

# Subtrochanteric Femoral Fractures Treated by Fixation with Dynamic Condylar Screw System

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## ABSTRACT

**OBJECTIVE:** The purpose of this study was to evaluate the results of dynamic condylar screw system in the management of subtrochanteric femoral fractures, regarding union time, implant failure rate; infection rate and functional outcome.

**STUDY DESIGN:** A prospective case series.

**PLACE AND DURATION OF STUDY:** This study was carried at the department of Orthopedic Surgery and Traumatology Liaquat university of Medical and Health, sciences Jamshoro, during January 2008 to December 2009.

**MATERIAL AND METHODS:** Total 52 consecutive patients with subtrochanteric fracture were studied. Four patients were lost during follow-up and total 48 patients were finally assessed. The inclusion criteria was closed subtrochanteric fractures in adults of both gender aged 20 years or above; pathological fractures and open fractures were excluded from the study. After fixation of fractures with dynamic condylar screw system patients were followed up for 6-12 months, the mean follow up period was 8 months. Results of treatment were assessed by the Radford criteria.

**RESULTS:** Among 48 studied cases, males were 29(60.42%) and female 19(39.58%). Most common mode of injury was road traffic accidents in 32 patients (66.66%) and 16 patients had fall. All the patients underwent operative treatment by fixation of DCS. Autogenous bone graft was done in 07 patients. The union rate in this series was (93.5%). Implant failure was observed in 03(6.25%) patients, 03 (6.25%) patients developed varus deformity and infection occurred in 02 (4.66 %). According to criteria of Radford, we achieved good to excellent results in 81 % cases, fair in 6 (12.5 %) patients, poor in 03(6.25%) patients.

**CONCLUSION:** We conclude that subtrochanteric fractures need open reduction and internal fixation to avoid complications like implant failure, nonunion, infection, and mal-union. In our circumstances we achieve good results by the use of dynamic condylar screw.

**KEY WORDS:** Subtrochanteric Femoral Fractures, Dynamic Condylar Screw, Internal Fixation.

## INTRODUCTION

Subtrochanteric fractures comprises of 10-34% of all hip fractures.<sup>1</sup> Although different implants are available to internally fix this fracture, due to anatomical & biomechanical reasons, the sub-trochanteric femoral fracture still a challenge for Orthopedic Surgeons. The forces in this area are up to 1,200 pounds/square inch on the medial cortex leading to immense stresses in the area. Besides this the orientation of muscle forces in this area causes shear at the fracture site.<sup>2</sup> Biomechanical studies have shown that femoral cortex in the postero-medial subtrochanteric region is subjected to highest stresses in the body as a result of high compressive and tensile forces in the medial cortex distal and lateral to the lesser trochanter respectively, internal fixation is difficult and risks a high failure rate.<sup>3</sup> Considering the biomechanical forces which lead displacement, open reduction and internal fixation is nec-

essary. Conservative treatment gives only satisfactory results in 56% of patients as compared to 70-80% for operative methods<sup>4</sup>. During the past 30 years, there has been a near-complete elimination of non-operative treatment in adults and a corresponding increase in the operative treatment of subtrochanteric fractures<sup>5</sup>. There are two main types of devices to fix subtrochanteric fractures, intra-medullary devices and extra-medullary devices. Intra-medullary implants includes reconstruction nail, gamma nail, Russel Taylor nails while extra-medullary implants commonly use includes A.O 95 angled condylar blade plate, A.O 95 degree dynamic condylar screws, Dynamic hip screws. The A.O dynamic condylar screw provide strong fixation in the cancellous bone of the neck and head with considerable rotational stability<sup>6</sup>. Intra-medullary devices require less surgical exposure, enable early weight bearing, achieve better proximal fixation and exert less biomechanical stresses. How-

ever they are not suitable for subtrochanteric fractures with intertrochanteric extension and are associated with technical difficulties in 63% of cases<sup>7</sup>. DHS and DCS are among the best fixation devices in the armamentarium for subtrochanteric fracture management<sup>8</sup>, DCS are preferred to fix subtrochanteric fractures, probably it has advantage of easy insertion, firm fixation, increase strength, and resistance to stress failure, less operative time and short hospital stay<sup>9</sup>. Complications of subtrochanteric fracture management are, non-union, implant failure, malunion, and wound infections. We use dynamic condylar screw fixation to stabilize subtrochanteric fractures in our set-up. This study was conducted to evaluate the results of fixation of this device in our circumstances.

**MATERIAL AND METHODS**

During January 2008 to December 2009 (02 year period) 52 subtrochanteric femoral fractures were included in this study, conducted at the department of Orthopedic Surgery and Traumatology Liaquat University of Medical and Health Sciences Jamshoro Pakistan. Four patients were lost in follow-up finally 48 patients were assessed to evaluate union rate, implant failure, infection and functional outcome. This was a prospective type of study. The inclusion criteria was closed subtrochanteric fractures in adults of both gender. The age ranged between 20 -80 years with average age 44.5 years. Pathological fractures and open fractures were excluded from the study.

After admission temporary skin traction was applied to relieve pain. To choose proper implant size and fracture geometry was assessed preoperative planning on X-rays and was operated on elective list. All the fractures were classified according to A.O classification. There were 18 (37.50%) type A, 16 (33.34%) and 14 (29.16%) type c fractures according to A.O classification.

Time lapse between the injury and surgery ranged between 1-15 days with average 11 days due to late arrival of patients. All the patients were given prophylactic bolus dose of antibiotics to avoid infection. Second or third generation cephalosporin were used pre and postoperatively. Patient after surgery were followed-up for 6 months to 1 year and assessed according to Radford criteria of functional outcome.

Postoperatively, quadriceps exercises were encouraged on the next day of operation. Prophylactic antibiotics second generation or third generation cephalosporins were used for 48-72 hours depending upon the conditions of patients and type of surgery Exercises were encouraged as patients tolerated the pain. The patients were discharged on the sixth -7<sup>th</sup> day post operatively. Stitch removal was done on the 14th

day. Partial weight bearing was allowed after 15 – 20 day in type A and B fractures and weight bearing was delayed for 6-8 weeks in type C fractures till the appearance of callus on radiograph.

**RESULTS AND OBSERVATIONS**

The age, sex and mode of injury distribution is appreciated as in graph 1, 2 and table 2 that indicate M:F ratio as 1.53:1 and the common mode of injury was road traffic accident i.e. 66.66%.

Hospital stay in our series was 7-20 days with average with average time in the hospital 10.2 days. Union of fracture was achieved in 45 (93.6 %) patients out of 48 patients with average union time in 16 .5 weeks Ranging from 12 weeks to 22 weeks. Three (6.25) patients had implant failure with non union and 02 (4.16%) deep infection 03 (6.25 %) patients underwent varus deformity and developed shortening of 03 cm managed by shoe raising. Implant failure patents were managed by repeat surgery and secondary bone grafting. Nonunion was seen in all three patients who developed implant failure cases were 01 case was type B and 02 cases of type C fractures.

According to Radford criteria excellent to good results in 81.5 % in patients fair in 6 and poor results in 3% were achieved.

**TABLE I: DISTRIBUTION OF FRACTURES ACCORDING TO A.O CLASSIFICATION MULLER ET-AL 1990.<sup>10</sup>**

Type of fracture	No of patients	Percentage
Type A	18	37.50
Type B	16	33.34
Type C	14	29.16

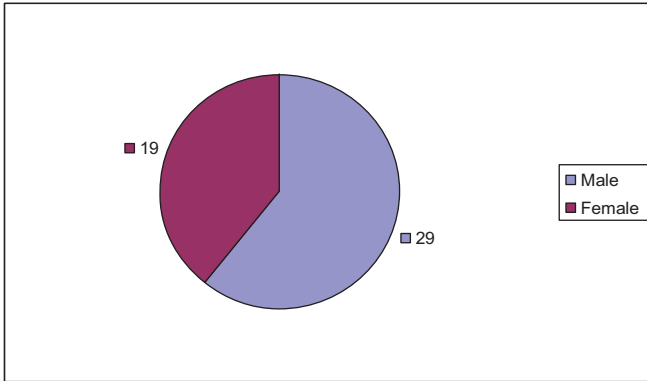
**TABLE II: MODE OF INJURY**

Mode of injury	No of patients	Percentage
Road traffic accident	32	66.66
Fall	16	33.34
Type C	14	29.16

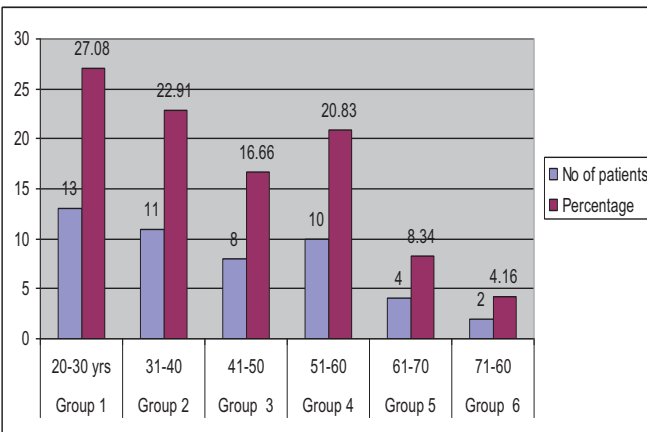
**Table III:**

Results	No of patients	Percentage
Excellent results	27 patients	56.25%
Good results	12 patients	25.00%
Fair results	06	12.5%
Poor	03	6.25%

**MALE & FEMALE RATE**



**AGE GROUPS DISTRIBUTION**



**Type c fracture union achieved in 17 weeks**



**Type c fracture united in 20 weeks**



**Type c fracture union achieved in 12 weeks**



**Type B fracture union achieved in 15 weeks**

**DISCUSSION**

Primary goal of subtrochanteric fracture treatment is to achieve rigid fixation and adequate union with optimal functional out come. Subtrochanteric fractures treatment is debatable many types implants are being used. These fractures can be effectively stabilized with 95 angled plates femoral reconstruction nails or trochanteric femoral nails with interlocking options an accurate reduction and meticulous surgical technique with minimal soft tissue dissection can routinely produce good results.<sup>12</sup> Complication rate for unstable fractures treated with a dynamic hip screw or dynamic condylar screw is high, because of high stresses in this particular zone of proximal femur. We choose the dynamic condylar screw for subtrochanteric fracture fixation, because this is used commonly in our setup.

Rohilla<sup>13</sup>, Halwai<sup>14</sup>, Sharma<sup>15</sup>, present 43, 30 and 25 case series with little difference of average age and achieved 73 to 100% union. However Sharma used primary bone graft despite that his results could not match. We had 48 patients with average age 44.5 years and union rate was 93.5 % we used direct method of reduction matches with this case series regarding age our results of union rate is lower due to direct method of reduction in our set –up and more cases of type c. Mean time to union was 16 weeks in

series in our series mean time of union was 16.5 weeks our study is comparable with this study. Kulkarni et al<sup>16</sup> presented excellent and good results in 77% of patients and, failure was high 23% of cases. In this series we achieved 81% excellent and good results. We had failure in 6.25 % our failure rate is lower than this series. In our series we achieved 81% excellent and good results we used direct method of reduction in type A and B fractures and did biological type of plate fixation in type C fractures .We recommend DCS an implant which is appropriate for comminuted type c fractures complications depends upon the degree of damage to the postero- medial cortex of proximal femur we had 6.25 % implant failure and 4.66 % infection rate as we work under the circumstances of conventional operation theaters in our set-up. However our results are comparable with other studies.

#### CONCLUSION

We conclude that subtrochanteric fractures need open reduction and internal fixation to avoid complications like implant failure, nonunion, infection and mal-union. In our circumstances we achieve good results by the use of dynamic condylar screw.

#### REFERENCES

1. Lavelle David G. (2003) Campbells operative orthopaedics 10<sup>th</sup> edition. Mosby, St. Louis p2897.
2. Sims SH (2002) Treatment of complex fractures orthopaedics clinics of north America; 33(1):1-12.
3. Kyle RF, Cabanela ME, Russel TA, Swiontkowski, RA Winqvist RA, Zukerman JD ,et-al fractures of proximal part of the femur. Instructional lecture 1995;227-53.
4. Niall J.A Craig. Subtrochanteric fractures: Current management options published in disability and rehabilitation 2005 vol;27:18 and 19 page 1181-1190.
5. Khallaf FGM, Al Rowaih, Abdul Hameed HF. Results of subtrochanteric fractures treated by dynamic hip Screw and dynamic condylar screws Med: Principles practice 1998;7:283-291.
6. Wadell JP. Subtrochanteric fractures of femur: a review of 130 patients. J Trauma August 1979 19 (8):582-92.
7. Vaidya SV, Dholakia DB, Chatterjee A. Use of dynamic condylar screw and biological reduction techniques for subtrochanteric femur fractures; injury 2003;34:123-8.
8. Baumer F, Jurowich B, Taruttis H. Use of dynamic condylar screw in coxal end of femur are there advantages to gerontologic traumatology zentralbil m chir 1992;117(8):460-4.
9. Bolden C, Seibert FJ, Fankhauser F, Peicha G, Greichnig W, Szyszkowitz R, The proximal femoral nail (PFN)—a minimally invasive treatment of unstable proximal femoral fractures; A prospective study of 55 cases with follow –up of 15 months. Acta orthopedic Scand 2003;74:53-8.
10. Muller ME, Nazarian S, Kock Pet-al 1990.the A.O classification of fractures of long bones .springer, Berlin. P 116.
11. Radford PJ, & Howell CJ. The A.O Condylar screw for fractures of femur. The british journal of accident surgery 1992;23:89-93.
12. Douglas W, Lundy MD. Subtrochanteric femoral fractures J Am acad Orthop surg 2007. Vol,15 No 11:663-671.
13. Rohilla R, Singh R, Magu NK, Siwach RC, Sangwan SS, Journal of orthopaedic surgery 2008;16 (2)150-5.
14. Halwai MA, Dhar SA, Muhammad Iqbal, Butt, MF, Bashir Ahmed Mir, Murtaza Fazal Ali et-al Strategies trauma Limb reconst:2007 December; 2 (2):77-81.
15. Sharma V, Sharma S, Sharma N, Singh N & Dong H. Management of subtrochanteric fractures by dynamic condylar screw .the internet journal of orthopaedic surgery 2010. Vol;11:2 1-13.
16. Kulkarni SS, Moran CJ Results of dynamic condylar screw for subtrochanteric fractures. Injury 2003;34:117-122.



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