

Risk Factors Impacting the Results of Treating Intertrochanteric Fractures in Older Patients with Dynamic Hip ScrewsManthan Soni¹, Haresh Chaudhary²¹Assistant Professor, Department of Orthopaedics, Banas Medical College and Research Institute, Palanpur, Gujarat, India²Assistant Professor, Department of Orthopaedics, GMERS MEDICAL College, Vadnagar, Gujarat, India

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Abstract:**Background and Aim:** Dynamic hip screw fixation is the most popular treatment option among the many fixation techniques for intertrochanteric fractures. In a tertiary care hospital in India, the current study was done to assess the risk factors that will have an impact on how intertrochanteric fractures treated with dynamic hip screw fixation turn out.**Material and Methods:** This was an observational research carried out over the course of a year by the orthopaedics department at the medical college and hospital in India. Fractures were classed in accordance with Evans' radiological classification of intertrochanteric fractures. Fractures were additionally classified using the AO/OTA system. On the basis of one of the following radiographic parameters, operation was deemed "failed". At six months, the Harris hip score was used to evaluate the functional outcomes.**Results:** 100 patients in total, mostly men, were included in the trial. Based on the established radiological criteria, 22 of the 100 recruited patients (or 22%) were judged to have "failed" surgical results. When comparing the patient factors, it was discovered that the "failed fracture" subgroup's mean age was substantially higher than the "united fracture" subgroup's (p 0.05). According to AO/OTA categorization, a significantly higher proportion of cases in the "failed fracture" category were found to fall into Evans' classes IV and V as well as the A3 class. (p<0.05).**Conclusion:** The result of intertrochanteric fractures treated with dynamic hip screws was influenced by patient characteristics such as older age and obesity, intertrochanteric unstable fractures as indicated by Evans' classes IV and V, and A3 class based on AO/OTA classification. Still a good implant for most intertrochanteric fractures is the sliding hip screw.**Keywords:** Evans classification, Hip screw, Intertrochanteric fracture, Observational study.This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

Hip fractures are common injuries that have both morbid and deadly effects on the elderly population. Epidemiological studies predict that as urbanisation and lifespan increase, so will the frequency of hip fractures.[1]

Intertrochanteric hip fractures are those that affect both the greater and lesser trochanters.[2] In the elderly population, intertrochanteric hip fracture is a significant public health issue. Given the patient's age and any co-morbid conditions, definitive management is preferred. These fractures are common in elderly people with osteoporosis, which raises mortality and morbidity rates.[3] Despite the fact that high energy trauma causes intertrochanteric fractures in the younger population, about 90% of

these fractures happen in adults over the age of 65.[4]

Prior to the invention of fixation devices, the mainstay of therapy for intertrochanteric fractures consisted of prolonged bed rest in traction until the fracture healed, followed by a drawn-out ambulation training regimen. This method was linked to significant rates of problems in senior individuals, such as Decubitus ulcers, joint contractures, pneumonia and thromboembolic complications, urinary tract infection, and a high mortality rate. Additionally, due to traction's failure to adequately counteract the deforming muscle forces, fracture healing is typically accompanied by varus deformity and shortening.

The objective of surgical therapy is to achieve union in a favourable position with minimal morbidity while encouraging an early return of the individual to their pre-fracture activities. Pain management and enhanced nursing care, if the patient was bedridden before to the occurrence, are among the objectives of therapy.[5] For many patients who are not candidates for surgical intervention because to low socioeconomic status or other co-morbidities such severe anaemia, poor pulmonary condition, etc. in developing countries, a less invasive approach, such as external fixation, may be a suitable option.[6] The most popular treatment for proximal femur fractures among the various fixation techniques for intertrochanteric fractures with a variety of implants is dynamic hip screw fixation.[7] The fundamental idea behind the dynamic hip screw is to provide a controlled collapse at the fracture site. Although the origins of these issues are still up for debate and poorly understood, it is believed that the failure rate for unstable fractures is between 10 and 16 percent.[8-10] In a tertiary care hospital in India, the current study was done to assess the risk factors that will have an impact on how intertrochanteric fractures treated with dynamic hip screw fixation turn out.

Material and Methods

The orthopaedics department at the medical college and hospital in India conducted an observational prospective study between for a period of one year. The institutional ethical committee provided its ethical approval, and each subject provided signed informed permission. All patients with intertrochanteric fractures 60 years of age and older who visited our hospital's emergency room and outpatient clinic after suffering the fractures were included in the study.

Exclusion criteria

1. Pathological fractures
2. Infection
3. Treated after 3 weeks of trauma.
4. Patients medically unfit for surgery.
5. Compound fractures associated with vascular injuries, ipsilateral femoral shaft fractures and pelvic fractures.

Inclusion criteria

All Intertrochanteric fractures treated with sliding hip screw fixation.

All patients underwent in-depth clinical assessments, medical exams, and relevant investigations. Fractures were classed in accordance with Evans' radiological classification of intertrochanteric fractures.[11] Fractures were additionally classified using the AO/OTA system.[12]

After the patient's overall health was optimised, the elective surgery was performed that day on a trac-

tion table with an image intensifier. Both general anaesthetic and spinal anaesthesia were used during surgery. All procedures were carried out by the same team using the same standard surgical technique. The fracture was reduced by traction and manipulation, and it was verified using an image intensifier. The femur neck's posteroinferior part was secured utilising a 4-hole 135-degree sliding plate DHS and a sufficient lag screw, all while maintaining the tip apex distance (TAD). The TAD was calculated as the difference between the lateral view's distance from the apex of the femoral head's centre to the tip of the screw and the AP view's distance from the same point on both hip joints immediately following surgery. A TAD of less than 25 mm was deemed favourable.[13]

Supervised physical therapy started on the first post-surgery day. Following surgery, patients were instructed to refrain from bearing any weight until the beginning of the third post-operative week. All patients received recommendations for follow-up appointments during the second week and then every fourth week for a total of six months. Each visit included a clinical and radiological evaluation of the patient. The HHS was utilised to assess the functional result at the six-month point. The results were rated as excellent (HHS scores between 90 and 100), good (HHS scores between 80 and 90), acceptable (HHS scores between 70 and 80), and poor (HHS scores below 70).[14]

We investigated various factors including age, sex, body mass index (BMI), fracture side, and fracture type that may cause impact the outcome of surgery. "Failed" surgery was considered based on one of the following radiographic criteria: greater than 20-mm pull out of the lag screw, mal union including varus deformity, perforation of the femoral head, or broken plate.[15]

Statistical analysis

The collected data was organised, inputted, and exported to the data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA) after being combined and entered into a spreadsheet programme (Microsoft Excel 2007). The level of significance and confidence level for each test were set at 5% and 95%, respectively.

Results

Table 1 below lists the demographic and baseline features of intertrochanteric fractures. There were 100 patients included in the trial, 71 of whom were men (71%). The majority of instances were presented to the emergency room, and the majority of the enrolled patients (n=48, 48%) had normal BMI. Road traffic accidents were the most frequent cause of injury, accounting for 67%. According to Evans' classification, type I and II fractures made up the bulk of the cases (n=32, 32%). At the enrolled pa-

tients' follow-up, the HHS was noted. According to HHS assessment at 6 months, 60 of the enrolled cases (60%) had excellent outcomes, 15 patients (15%) had good outcomes, 5 patients (5%), fair outcomes, and 20 patients (20%) had poor outcomes. Based on the established radiological criteria, 22 of the 100 recruited patients (or 22%) were judged to have "failed" surgical results. Mal union was the second most frequent presentation of these, followed by >20 mm lag screw pull-out. Femoral head puncture and a shattered plate were both present in one case.

When comparing the patient factors, it was discovered that the "failed fracture" subgroup's mean age was substantially higher than the "united fracture" subgroup's (p 0.05). Obesity was seen in a significantly higher proportion of individuals in the "failed fracture" subgroup (p 0.05). In the "failed fracture" subgroup, a significantly higher percentage of cases were found to fall into Evans' classes IV and V as well as the A3 class according to the AO/OTA classification (p 0.05). It was observed that other factors were comparable amongst the subgroups.

Table 1: Demographic Distribution of study participants

Variables	N (%)
Age (years) (Mean \pm SD)	68.20 \pm 8.22
Gender	
Male	71 (71)
Female	29 (29)
BMI based classification (kg/m ²)	
Normal (18-24.99)	48 (48)
Pre-obese (25-29.99)	31 (31)
Obese (> 30)	21 (21)
Laterality of intertrochanteric fractures	
Right side	64 (64)
Left side	36 (36)
Mode of injury	
Fall while standing	33 (33)
Road traffic accidents	67 (67)
Frykman classification	
I and II	32 (32)
III and IV	43 (43)
V and VI	12 (12)
VII and VIII	13 (13)

Discussion

Intertrochanteric fractures are typically treated surgically. Despite extensive management of unstable intertrochanteric fractures, there are still several variables that lead to poor outcomes in many locations. For the treatment of intertrochanteric fractures in the elderly, a dynamic hip screw or sliding hip screw with plate is a frequently utilised implant. Kuzyk et al. examined extra-medullary and intramedullary implants in an in-vitro biomechanical investigation and discovered that intramedullary devices were more effective at stabilising unstable inter-trochanteric fractures. The intramedullary nail is a favoured implant for addressing unstable inter-trochanteric fractures because it is more medially positioned in the medullary canal, has a shorter lever arm, and moves the stress away from the posteromedial calcar and towards the femoral axis.[16]

Intertrochanteric fracture patients over 60 years old were included in the current investigation. The age range in our study was between 61 and 79 years, with 68.20 being the mean age. The average age of these patients, according to published literature, is

between 71 and 76 years old.[16-18] In general, there were slightly more females than males. The female to male ratio in the related study by Jain et al. was 1.3:1, which is identical to our data. Dahl series revealed a female to male ratio of 8:1, whereas Gallagher et al. reported a female to male ratio of 1.7 to 1.[19,20]

According to Steinberg et al., the failure rate increased when the increased sliding was greater than 15 mm.21 We found that sliding over 20 mm shortens the affected leg and causes hip discomfort. Osteoporosis, osteoporotic fractures, lack of anatomic reduction, fixation device failure, and screw placement in the femoral head are among the most frequent causes of fixation failure.[22-24]

20% of patients overall were identified to have failed fractures, which was consistent with the previous study results. The failure rate reported by Jain et al. was 20.6%, which was quite comparable to the results of our investigation. 6.8% of intertrochanteric fracture patients in the study by Hsueh et al had screws that had been taken out, indicating a bad result.[25] Greater age, obesity, unstable fractures classified by Evans' classes IV and V, and A3

class based on AO/OTA classification were shown to be substantially linked with the "failed fracture" subgroup as opposed to the "united fracture" subgroup when patient factors were compared. ($p < 0.05$). According to a study by Ju et al., patients with unstable fractures (AO/OTA class A3), advanced age, and a BMI in the obese range had reduced HHS, which indicated poor functional outcomes. These findings are consistent with those of our study.[26] According to Evans' classification, the study by Jain et al. found that unstable fractures had a high rate of collapse. In contrast to patients who had a stable or unstable fracture treated with internal fixation, Chan and Gill found that patients with femoral intertrochanteric fractures who underwent hemiarthroplasty had significantly more weight bearing on the injured limb in the immediate post-operative period.[27] An accurate pre-operative evaluation of the fracture's instability using Evans' classification in older patients can forecast post-operative collapse or failure. As a result, the findings of this study could not accurately reflect the situation across the entire nation.

Conclusion

The result of intertrochanteric fractures treated with dynamic hip screws was influenced by patient characteristics such older age and obesity, intertrochanteric unstable fractures as indicated by Evans' classes IV and V, and A3 class based on AO/OTA classification. Still a good implant for most intertrochanteric fractures is the sliding hip screw.

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