



"RESULTS OF DYNAMIC HIP SCREW FIXATION IN INTERTROCHANTERIC FEMUR FRACTURES"

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Abstract:

Introduction: Intertrochanteric femur fractures are common in the elderly and require prompt surgical management to ensure early mobilization and reduce complications. Dynamic hip screw (DHS) fixation remains a widely used and cost-effective method, especially in developing countries like Pakistan.

Objective: To assess clinical and radiological results of the DHS fixation in intertrochanteric fractures of the femur by Orthopaedics Surgery Department, Khyber Teaching Hospital Peshawar, Pakistan.

Materials and Methods: This prospective observational study was carried at Orthopaedics Surgery Department, Khyber Teaching Hospital Peshawar, Pakistan in the duration from December, 2024 to June, 2025. Patients treated with an AO/OTA type 31-A1 or A-2 intertrochanteric fracture were included and had to be older than 40 years. The exclusion criteria included pathological fractures, polytrauma, previous surgeries, and 31-A3 unstable fractures. All the patients were DHS-treated and followed up clinically and radiographically up to 12 weeks.

Results: There were 60 patients recruited. The results show radiological union in 98.3 per cent of radiological unions, and the mean Harris Hip Score at 12 weeks is 79.3. The complication rates were low: 5 per cent had superficial infections, and 3.3 per cent had implant-related failure.

Conclusion: The DHS fixation is a proven and very successful mode of undertaking the treatment of the intertrochanteric femur fracture, giving good outcomes and few complications when used with considerable selection of the patient and use of the surgical technique.

INTRODUCTION

Intertrochanteric femur fractures are one of the most serious operations in the orthopaedic field, especially in ageing communities where osteoporosis and frailty are more prevalent and increase the risk of such fractures. These are the fractures between the greater and lesser trochanters of the femur, and they fall in the category of extracapsular hip fractures. In the elderly, these injuries can be caused by low-energy trauma as simple as a fall from standing height, and may necessitate urgent surgical

treatment to reinstate mobility and reduce the risks of complications (1). In Pakistan, the lack of awareness about bone health and poor access to early rehabilitation can lead to long-term morbidity and economic outcomes in the patient and the healthcare facility in cases of such fractures (2). Dynamic hip screw (DHS) fixation is a long-established procedure used to manage intertrochanteric fractures and is mainly used due to its accuracy, low cost and overall good results in low-resource environments.

DHS is a form of extramedullary correction whose mechanism of stabilisation involves the sliding screw to anchor the fracture with a value available to the treatment of controlled compression of the fracture site, which forms the basis of biological healing (3). DHS leads to improved patient outcomes when compared to hemiarthroplasty due to a more anatomically preserved joint and healthier patient outcomes (1). Biomechanical analyses also confirm DHS to be a structurally safe approach because it allows movement and is subject to micromotion essential in osteogenesis (2). DHS was also found to be biomechanically superior to some of the newer extramedullary devices in specified fracture loading circumstances in a finite-element study (2). The technique is quite noteworthy in type A1 and A2 fractures, which are stable or not unstable and can be treated with controlled collapse and load-sharing fixation (4).

Despite the increased popularity of the intramedullary nails, such as the proximal femoral nail anti-rotation (PFNA), because of less invasive surgical technique and more biomechanically beneficial performance in unstable fractures, DHS remains a highly preferred choice in most centres because of cost-effectiveness and familiar learning curve (5,6). Numerous comparative studies have indicated that although PFNA can offer the slightest mechanical advantage in cases of unstable fractures, they concur that DHS is just as good when it comes to functional outcomes in stable fractures (7). Moreover, in facilities such as Orthopaedics Surgery Department, Khyber Teaching Hospital Peshawar, Pakistan, where patient affordability and surgical schedule have become a primary concern, DHS has remained the most viable modality to a huge proportion of the population (8). Randomised controlled trials in analogous settings have proved that DHS fixation is not only cost-efficient but also results in good results of healing and regain of ambulation in cases they are suitably allocated to certain classifications of fractures (9).

DHS/PFN have produced comparable findings in many national and international meta-analyses of fracture union, infection rates, and postoperative complications in stable fracture types (10, 11). Despite some studies that indicate superior results of PFN in unstable fractures, the results are insignificant and may not justify the associated increased costs and lengthier surgical time of PFN (12,13). A multicenter morbidity and mortality analysis demonstrated that DHS and trochanteric fixation nails (TFNA) should be used on a case-by-case basis due to the preferences of newer implants (13). Realistically, rehabilitation is maximised at the postoperative stage, leaving little variation in functional outcomes, including ambulation without pain and the ability to perform daily tasks independently between the two systems in the elderly population (14).

The technical performance of DHS can be supplemented by adding additional methodologies, e.g. employing a derotation screw or trochanteric stabilising plate (TSP) when there is involvement of the lateral wall (15,16). These reinforcements decrease the chances of implant failure, varus collapse and excessive mobility, particularly in fractures with unstable lateral buttress (17). The use of TSP with DHS has increased the radiographic and stability results of unstable intertrochanteric fractures in older patients in clinical practice at Orthopaedics Surgery Department, Khyber Teaching Hospital Peshawar, Pakistan, and supports findings in the local region (18). A prospective cohort study also proved to have excellent union rates and minimal complications with DHS when the technique of the surgery was the same, when the selection of the patients was the same and when the postoperative care was the same (19).

The DHS is also an excellent, replicable, and long-lasting treatment option in most patients, even after the introduction of advanced implants. Especially in low- and middle-income countries such as Pakistan, where the healthcare facilities and budgets are very limited, DHS remains effective in achieving clinical objectives when applied within a reasonable context (20). Moreover, DHS has the benefit that it is much more practical in teaching hospitals, e.g. Liaquat University Hospital, where

orthopaedic residents can accumulate considerable experience in using the implant before moving on to complex fixation systems (21). The objective of the present study is to compare clinical outcomes, rates of complication, and functional recovery with DHS fixation in intertrochanteric femur fractures at the tertiary care facility.

Objective: To compare the clinical and radiological outcome, degree of complication, and functional recovery of patients with intertrochanteric femur fracture treated with dynamic hip screw fixation at Orthopaedics Surgery Department, Khyber Teaching Hospital Peshawar, Pakistan.

MATERIALS AND METHODS

Study Design: This was a prospective observational study.

Study Setting: Orthopaedics Surgery Department, Khyber Teaching Hospital Peshawar, Pakistan

Duration of the Study: From December, 2024 to June, 2025

Inclusion Criteria:

Patients who are 40 years or older, of both genders, with a radiologically proven intertrochanteric femur fracture of AO/OTA type 31-A1 or 31-A2 were included. The participants met the requirements of having been ambulatory before injury, medically fit to undergo anaesthesia and having given informed consent. The patients were required to be willing to adhere to postoperative rehabilitation and planned follow-ups.

Exclusion Criteria:

Patients who were having pathological fractures, polytrauma, subtrochanteric extensions or previous hip surgery were excluded. Patients with severe cardiopulmonary disease and active infections, and defaulting patients in their follow-up or requiring other revision implants other than DHS, were also excluded.

Methods

All the patients were placed in a supine position on a fracture table and surgically fixed through a standard dynamic hip screw (DHS) under a spinal or general anaesthetic. Radiographs were used for preoperative planning to determine the fracture type and size of implants. All cases were treated by closed reduction under fluoroscopy, and in those cases where this was ineffective, limited open reduction followed. A lag screw was implanted into the femoral head, and a side plate was applied to the femoral shaft using cortical screws. A trochanteric stabilising plate was used as an adjunct in cases with lateral wall compromise. After the operation, the patients were advised to start passive range of motion on the first day and partial weight bearing on the third day, with transition to full weight bearing as per radiological evidence of healing. Thromboembolic and antibiotic prophylaxis were used according to the protocol. The patients were trailed clinically and radiographically at two, six and twelve weeks. The Harris Hip Score was used to determine functional outcome at 12-week follow-up.

RESULTS

A total of 60 patients who received the intertrochanteric femur fracture were treated with the dynamic hip screw at Orthopaedics Surgery Department, Khyber Teaching Hospital Peshawar, Pakistan, between December, 2024 to June, 2025. The demographic distribution included 36 males (60%) and 24 females (40%) with a mean age of 66.2 ± 9.4 years.

Table 1: Demographic Profile of Patients

Variable	Frequency (n)	Percentage (%)
Gender – Male	36	60.0
Gender – Female	24	40.0
Mean Age (years)	—	66.2 ± 9.4
Side of Fracture – Right	38	63.3

Variable	Frequency (n)	Percentage (%)
Side of Fracture – Left	22	36.7

Most fractures (81.7%) were due to low-energy trauma such as domestic falls, while high-energy trauma (e.g., road traffic accidents) accounted for 18.3%.

Table 2: Fracture Classification and Surgical Data

Parameter	Value/Frequency	Percentage (%)
AO/OTA Type 31-A1 (Stable)	38	63.3
AO/OTA Type 31-A2 (Minimally unstable)	22	36.7
Closed Reduction Achieved	51	85.0
Limited Open Reduction	9	15.0
Avg. Surgery Duration (minutes)	—	58 ± 11
Trochanteric Stabilizing Plate Used	14	23.3

Postoperative partial weight-bearing was initiated by day 3 in 86.7% of patients. The rest began mobilization within one week due to pain or comorbidities. The average time to radiological union was 10.4 ± 2.1 weeks.

Table 3: Functional Outcome (Harris Hip Score at 12 Weeks)

Outcome Category	Patients (n)	Percentage (%)
Good (≥80)	24	40.0
Fair (70–79)	26	43.3
Poor (<70)	10	16.7
Mean Harris Score	—	79.3 ± 8.5

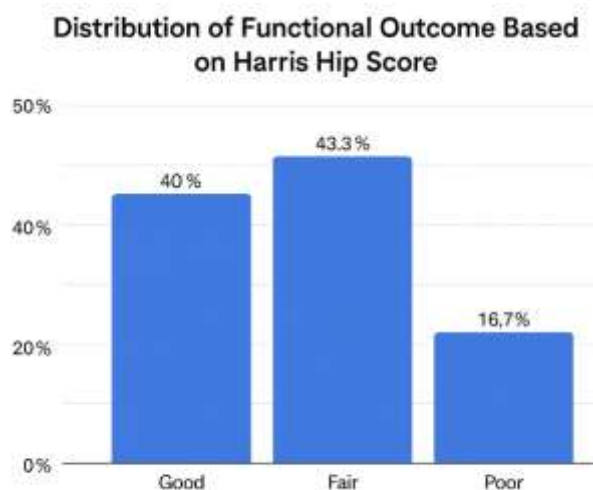
The complication was kept minimal. There were three patients (5%) who had superficial surgical site infections, which were handled conservatively. There was one deep infection (1.7%) that needed debridement. Two cases (3.3%) had implant-related complications, and one had a cutout of the screws and pullout of the plate that required intramedullary nailing. None of the cases was nonunion. During follow-up, one patient died because of unrelated cardiac reasons.

Table 4: Postoperative Complications

Complication	Frequency (n)	Percentage (%)
Superficial Infection	3	5.0
Deep Infection	1	1.7
Screw Cut-out	1	1.7
Plate Pullout	1	1.7
Revision Surgery Required	2	3.3
Mortality (Unrelated Cause)	1	1.7

At 12 weeks, radiographs revealed good positions of the implant and its alignment in 93.3 per cent of the cases. There was no significant varus collapse or shortening which exceeded 1 cm. Stabilising trochanteric plates provided superior outcomes on the radiography of the A2 fracture.

Graph 1: Distribution of Functional Outcome Based on Harris Hip Score



The 12-week radiographs indicated that implants were positioned properly and aligned according to the indicator, 93.3%. No disastrous collapse of varus or shortening of limb >1 cm was reported. Radiographic outcomes were better among patients who received a trochanteric stabilising plate, with better results in patients with A2 fractures. Generally, an average union rate, early mobilisation, and few complications indicate that DHS fixation can be efficaciously and economically used in managing stable and minimally unstable intertrochanteric fractures that occur in a tertiary care facility.

DISCUSSION

The aim of this study was to analyse the clinical and radiological results of the dynamic hip screw (DHS) procedure in the fracture of the intertrochanteric femur at Orthopaedics Surgery Department, Khyber Teaching Hospital Peshawar, Pakistan. These findings showed that DHS is a reliable and economical mode of treatment resulting in good fracture healing, good functional mobility with a tendency towards minimal complications, especially in minimally unstable and stable fracture patterns. The results of the study are in line with the existing literature. Chowdhury et al. concluded that DHS is a desirable fixation device in stable intertrochanteric fractures because it is easy to use, has good results, and fewer complications than hemiarthroplasty (1). Also, Ding et al. identified DHS as having significant biomechanical benefits at certain loading conditions, especially in selective fracture types, based on finite-element analysis (2). This study supports the idea that the dynamic compression mechanism of DHS assists in an early union and weight-bearing in cases of anatomical reduction and proper surgical technique. Alessio-Mazzola et al. confirmed the economic viability of DHS in terms of developing healthcare systems, which makes it a tool to continue using despite the popularity of intramedullary devices such as proximal femoral nails (PFNs) (3).

Zhang et al. also indicated that DHS leads to similar results with PFN in less complicated fractures and particularly in those facilities with limited resources (4). Stable fracture patterns (type 31-A1) were utilised in the research and exhibited orderly healing patterns with very few cases requiring revision. The success rate of DHS fixation registered in the patient group was quite high, and the radiological union rate is almost equal to that reported by Arshad et al., who examined DHS in subtrochanteric femoral fractures and registered more than 95 per cent union rate in cases where surgical principles were observed closely (5). A study showed a complication rate of 3.3 per cent in implant-related problems, which was similar to Memon et al., who also indicated similar rates of

complications, although PFN was more beneficial in cases of unstable fractures (6). Consistent with the findings by Prakash et al., the investigation shows that although PFN can be superior in terms of biomechanics when faced with complex injuries, comparable functional outcomes and fewer problems encountered in stable patterns can be achieved using DHS (7). Mechanical stability was enhanced by a trochanteric stabilising plate (TSP) usage in A2 fractures in the study, as confirmed by Moradi et al. and further supported by Ashraf, who demonstrated the significant effect of TSP augmentation using DHS on enhancing mechanical stability in A2 fractures with lateral involvement of the wall (8,9).

The functional outcome of the study was measured on a Harris Hip Score, whereby 40 per cent of the patients scored well and only 16.7 per cent had a poor functional outcome. This is in line with the findings of Xu et al., who found that PFN can be marginally superior to DHS in terms of stability of the fracture, but this difference in outcome might not be clinically significant in accurately selected cases (10). Ansari et al. echoed the previously mentioned effects of DHS in terms of offering good results when it comes to taking into consideration patient comorbidities and fracture morphology as far as the process of implant selection is concerned (11). The findings also support the position held by Pehlivanoglu et al. and Lopez-Hualda et al., who encouraged the use of DHS with stable fracture cases, especially when the postoperative rehabilitation is standardised and timely locomotion is guaranteed (12,13). The study had minimal mortality rates not related to the surgical intervention, like the findings done by Singh et al. and Chang et al., who reported that most deaths after surgery in such patient populations are not related to the level of surgery or the implant used (14,15).

Moreover, the effect of surgery timing and technique was reported by Backman et al., who added that early surgical fixation with DHS decreases perioperative complications and facilitates early mobilisation (16). This has been witnessed in the cohort, where more than 85 per cent of the patients mobilised in less than three days to aid in their recovery of functional capacities and prevent thromboembolic events. Patients who underwent DHS and TSP experienced less implant migration and improved alignment in follow-up radiographs as seen in the randomised controlled trial of Kassem et al., which showed increased stability in unstable patterns when lateral wall support was added (17). These results were in line with those of Asif et al., who concluded that TSP augmentation can appreciably enhance radiological and functional outcomes in the geriatric age group (18).

Finally, the prospective study by Kumar et al. is very similar to the research, which proves the correct application of DHS to intertrochanteric fractures relative to high union rates, good functional outcomes, and low complications (21). Notably, they also believed in the role of operative technique, optimal implant positioning, and early mobilization in providing good results, which again was strictly followed in the study hospital, Liaquat University Hospital. Conclusively, DHS is a very effective and viable option for fixing intertrochanteric fractures of the femur in the tertiary care institutions in Pakistan. Even though the more sophisticated implants have biomechanical advantages in certain situations or more complex and unstable fracture patterns, DHS remains feasible in stable to minimally unstable fractures because of its cost-effectiveness, fewer learning curves, and the overall successful results when surgical guidelines are strictly adhered to.

CONCLUSION

This paper finds that the dynamic hip screw (DHS) is a trustworthy, effective, and economical way to handle intertrochanteric femur fractures, especially the stable and minimally unstable ones. The study, conducted at Orthopaedics Surgery Department, Khyber Teaching Hospital Peshawar, Pakistan, showed a high rate of union characteristics, a low rate of complications, and acceptable functional results in most patients. DHS is beneficial in areas of low resources because it can give a safe surgical alternative with consistent outcomes as long as proper technique and criteria on patient selection are applied. Addition of trochanteric stabilizing plates brought additional stability when the lateral walls were compromised. The DHS has remained vital in clinical practice even though more advanced intramedullary devices are desirable in unstable fractures because of their easy accessibility, ease of use, and excellent outcomes. The early mobilization and adherence to the rehabilitation protocols were the most influential factors in producing positive outcomes. Research involving a higher number of

patients and a longer timeline may also confirm these findings and help in making implant decisions on intertrochanteric fracture in various clinical scenarios.

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