracture gives promising results.[8,11,12,13] similarly the wide variation in the fracture pattern and availability of the variety of the implants, the treatment of the *subtrochenteric* fractures remains debatable. The intramedullary implant are biomechanically superior to the extramedullary implants. Also the recovery time is also less with intramedullary fixation. Elderly patients has good outcome with intramedullary fixation. Intramedullary fixation requires less surgical exposure, enables early weight bearing and achieve better proximal fixation. Also nailing exerts less biomechanical stresses (Rohilla *et al*., 2009).

Table 3. Comparison of the Outcome with other Studies

	No of Patients	Bone graft used	Complications			
			Implant Failure	Nonunion	Malunion	Infection
Warwick *et al*., (1995)[17]	36	3	6	1	1	-
Kulkarni and Moran, (2003)[5]	53	16	12	12	0	-
R Rohilla *et al*. (2008)[8]	43	0	0	0	2	1
Muhammad Ayoub Laghari *et al*. (2011)[18]	48	-	3	3	3	2
Present sutdy, (2015)	30	3	2	1	0	0

CASE 1


PRE-OP X-RAY


POST-OP X-RAY


FOLLOW UP 3 MONTHS

CASE 2


PRE-OP X-RAY


POST-OP X-RAY

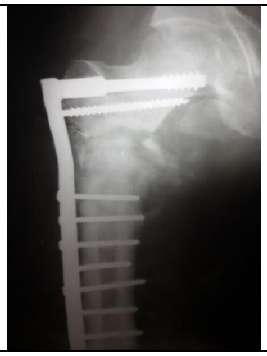

FOLLOW UP 14 WEEKS

CASE 3


PRE-OP X-RAY


POST-OP X-RAY


IMPLANT FAILURE 3WEEKS


REVISION FOLLOW-UP 4MONTHS

However intramedullary implants are not a good option for comminuted *subtrochenteric* fracture, particularly when associated with extension to trochenter or lower down into the shaft (Sienbenrock *et al*., 1998; Kinast *et al*., 1989; Vaidya *et al*., 2003).

Moreover nailing is a technically demanding procedure. The 95 DCS and side plate works on the principle of tension band and allows the reduction of the fracture fragment with buttressing of the lateral cortex (Celebi, 2006). Also there is no significant difference in pain, range of motion, weight bearing and

walking ability at the union of fracture (Krettek *et al*., 1997; Schipper *et al*., 2004; Strauss *et al*., 2006). 95 DCS simplifies the fixation and is less exacting. It requires only two plane alignment during fixation. The implant is cheap compared to intramedullary devices (Rohilla, 2009). 95dcs and plate is implant of choice in younger patients with high energy trauma but not in elderly population because of high failure rate of these implants in elderly on weight bearing and during rehabilitation (Kulkarni and moran, 2003). In our study also the two failure cases occurred because of early weight bearing in osteoporotic elderly individuals. We had only a small numbers of elderly population to draw and to compare the outcome of these implant. This requires study on large scale. There are many studies are going on to observe the usefulness of other implant in such fracture patterns particularly in osteoporotic elderly individuals (Strauss *et al*., 2006; Gardner *et al*., 2007).

Conclusion

Based on our result we conclude that, the use of 95 DCS and plate for the fixation of comminuted and/or long *subtrochenteric* fracture, combined with proper planning, elaborative surgical technique, minimum soft tissue damage, preserving the vascularity if the fracture fragments proves an effective method of fixation with good results in terms of fracture healing and functional outcome of the patient.

Conflict of Interest: Nil

Acknowledgement Funding: Nil

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