Introduction

Sub-trochanteric fractures of femur occur below lesser trochanter to 5 cm distal in shaft. These fractures are difficult to treat due to compressive, tensile, torsional forces, and decreased blood supply in the region. Medial cortex has greater stress and muscles forces exert shears at fracture site. These fractures can pose various problems, including non-union, implant failure, and iatrogenic devascularization of the operative site.

These injuries can occur from high energy trauma, either by road traffic accident (RTA) and fall from height. In elderly, these fractures occur from fall. Open reduction and internal fixation (ORIF) of these fractures is necessary for early recovery of a patient.

There is no single implant recommended for the fixation of sub-trochanteric fractures. These include intramedullary implants like intramedullary nail, proximal femoral nail, Russel Taylor nail, gamma nail, and extra-medullary implants like plate and screw.
Intra-medullary implants required less exposure have better outcome but in sub-trochanteric fracture with extension into piriformis fossa has technical difficulties included nail entry and problem with proximal locking. Sliding or dynamic hip screw has technical difficulty, including anchoring in proximal fragment with supplement of screw and on weight bearing the outward drift may result into construct failure and non-union.

Dynamic condylar screw exerts vertical forces and provides good stability due to strong yxation in the cancellous bone of neck and head with good rotational stability. Keeping in mind all these aspects we planned to yx sub-trochanteric fractures with dynamic condylar screw (DCS) to ynd out rate of fracture union, implant failure and hip range of motion of the hip joint.

**Methodology**

This case series was done in the Department of Orthopedics Surgery and Traumatology Unit-I (DOST-I), Mayo Hospital, Lahore from January 2013 to December 2015. A total of 26 patients with closed sub-trochanteric fracture between 20 to 60 years of age with history of acute trauma within last two weeks later confirmed on radiograph. Patients with segmental fracture, pathological fracture and polytrauma were excluded from the study. We assessed all patients till last follow up for radiological union, implant failure and range of motion of the hip joint.

After permission from ethical board of the hospital, we obtained verbal and written consent from all the patients. Patients were admitted in the hospital and temporarily immobilized with proximal tibial skeletal traction by Steinmann-pin under local anesthesia and was suspended on a Bohler's splint in 45o of abduction at hip, with weight equal to 10 lbs. Fractures were classified according to AO Mueller classification to assess the stability. All the patients were given third generation cephalosporin in 30 mins prior to the surgery and 48 to 72 hours post-operatively. Quadriceps exercises were started on second post-operative day. Patients were discharged on 3rd and 4th post-operative day and continued oral antibiotics till removal of stitches. Stitches were removed 15 post-operative-day in outpatient department (OPD). We followed all patients at two weeks interval for 1st month and after one month till nine months post-operatively at four weeks interval. Upon every follow up, patient was taught static quadricep, knee bending and high sitting exercises and assessed clinically (operative site & range of motion, and painless weight bearing) and radiologically progression of callus on X-rays for the union. Partial weight bearing was started in stable fracture with good yxation 16 to 21 days post-operatively and delayed weight bearing in 6 to 8 weeks in unstable fractures. Patients radiological union was assessed every month with progression of callus. Range of hip motion was measured on each follow up using Modiýed Harris Hip Score as excellent, good, fair and poor score. Union was considered when patient was able to bear weight painless with adequate hold of callus seen on x-ray.

Data was analyzed using SPSS version 20.0. Quantitative variables of age, and union time were calculated as mean±SD. Qualitative variables gender, side of limb involved, and mode of injury were calculated as frequencies and percentages. Associations between variable were tested for statistical signiﬁcance using Chi-square test and diﬁerences were regarded to be signiﬁcant at the 5% level.

In supine position under spinal / epidural anesthesia, patient put on traction table and reduction of the fracture was done. Skin was prepared over hip by soap scrub and pyodine solution. Through lateral approach incision was made and extended it distally. Hemostasis was secured, and fracture site was opened. Guide wire was inserted over anterior aspect of femoral neck to determine the antversion. Another guide wire inserted with controlled drill machine through greater trochanter with the help of guide angle 95A in lower half of femur neck. Guided pin remained 1cm below the articular surface subsequently reaming done over the guide wire. Appropriate size lag screw inserted after tapping. Side plate yxed according to required length of fracture and yxed with 4.5mm cortical screws. We did bone grafting in cases with severe posteromedial comminution, where, it was not possible to hold the posteromedial area in spite of anatomical alignment. Our focus was to obtain length, mechanical and rotational alignment. Wound closed with suction drain and aseptic dressing was done.

**Results**
Out of 26 patients, there were 18 (69.22%) males and 08 (30.8%) females. Median age with inter-quartile range, side of limb involved, mode of injury, side of the affected limb, outcomes of fractures, AO classification, femoral neck shaft angle, mean union time (Mean±SD) is given in table 01. The non-union was observed due to implant failure. The implant failure was observed between 3rd to 5th month. The mean degree hip flexion at nine months was 115.7°±7.9. Majority 21 (80.76%) has stable, and only 04 (19.23%) patients had unstable sub-trochanteric fractures. Out of 25 patients with union, the modified Harris hips score was excellent in 16 (64%) patients, good in 06 (24%) patients and fair in 02 (8%) patients and one patient poor range of motion (Table 02). We used bone graft in three cases. Chi square test was applied to determine if there was statistically significant difference between mode of injury and union of the fracture in months. The result was non-significant for union of the fracture with mode of injury (p-value =0.619) (Table 03).

**Discussion**

Sub-trochanteric fractures of the femur demand special attention of Orthopedic trauma due to the high complications associated with their management biomechanically. There is high stress concentration in this region and fractures with comminution are difficult to reduce and fix anatomically. Loss of anatomical reduction and inadequate implant choice is associated with high complications rate. Dynamic condylar screw (DCS) is implant of choice for fixation of sub-trochanteric fracture. There are minimum chances of stress failure, less operative time, easy to insert and higher union rate.

In our study the primary union was observed in (96.15%) cases which was similar to the results of Halwai et al who had 96.6% primary union. Rohilla et al. and Sherma et al. who presented 40 and 25 cases respectively. They found union 100% in patients with sub-trochanteric fractures treated with DCS. As compared to the study of Sahin et al. in which union rate fracture was 70.2% which was low when compared to the result of our study. They had acceptable functional result as 16.5% and poor outcomes in 13.5% patients treated with DCS. Their difference may be result of patient factor, surgeon technique and sample size. These fractures required anatomical reduction and adequate fixation. The mean time of union was 17 weeks in our study which is comparable with other studies.

In our study there were 18 (69.22%) were males and
08 (30.8%) were females, while Vashisht et al. had 73.3% males and 25.7% females which are similar to our reported data. The mean age of the patients in our study was 37.45±4.29-year with minimum age 30 and maximum age 48-year and El-Desouky et al. had mean age of the patient 44.3-year in his study population. The lower mean age in our study was the reason of inclusion of age group of patients between 20 to 60-year while El-Desouky et al. had patients included between 18 to 74-year in his study.

Hip range of motion (ROM) was measures in every follow up using Modiﬁed Harris Hip Score. In our study, Modiﬁed Harris Hip Score was excellent in 16 (64%) patients, good in 06 (24%) patients and fair in 02 (8%) patients and one patient poor range of motion. Vashisht et al. in which he reported excellent score in 50%, good in 30%, fair in 15% and poor in 5% patients.

When we compared the implant failure, it was minimal in our study which was only one (3.84%) case of implant failure, while Kulkarni et al. reported 04 (10%) cases of implant failure in his study. The data has reported the implant failure due to the mechanical shearing load effect. The implant failure in our study was associated with early weight bearing. According to AO classiﬁcation, 09 (34.61%) were Type A, 14 (53.84%) were type B and 03 (11.54%) were type C fractures while Mahmood et al. type A fracture was noted in 17 (18.1%) patients followed by type B 46 (48.9%) and type C in 31 (33%) patients.

There were 16 (61.53%) fractures were on right and 10 (38.47%) were on left sided. Majority 21 (80.77%) of the patients had fractures due to RTA and 05 (19.23%) sustained injury due to fall from height. These fractures result due to high energy trauma. The mean time of union was 17.807±4.647-week. The advantage of this study was good union rate 96.15% and excellent to good functional outcome in 84% patients. There are certain limitations in our study. The sample size of the study was small. Compared with closey xation in which hematoma is preserved, it was done through open reduction. The better evidence can be obtained with addition of control group in this population to consolidate the treatment of one type over the other for such fractures in our population.

Conclusion

Dynamic condylar screw has good clinical and radiological outcomes in management of subtrochanteric fractures femur. We also ynd it biomechanically stable with minimum rate of implant failure and early union is effective for good range of motion at afected hip joint. We recommend further studies to conﬁrm our observations.

Ethical Approval: Given

Conflict of Interest: None

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References


