

# Functional Outcome of Dynamic Hip Screw Fixation in Intertrochanteric Fracture

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## ABSTRACT

**Objective:** The objective of the study was to assess the functional outcome of intertrochanteric fracture fixed with dynamic hip screw by looking at the time of union, rate of infection, range of hip motion & limb shortening.

**Methods:** A prospective study of 30 cases of intertrochanteric femur fractures was carried at Jinnah Post Graduate Medical Centre. All these cases were fixed with dynamic hip screw.

**Results:** The mean age of  $68.17 \pm 12.49$  yrs. Injury was more common in males 17(57%) than females 13(43%). The mechanism of injury was found to be fall in 17(56.7%) patients and Road traffic accident was responsible for 13(43.3%). All patients could reach the hospital after 6 hours and no patient got definitive treatment within six hours of injury. 5 (16.7%) of our patients were presented with associated injuries. Right limb was involved in (60%) cases and left limb in (40%) cases. Superficial infection was found in 2(6.66%) patients at 2<sup>nd</sup> week. At the end of 6<sup>th</sup> wk wound of all of the patients became clean. None of our patient got deep infection.

Only one (3%) patient had more than 2cm limb shortening while 29(97%) had less than and equal to 2 cm limb shortening. Full wt bearing was allowed to 96.7% patients at the end of 24<sup>th</sup> wk. At the end of our study most of our patient's (96.7%) got Hip range of motion Flexion / Extension from  $121^\circ \pm 8.8^\circ$  and  $9.33 \pm 2.5$ , Abduction/ Adduction from  $26.8^\circ \pm 5.6^\circ$  and  $31.8^\circ \pm 6.5^\circ$  and Internal and external rotation from  $30.5 \pm 7.1$  and  $30.2 \pm 6.9$ . The overall results were good.

**Key words:** Intertrochanteric femur fracture, dynamic hip screw.

## INTRODUCTION

Intertrochanteric fractures are relatively common injuries in adults and elderly individuals. In young individuals intertrochanteric fractures are result of high energy trauma while minimal trauma is required for elderly.<sup>1</sup>

The incidence of proximal femoral fractures is on rise and expected to increase from 1.7 million in 1990 to 6.3 million in 2050.<sup>2</sup> The effect of these fractures is frequently devastating; the social impact is high and the relative costs of treatment are increasing. For these reasons methods of osteosynthesis that will permit early mobilization and a rapid return to pre-injury levels of independence are sought by surgeons.<sup>3</sup>

The standard of care of these fractures is surgical fixation, close reduction and internal fixation which increases patient comfort, facilitate nursing care and decrease hospital stay.<sup>4,5</sup>

Sliding hip screw with slide plate is commonly used implant for fixation for these fractures. The 135degree plate is most commonly utilized. This angle is easier to insert in the desired central position of the femoral head and neck than higher angle devices and create less stress riser in subtrochanteric region.<sup>6,7</sup>

Sliding hip screw works on basis of tension band in stable fracture (Evans 1 & 2) patterns transmitting forces through medial cortex, and allows for fracture collapse this minimizing the chances of medial penetration.<sup>7</sup>

Sliding hip screw is the implant of choice for most intertrochanteric hip fractures,<sup>8</sup> because DHS is simple to place, guides the proximal fragment in to stable position, shearing forces being transferred to the axis of the sliding hip screw and produces the compression. Additional compression is achieved with compression screw. Dynamic compression achieved when patient start weight bearing. DHS allows early rehabilitation of patient, and less chances of infection, nonunion and rotational deformities.<sup>9</sup> Despite these theoretical and biomechanical advantages, sliding hip screw constructs have limitations. Excessive collapse results in failure. Sliding of more than

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15mm leads to a higher prevalence of fixation failure. Medialization of the femoral shaft by greater than one third of the diameter of the femur is associated with a seven fold increase in fixation failure. Cutout of implant may occur in severe osteoporotic bone and wrong implant placement. Failure rate of D.H.S. is about 5%.<sup>9</sup> Insufficient or excessive sliding length available between the screw and barrel. Jamming of screw in the low angle barrel plate. (120 or 125 angle). Majority of failure due to poor positioning of screw. TAD > 25 and screw not in the center of head. Lateral wall fracture. Fracture of lateral wall during surgery. D.H.S gives poor results in reverse oblique fracture.<sup>9</sup>

## MATERIAL AND METHODS

**Study Design:** This was a descriptive case series study of patients with proximal fracture femur treated by dynamic hip screw

**Sample Size:** Thirty patients were included in this study.

**Sampling Technique:** Non probability convenience

### Inclusion Criteria

1. Proximal femur fractures, diagnosed on history clinical examination & radiological examination by taking X-rays AP & Lateral View.
2. Skeletally mature patients (the patients whose epiphysis has been united)
3. Intertrochanteric fractures of less than one week

### Exclusion Criteria

1. Patients who showed pre op. signs and symptoms of infection at the site to be operated or elsewhere in the body.
2. Patients with non united & Malunited femur fractures.
3. Patients with pathologic fractures i.e. secondary to bone tumors, metabolic bone diseases, tuberculosis etc.
4. Patients with other problems such as stroke, Parkinson disease, CRF, immunosuppression etc which affect fracture healing or rehabilitation.
5. Patients operated on opposite side and poly trauma patient

### DATA COLLECTION PROCEDURE

Patients were admitted from accident & emergency and OPD department once they had met the

inclusion criteria. Detailed history with known comorbidities, detailed examination and investigations including x-rays were done at the time of admission.

Base line investigations and Chest X-rays, ECG, X-ray pelvis AP view & X-ray of Involved hip joint AP & lateral view for all patients were done. Informed, written consent was taken pre operatively. Informed, written consent was taken pre operatively.

Prophylactic I/V antibiotic was given, which was switched to oral after change of dressing after 48 hours of operation. Oral antibiotics were given for 5 days.

Patient under spinal or general anesthesia, lying supine on traction table, reduce the fracture and confirm before applying drapes. Through lateral approach bone exposed, guide pin inserted 2cm below the vastus lateralis ridge. We used both technique for insertion of the guide pin i.e with Aiming Device and Freehand insertion. Guide pin directed to tip of head, either in center or in postero medial part. Power combination reamer was set to the lag screw length indicated by the measuring gauge and reamed until the distal aspect of the positive stop reaches the lateral cortex. Lag Screw placed, the side plate was advanced onto the lag screw shaft and fully seated and secured with bone clamp and fixed with 4.5mm cortical screw.

Post operatively patients were mobilized on bed in evening of operative day, allowed to sit on side of bed at 1<sup>st</sup> post operative day. Patients were discharged on 3<sup>rd</sup> post operative day.

Mobilization with the help of crutches or walker, non weight bearing, along with range of motion exercises and abductor and quadriceps strengthening exercises were allowed at 1<sup>st</sup> week. Partial weight bearing was allowed after 6 week & full weight bearing after clinical & radiological evidence of union. OPD follow-ups were carried out at 2 weeks for removal of sutures and then at 6th, 12th, 18th and 24th weeks for assessment of union, infection, range of motion & limb shortening.

## RESULTS

A total of 30 patients with proximal femur fracture diagnosed on clinical and radiological examination by taking X-ray AP and lateral view, were included in this study.

According to the modified Evan's classification for intertrochanteric fracture, Type I-C was the most common fracture that was found in 13(43.3%) patients, type I-A fracture in 7(23.3%),

type I-B in 7(23.3%) and type I-D fracture in 3(10%) .

Radiological evidence of union was present in 29 (96.7%) cases in 12<sup>th</sup> weeks while one (3.3%) case was non union at 24 weeks.

All patients were followed up postoperatively for 24 weeks. Out of 30 patients, wounds of 28(93.33%) patients were clean and 2(6.66%) patients had superficial infection at 2<sup>nd</sup> week which became clean in 6<sup>th</sup> week and successive follow-up weeks. Deep infection was not found in any patients.

None of the patients were allowed full weight bearing in the first weeks of their operation, Partial weight bearing after 6 week and full weight bearing were allowed after clinical and radiological evidence of union. Twenty nine (96.7%) patients were allowed partial weight bearing in 6 week while 1(3.3%) patients were not allowed weight bearing in 6 weeks.

Twenty six (86.7%) patients were allowed full weight bearing in 12<sup>th</sup> weeks while 4(13.3%) patients were not allowed. 28(93.3%) patients were allowed full weight bearing in 18<sup>th</sup> weeks, and finally, 29(96.7%) patients allowed full weight bearing in 24<sup>th</sup> week while in 1(3.1%) patient weight bearing was painful so did not allowed in 24<sup>th</sup> weeks .

The mean flexion and extension were of  $121^{\circ} \pm 8.8^{\circ}$  and  $9.33 \pm 2.5$  at 24 weeks respectively. Flexion and extension were closed to the normal range of flexion and extension of motion (Friedman test;  $p < 0.01$ ).

The average abduction and adduction were  $26.8^{\circ} \pm 5.6^{\circ}$  and  $31.8^{\circ} \pm 6.5^{\circ}$  at 24<sup>th</sup> weeks which were closed to normal range of abduction and adduction at hip joint (Friedman test;  $p = 0.0001$ ).

The average range of motion in term of internal and external rotation were at 24<sup>th</sup> weeks which were closed to normal range of internal and external rotation at hip joint (Friedman test;  $p = 0.0001$ ).

Out of 30 patients, only one (3%) patients had more than 2cm limb shortening while 29(97%) had less than and equal to 2 cm limb shortening .

## DISCUSSION

The treatment of proximal femoral fractures using fixed angled implants was succeeded by sliding screw devices which produced an improvement in union rates and fewer fixation and implant failures.

As the natural history suggest these fractures are known to occur in elderly patients.<sup>10</sup> The

youngest patient in our study was 45 years old and the oldest was 90 years old an average age of patients was found around 70yrs.<sup>11,12,13</sup>

Study conducted in QUETTA by SALEH TAREEN showed (According to the modified Evan's classification) Type I- reducible unstable(1c) was found in 5(12.5%) patients, 15(37.5%) were type I- undisplaced fracture(1a), 18(40%) were type I- reducible stable(1b).<sup>12</sup>

In our study Type I-C was the most common fracture that was found in 13(43.3%) patients, type I-A fracture in 7(23.3%), type I-B in 7(23.3%) and type I-D fracture in 3(10%) .

In our study radiological evidence of union was present in 29 (96.7%) cases in 12<sup>th</sup> weeks while one (3.3%) case was non union at 24 weeks. Study conducted in India out of 110 cases, 72 patients had sound bony union 32 patients had satisfactory results with few degree of terminal restriction of hip joint movements.<sup>16</sup> Study by Ahmad Fawad reported the rate of non-union (0%) .Study conducted in Islamabad by IMRAN reported union in 97% cases.<sup>11</sup>

Korean study reported that unstable intertrochanteric fractures with osteoporosis had a failure rate of more than 50%.<sup>17</sup> Mariani and Rand reported that 10 of 20 patients with non- union of intertrochanteric fractures have unstable fractures with loss of medial support. <sup>18</sup> Study conducted in Switzerland reported that all fractures had healed six months after the operation.<sup>19</sup> Internationally Nonunion following surgical treatment of intertrochanteric fracture occurs in less than 2% of patients.<sup>20</sup>

In our study Out of 30 patients, wounds of 28(93.33%) patients were clean and 2(6.66%) patients had superficial infection at 2<sup>nd</sup> week which became clean in 6<sup>th</sup> week and successive follow-up weeks. Deep infection was not found in any patients.

Study conducted in Islamabad showed superficial wound infection in 1.7% cases. Study by SALEH TAREEN showed superficial wound infection in 2.5% cases.

Studies conducted in JPMCKarachi reported infection rate in clean orthopedics surgery was 5%and 3.97%. Study conducted in Bahawalpur reported infection rate7.8%.Study conducted in India showed wound infection (1.8%) cases. <sup>14,15</sup>

Our infection rate was much higher than the developed countries. This high rate of infection should be reduced by eliminating factors

responsible for infection for which further research needed.

Study conducted in QUETTA reported that range of hip joint motion was within normal limit in 97.5% cases, 80% of them have ambulatory status without support and 17.5% have ambulatory status with support after six month.<sup>12</sup> Study conducted in India reported that out of 110 cases 72 patients(65.4%) had good function recovery ,32 (29%) patient had satisfactory results and 6 cases has shown poor results.<sup>21</sup>

In an evaluation of the contribution of intensive rehabilitation efforts, Jette and co- workers observed that only 33% of patients recovered preinjury function.<sup>22</sup> This contrasts with a 69% good or excellent hip function noted by Miller and an Optimistic report of Jarnlo and associates that most of their patients regained preinjury function within 4 months.<sup>23,24</sup> T. R. C. Davis. reported that Of the 6 months survivors, 55 per cent whose fractures were unstable and 76 per cent whose fractures were stable regained 90 per cent or more of their individual prefracture walking ability walk.<sup>25</sup>

In our study Out of 30 patients, only one (3%) patients had more than 2cm limb shortening while 29(97%) had less than and equal to 2 cm limb shortening. .

## CONCLUSION

In conclusion, the geriatric hip fracture epidemic is a major health care problem in which the orthopaedic surgeon plays a pivotal but not isolated role.

We concluded that sliding compression hip screw is the implant of choice for the treatment of intertrochanteric fractures with good functional outcome. Further research needed both by supervisors and trainees to popularize this important modality of proximal femur fracture stabilization in our setup.

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