ORIGINAL RESEARCH

The anatomical and functional outcome of intertrochanteric fractures treated with dynamic hip screw

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ABSTRACT
Many methods of treatment for the intertrochanteric fractures have been mentioned in the literature as well as series of changes and modifications were adopted in the implant design and method of treatment to improve the outcome of treatment. Study subjects were selected from those who attended orthopaedic outpatient department with history of fall/RTA and other modes of injury, with complaints of severe pain in the hip region and inability to walk after the injury. After confirming the diagnosis of intertrochanteric fracture by radiographs, the study subjects were explained about the fracture and the method of surgical treatment. Those patients who gave consent for surgery were thoroughly examined for surgical fitness and detailed history with clinical examination was done as per a prewritten proforma. In our study the outcome of the patients who were treated with dynamic compression screw, after an average follow up period of 6 months are, 73.8 % good results, 21.4% fair results & 4.7% of poor results. The fracture united in 97.6% with 73.8% of good functional outcome.
Key words: Functional outcome, intertrochanteric fracture, dynamic hip screw

INTRODUCTION

Hip fractures in the elderly are common worldwide and with the aging population, the burden these fractures impose on health care systems becomes heavier. Moreover, the number of hip fractures is rising more rapidly than can be accounted for by demographic changes alone.[1]

Though these fractures are common in the elderly, it is becoming more apparent that even in younger adults, intertrochanteric fractures are increasing. The cause for this can be attributed to the steep rise in fast moving vehicles on the roads leading to increased number of accidents. [2]

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Among the many methods of treating intertrochanteric fractures, open reduction and internal fixation with dynamic hip screw and plate has become the standard procedure for fixation of both stable and unstable intertrochanteric fractures. Many complications that were faced by different methods of treatment like malunion, nonunion, implants failure etc. can be avoided by treating intertrochanteric fractures by dynamic hip screw.[4]

METHODOLOGY

Study subjects were selected from those who attended orthopaedic outpatient department with history of fall/RTA and other modes of injury, with complaints of severe pain in the hip region and inability to walk after the injury. After confirming the diagnosis of intertrochanteric fracture by radiographs, the study subjects were explained about the fracture and the method of surgical treatment. Those patients who gave consent for surgery were thoroughly examined for surgical fitness and detailed history with clinical examination was done as per a prewritten proforma.

The associated risks that were evaluated after thorough examination and investigation of study subjects were as follows. Chronic obstructive pulmonary disease in 6 patients, lower respiratory tract infection in 3 patients, diabetes mellitus in 7 patients and hypertension in 4 patients. Physicians

concerned treated all of them. Patients with hypertension and diabetes mellitus were mild to moderate cases and required oral medications for few days. Patients with lower respiratory tract infection were treated with antibiotics and those with chronic obstructive pulmonary disease were given appropriate treatment and nebulization.

PRE-OPERATIVE PREPARATION

The patients were assessed for surgical fitness by doing the routine investigations like Hb%, Total cell count, Differential cell count, ESR, Blood urea, Serum creatinine, Chest X-Ray, ECG, Random blood sugar, HBsAg and treated for other medical illnesses like diabetes and hypertension. Pre-anaesthetic check-up was also a part of pre-operative preparation. During this period a skin traction or skeletal traction was applied to the injured limb. The angle of barrel plate and the length of the dynamic hip screw were determined preoperatively with the help of X-ray of the normal hip. A written consent was taken before shifting the patient to the operation theatre.

Preoperatively the patient was taught active quadriceps exercise. The patient was prepared the previous night of the OT day by shaving the operative site, scrubbing with Savlon, and covering the site with sterile drapes. Tetanus vaccine was also administered. Before giving anaesthesia, patients were given antibiotics.

The anaesthetist based on ASA criteria decided the choice of spinal anaesthesia, epidural anaesthesia or general anaesthesia.

INSTRUMENTS AND IMPLANTS USED

1. Dynamic Hip Screw instrumentations including
- Triple reamer
- Dynamic Hip Screw tap
- Angle guide plate
- Dynamic Hip Screw introducer
- Three guide pins
- Two drill bits of 3.2 mm
- Electric drill
- C-ARM/Portable X-ray unit
- Bone holding forceps
- Bone levers
- L-blade retractors
- Cautery (Bipolar and Unipolar)

2. Implants
- Dynamic Hip Screws of lengths ranging from 75 to 100 mm.
- Set of barrel plates with 4-6 holes.
- 4.5 mm cortical screws.
- Cancellous screws of lengths ranging from 75 to 100 mm.

FOLLOW-UP

All patients were radiographed at an interval of 6-8 weeks till the evidence of union. The average duration of follow-up was 6 months, ranging from 4 months to 13 months.

Clinical assessment included postoperative pain, walking ability, hip and knee function, radiological fracture union and implant-bone interaction. Patients were followed at an interval of 6 weeks, 3 months, 6 months and 12 months. On every follow-up visit, patients were examined in detail for the functional ability with respect to ambulatory status, ability to squat, sit cross-legged and walk for a small distance.

RESULTS

The study subjects were treated by open reduction and internal fixation with dynamic hip screw. They were followed up for an average period of 6 months. During the follow up visits, clinical assessment included postoperative pain, walking ability, hip and knee function, with radiological fracture union and implant-bone interaction was recorded.

Of the 49 patients, 7 did not come for follow up. The remaining 42 patients were treated with dynamic compression screw.

31 patients (73.8%) had good results, who showed radiological and clinical fracture union and good functional outcome.

9 patients (21.4%) had fair results. They had radiological and clinical fracture union but had limb shortening of < 2 cms. They had restriction of hip movements along with mild pain that did not require treatment. They could not walk for long distances without pain.

2 patients had poor results (4.16%). Of which, one of the patients had a non-union after 6 months with a cut out of the implant (2.3%) at 2 months postoperatively. The implant was removed, and patient was treated conservatively. He was confined to wheelchair and was not able to walk even with support.

The other patient had an implant failure (2.3%) with the breaking of the side plate. The patient was re-operated, and the implant was removed. DHS was reapplied along with bone grafting. He showed union of the fracture after 7 months of follow up.

In our study the outcome of the patients who were treated with dynamic compression screw, after an average follow up period of 6 months are, 73.8% good results, 21.4% fair results & 4.7% of poor results.

The fracture united in 97.6% with 73.8% of good functional outcome.

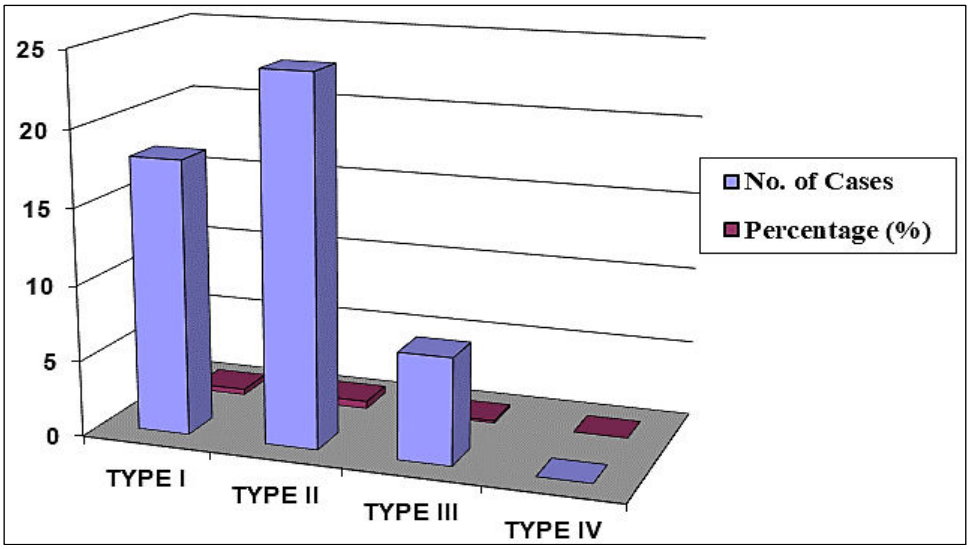

Figure 1: Type of Fracture: Fracture were classified according to *Boyd and Griffin* classification of intertrochanteric fracture

Table 1: Observations during follow-up

Mean duration of hospital stay	2.8 Weeks
Mean time of full weight bearing	5.6 Weeks
Post-operative mobility	
Independent	31 Patients
Aided	9 Patients
Bedbound/Chair	2 Patients
Mean range of movements (4 weeks post-op)	
At Hip	0-115 Degrees
At Knee	0-118 Degrees

Table 2: Functional Outcome-Results

Results	No. of Cases	Percentage (%)
Good	31	73.8%
Fair	9	21.4%
Poor	2	4.7%

DISCUSSION

Though intertrochanteric fractures of hip are known to man from the day man was known to exist, the treatment of the fracture is still under evaluation. Most of the surgeons prefer fixing these fractures with dynamic hip screw to allow early mobilization and prevent long-term morbidity and complications.

Today most authors prefer treating the intertrochanteric fractures with dynamic hip screw and barrel plate. The advantage of these implants is that they permit deeper insertion of lag screw without fear of the screw penetrating the joint. They also allow controlled collapse of the fracture site without penetration of femoral head. This controlled collapse improves the weight bearing capacity of the implant through a reduction of length of the movement arm. The telescoping of the lag screws maximizes bony contact and hence fractures stability, thereby decreasing implant failure.[5]

Clawson pointed out that to ensure impaction, the barrel of the hip screw device must not cross the fracture site. This was not seen in the cases that we have operated on. In majority of our cases a short barrel was used.

In one case where there was an implant failure with the side plate breaking at the neck of the barrel, there was no obvious sliding of the screw. This might be due to improper placement of the lag screw and/or lesser-angled barrel plate. The jamming of lag screw in the sleeve of the side plate might have lead the sliding device to act as a fixed angled nail plate device.[6]

The case where cutout was seen, was probably due to wrong placement of the lag screw.

Incidence of post-operative wound infection after operative treatment of intertrochanteric fractures varied from 1.7% to 16.9%. In our study the incidence of infection was 7.14%. All the cases had superficial skin infection.

Pressure sores over sacrum and buttocks which were reported by Agarwal and colleagues in their study to be up to 20%, other complications like osteonecrosis of femoral head, lag screw-side plate separation, intrapelvic penetration were not seen in our study.[7]

Nonunion after surgical treatment of intertrochanteric fracture is rare, occurring in less than 2% of patients. In our study, one nonunion (2.3%) was seen, which was due to implant failure.

The incidence of fixation failure, which is Varus collapse of the proximal fragment with cutout of the lag screw from the medial head, is reported as high as 20% in unstable fractures. In our study 7 cases of unstable fractures (Type III fractures) were treated with DHS. One case had a cutout of the implant (2.3%).[8]

The fracture union was seen in 41 patients (97.6%). The functional ability of the patients was assessed based on the patients' subjective evaluation for presence of pain, range of motion, ability to perform activities of daily living and hip stability. In our study 31 patients (73.8%) had good results, 9 patients (21.4%) had fair results with 70% range of motion at hip and no evidence of deformity. 2 patients (4.7%) had poor results who were wheelchair bound.[9]

Though the barrel happens to be used in abundance for stable intertrochanteric fractures, the treatment of choice is controversial in unstable intertrochanteric fractures. In our study we have used Dynamic Hip Screw and plate for unstable fractures.[10]

The drawback of this study is that the study consists of limited number of study subjects, with no control group to compare. The time duration of the follow-up is comparatively short.

CONCLUSION

The dynamic compression screw is the most useful tool in the orthopaedic surgeons' choices of treating the intertrochanteric fracture of femur. Acting as a load-sharing device, the hip screw allows fracture compression through a fixed angled construction in intertrochanteric fractures, perpendicular to the axis of the neck. Anatomic reduction of the fracture and with the central and very deep lag screw placement leads to an optimal fracture fragment- implant construct. The literature abounds with new modifications and advancements in the dynamic hip screw design in an attempt to discover the ideal fixation for these commonly encountered fractures.

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