

# Management Of Subtrochanteric Femoral Fractures By Dynamic Condylar Screw (DCS)

V Sharma, S Sharma, S Sharma, N Singh, H Dang

## Citation

V Sharma, S Sharma, S Sharma, N Singh, H Dang. *Management Of Subtrochanteric Femoral Fractures By Dynamic Condylar Screw (DCS)*. The Internet Journal of Orthopedic Surgery. 2008 Volume 11 Number 2.

## Abstract

The present prospective study was done to evaluate the results of Dynamic Condylar Screw (DCS) for the management of subtrochanteric femoral fractures. Twenty five (25) patients were taken up for the study. There were eighteen (18) male (72%) and seven (7) female (28%) patients, with an average age of 45.44 years (ranged 20-70 years). In fifteen (15) patients (60%) the mode of injury was road traffic accident and the ten patients (40%), had injury due to fall. Primary bone grafting was done in four cases (16%) and average time taken to union was 17.56 weeks. Results were evaluated using modified Schatzker and Lambert criteria and were excellent in twenty patients (80%), good in three patients (12%) and fair in two patients (8%). Patients with good quality bone, as per femoral score, had good healing of fractures. Two patients had superficial wound infection, which healed by antibiotics and local wound care. Varus/Valgus/ rotational deformity were seen in four patients, limb length discrepancy was seen in three patients. Two patients had restricted hip movement and one patient had restricted knee movements. To conclude, the Dynamic Condylar Screw for fixation of subtrochanteric fractures has proved to be safe and successful, provided the principles of accurate reduction, stable internal fixation and preservation of biology are followed.

## INTRODUCTION

Subtrochanteric fractures account for 2-5% of all the proximal femur fractures [1]. Though less common than intertrochanteric and femoral neck fractures, these are important because of their challenging management for biochemical and anatomical reasons. These fractures are encountered both in young and old age. Fractures in young patients are usually associated with high energy trauma and those in old age are associated with low energy trauma. The lever arm of the femoral neck produces large compressive stresses in the medial and large tensile stresses in the lateral subtrochanteric cortex. If fracture in this region is unstable, these stresses are transmitted to any fixation device, leading to a high failure rate. This biomechanical problem is compounded by powerful muscle vectors and by a predominance of cortical bone which takes longer to heal. Non-operative treatments in the majority of adult patients has proven unsatisfactory because resultant deformity and shortening.

Over the past half century, the treatment of the subtrochanteric fractures has evolved with improved understanding of both fracture biology and biomechanics. The onus is now on preserving biology while providing stability to fracture and allowing it to unite under protected

loading. Surgical methods of treatment of these fractures are preferred now and improved results have been obtained, with better understanding of fracture, by following AO/ASIF principles of accurate reduction and stable internal fixation and by doing biological reductions. Bone grafting has been found useful in shortening the overall periods of healing. Many implants have been used for operative treatment of these fractures, including a variety of intramedullary nails, Enders Nails, and angle plate and most series report technical failure [2,3,4]. We report the profile of subtrochanteric fractures and use of AO dynamic condylar screw (DCS), in their management. Although this device was designed for use in the distal femur, it has features which make it attractive for use in subtrochanteric fractures.

## MATERIAL AND METHODS

This study was conducted in the Post- Graduate Department of Orthopaedics, Govt. Medical College, Jammu from May, 2005 to August 2008. Patients included in the study were of both sexes with subtrochanteric fracture and subtrochanteric fractures with intertrochanteric extension.

Exclusion Criteria were:

- Skeletally immature patients.

- Patients with pathological fractures.
- Patients with compound fractures.
- Patients with associated neurovascular complications.
- Patients with multiple fractures.

The fractures were classified on the basis of the AO classification.

**Figure 1**

|  |
|--|
| <b>Type-A</b> Simple fractures (two part fractures)  |
| A <sub>1</sub> -Spiral<br>A <sub>2</sub> -Oblique<br>A <sub>3</sub> -Transverse                          |
| <b>Type-B</b> Wedge fractures ( fracture with a butterfly fragment)                                      |
| B <sub>1</sub> - Spiral wedge.<br>B <sub>2</sub> -Bending wedge<br>B <sub>3</sub> - Comminuted wedge     |
| <b>Type -C</b> Complex Comminuted fractures  |
| C <sub>1</sub> -Complex spiral<br>C <sub>2</sub> -Complex segmented<br>C <sub>3</sub> -Complex irregular |

Pre operative plan was drawn from the patients radiographs in order to decide about the placement of any inter-fragmentary lag screw and length of implant required. The quality of the patient's bone was estimated by femoral score i.e. fraction of diameter of the femoral shaft that consists of cortical bone on AP radiographs. Its effect on healing of bone was seen.

**Figure 2**

| Femoral Score | Quality of Bone       |
|---------------|-----------------------|
| >0.45         | Good bone             |
| 0.33-0.45     | Moderate osteoporosis |
| < 0.33        | Advanced Osteoporosis |

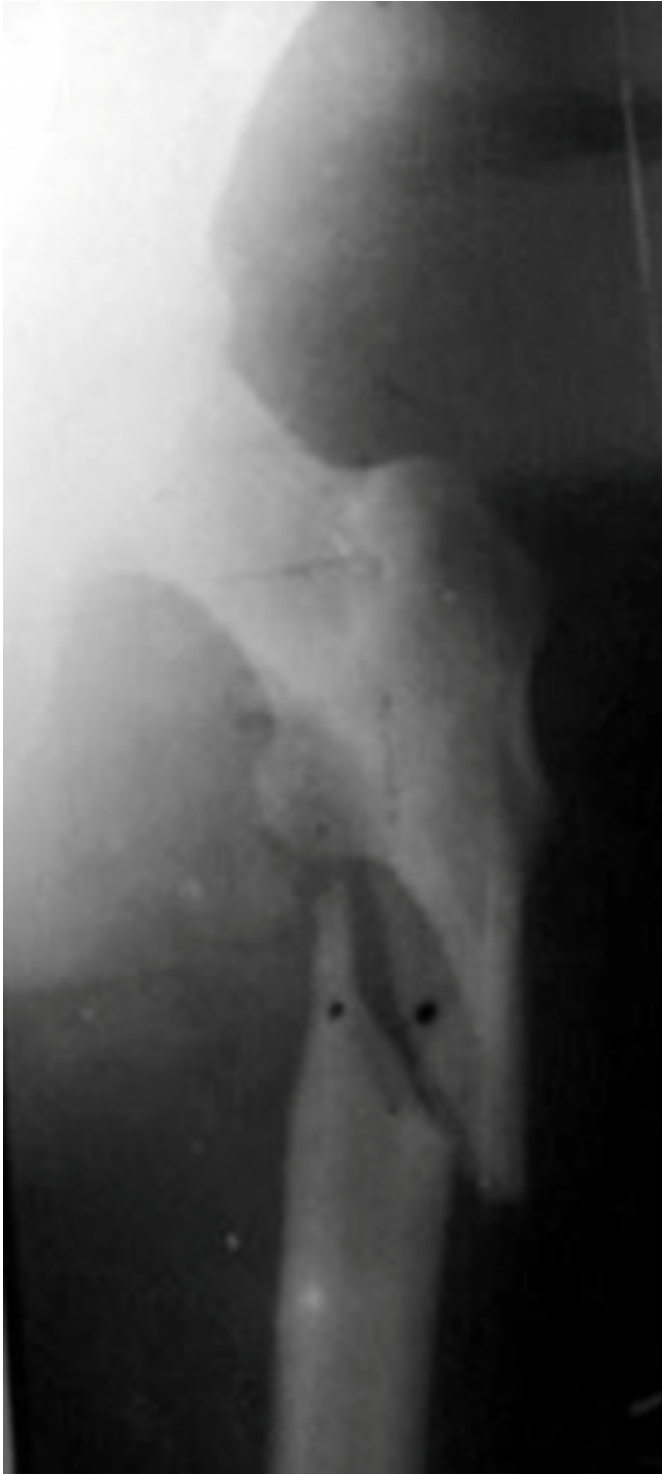
All the patients were operated on a fracture table using traction to reduce the fracture and fix the fracture under fluoroscopic guidance. Primary bone grafting was done in 4 cases (16%) The average duration of surgery was 92.2 minutes. The mobilization plan was at the discretion of the surgeon, generally partial weight bearing for type – A& B fractures and non- weight bearing for type C fractures until callus appeared. The patients were followed up at 6 weeks, 3 months and then at monthly intervals until fracture union.

## RESULTS AND OBSERVATIONS

The present study comprised of 25 patients of subtrochanteric fractures. Patients were in age group of 21-70 years, average age was 45.55 years. Out of 25 patients 18 (72%) were male and 7 (28%) were female patients. Right limb was involved in 18 patients (72%) and left limb in 7 patients (28%). 15 patients met road traffic accident and 10 patients, had injury due to fall. 20 patients came to hospital within 24 hours and 5 patients reported within 24-72 hours. Average interval was 1.2 days. In our series 56 % cases were Type-A fractures, 28% type-B and 16% type- C fractures. Average time interval between injury and surgery was 10.6 days. In 15 patients (60%) medial buttress was intact and 10 patients (40%) had no medial support. Primary bone grafting was done in 4 patients (16%), in whom there was posteromedial comminution. Source of bone grafting was iliac crest.

**Figure 3**

Figure 1: AP X Ray of Hip Showing subtrochanteric fracture



**Figure 4**

Figure 2: Six months post-operative AP X Ray of hip showing good fracture union.



In our series 17 fractures (68%) united in 14-18 weeks time, 4 fractures took 18-22 weeks to unite and 3 fractures united in 10-14 weeks time. Average union time was 17.56 weeks. In this study 18 (72%) patients had femoral score  $>0.45$ , 6 (24%) patients between 0.33-0.45 and 1 patient (4%)  $\leq 0.33$ . 18 patients having femoral score  $>0.45$  had average time of healing 17.2 weeks and 7 patients having femoral score  $<0.45$  took longer time to heal. In 80% of the patients of our series, full weight bearing without crutches was started from

17-20weeks, in 16% full weight bearing was started from 13-16 weeks. In 1 patient (4%) full weight bearing was delayed greater than 20 weeks. The average time to full weight bearing was 17.68 weeks. In this series 12% patients had follow up between 16-18 weeks, 76% patients between 18-20weeks and 12% between 20-24 weeks. Two patients had (8%) had superficial wound infections, which healed with local wound care and antibiotics.

**Figure 5**

Table 1: Complications

| S.NO. | COMPLICATIONS              | NO. OF CASES | PERCENTAGE |
|-------|----------------------------|--------------|------------|
| 1.    | Wound infection            | 02           | 08         |
| 2.    | Limb length discrepancy    | 03           | 12         |
| 3.    | Pain on walking            | 02           | 08         |
| 4.    | Restricted knee movements  | 01           | 04         |
| 5.    | Restricted hip movements   | 02           | 08         |
| 6.    | Loosening of implant       | None         | 00         |
| 7.    | Deformity                  | 04           | 16         |
| 8.    | Foot drop                  | None         | 00         |
| 9.    | Implant breakage           | None         | 00         |
| 10.   | Complications of decubency | None         | 00         |
| 11.   | Secondary procedure        | None         | 00         |

Two patients each of varus and valgus deformities were seen. In each group 1 case had deformity <10 and 1 case > 10. Two patients (8%) had limb shortening of 2 cm and 1 patient (4%) had limb shortening of 1 cm. In this series 2(8%) had pain on walking. 23 patients (92%) had full range of motion at hip and knee, 2 patients (8%) had restriction of movement at hip and 1 patient (4%) had restriction of movement at knee. In this study overall complications were higher in high velocity trauma, which comprised of 71% of total complications and less in low velocity trauma (29%).

Results were evaluated on the basis of criteria laid down by Schatzker and Lambert modified by Radford P.J. and Howell C.J, 1992. The results were excellent in 20 cases (80%), good in 3 cases (12%) and fair in 2 cases (8%).

**Figure 6**

Table 2: Results

| S.NO. | RESULT    | NO.OF CASES | PERCENTAGE |
|-------|-----------|-------------|------------|
| 1.    | EXCELLENT | 20          | 80         |
| 2.    | GOOD      | 03          | 12         |
| 3.    | FAIR      | 02          | 08         |
| 4.    | FAILURE   | 00          | 00         |

## DISCUSSION

Subtrochanteric fractures still continue to be a challenge to the Orthopaedics Surgeons, despite advances in surgical techniques and fixation devices. The primary goal of operative treatment of subtrochanteric fractures is to encourage sound union without deformity and at the same time allowing early mobilization. Operative treatment is continuously evolving, whereby problems that were inherent to conservative management are either overcome or minimized. The operative treatment using the principle advocated by AO/ASIF has resulted in up to 80% of good and excellent results, as has been observed in present study.

In the present study of 25 adult patients with subtrochanteric fractures of femur, open/ biological reduction and internal fixation was done by using 95 fixed angled dynamic condylar screw. In this study most of the fractures were of type – A (14) and relatively younger age (average 45.44 years) and 15 patients had intact medical buttress. In 16 patients reduction was done by open method and in rest 9 biological reductions was done. Primary bone grafting was done in 4 patients all of them were having posteromedial comminution. Thus, in patients with posteromedial comminution either biological reduction or primary bone grafting was done. Thus, lack of so called medial support is compatible with safe healing under conditions adequately maintained or restored by using biological reduction technique. Femoral score indicates the quality of bone and from our study it is evident that patients with good quality bone have good bone healing. In our series the number of complications was more in high velocity trauma (64%) and less in low velocity (36%) trauma. This is explained by fact that, in our series the patients with high energy trauma had sustained type B & C fractures. A variety of methods of treatments have been described for the subtrochanteric fractures. Non- operative treatment is difficult, because of characteristic flexion deformity of the proximal fragment.

Good results have been reported with internal fixation using both intramedullary and extramedullary fixation [3].

In Radford series, there were 64% excellent or good results and 27% fair results. There was 1 failure [6]. The fair result in 3 patients was because of pain and restriction of range of motion at knee. In series by Kulkarni et al, 77% of the patients were having excellent/ good results, failure was seen in 23% of cases. In this series most frequent cause of failure was unrestricted weight bearing in elderly patients followed by implant loosening [7]. In our series, we treated 25 adult patients with relatively younger age (average Age 45.44 years), 56% of the fractures were type-A, 28% type-B and 16% type-C. We got 92% excellent/good results, 8% fair results and no failure. The reason for down grading 2 patients (8%) to fair results, were restriction of knee flexion, varus/valgus deformity and pain. Our results are comparable with Kulkarni et al and Nungu et al [78]. The reasons for excellent/good results in our series are following of AO/ASIF principles of accurate reduction and stable internal fixation and doing biological reduction, relatively younger patients, less severity of fractures, & exclusion of patients with pathological, compound and multiple fractures.

### CONCLUSION

It is apt to conclude that operative fixation is treatment of choice for subtrochanteric fractures of femur in adults. In present study, we observed that Dynamic Condylar Screw for fixation of subtrochanteric fractures has proven to be safe and successful provided principle of accurate reduction,

stable internal fixation, with preservation of biology are followed. It is a definite advance, over previous methods of management of subtrochanteric fractures as experienced in the present study.

### CORRESPONDENCE TO

Name: Siddhartha Sharma, Address: House No 2, B Block, Housing Colony, Sector 2, Pocket 3, Channi Himmat, Jammu, India. Ph +919469210778 Email: sids82@gmail.com

### References

1. Luthje P, Kataja M, Santavirta S, Avikainen V, Nurmi I, Livio V, Lund T, Laike E, Partio E, Rintamo R: Hip fractures in two health care regions in Finland in 1989: an analysis of treatment. *Ann Chir Gynaecol* 1992, 81:372-377.
2. Kuderna H, Bohler N, Collon DJ: Treatment of intertrochanteric and subtrochanteric fractures of the hip by the Ender method. *J Bone Joint Surg Am* 1976, 58:604-611.
3. Harris LJ: Closed retrograde intramedullary nailing of peritrochanteric fractures of the femur with a new nail. *J Bone Joint Surg Am* 1980, 62:1185-1193.
4. Asher MA, Tippet JW, Rockwood CA, Zilber S: Compression fixation of subtrochanteric fractures. *Clin Orthop Relat Res* 1976:202-208.
5. Schatzker J, Mahomed N, Schiffman K, Kellam J: Dynamic condylar screw: a new device. A preliminary report. *J Orthop Trauma* 1989, 3:124-132.
6. Radford P.J & Howell C.J. The AO dynamic condylar screw for fractures of the femur. *The British journal of accident Surgery* 1992;23: 89-93.
7. Kulkarni SS, Moran CG: Results of dynamic condylar screw for subtrochanteric fractures. *Injury* 2003, 34:117-122.
8. Nungu K, Olerud C, Rehnberg L. Treatment of subtrochanteric fractures with the AO dynamic condylar screw. *Injury* 1993; 24: 90-92.

**Author Information**

**Vivek Sharma, M.S.(Ortho)**

Assistant Professor, Department of Orthopaedics, MMIMS

**Sushil Sharma, M.S. (Ortho)**

Registrar, Postgraduate Department of Orthopaedics, Government Medical College

**Siddhartha Sharma, MBBS**

Junior Resident, Postgraduate Department of Orthopaedics, Government Medical College

**Navdeep Singh**

Junior Resident, Postgraduate Department of Orthopaedics, Government Medical College

**Harish Dang, M.S. (Ortho)**

Associate Professor, Postgraduate Department of Orthopaedics, Government Medical College