Section: Orthopaedics

Case Series

EVALUATION OF RADIOLOGICAL AND FUNCTIONAL OUTCOME OF FEMORAL NECK FRACTURE TREATED WITH DYNAMIC HIP SCREW AND PLATE IN PHYSIOLOGICALLY YOUNG PATIENTS: A CASE SERIES

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ABSTRACT

Background: Femoral neck fractures in physiologically young adults are uncommon but clinically significant due to their risk of complications such as avascular necrosis and nonunion. The dynamic hip screw (DHS) with plate is a commonly used fixation method that provides stability and allows controlled collapse for fracture healing. This case series evaluates radiological and functional outcomes in five young patients treated with DHS.

Materials and Methods: Five physiologically young patients (age range: 25–40 years) with displaced femoral neck fractures were managed with DHS and plate fixation at our institution between January 2025 and August 2025. All patients were followed for a minimum of 12 months. Functional outcome was assessed using the Harris Hip Score (HHS), and radiological outcome was evaluated through fracture union and implant position on standard X-rays.

Results: All five patients achieved radiological union, with an average healing time of 14 weeks (range: 12–16 weeks). The mean Harris Hip Score at final follow-up was 89.2 (range: 82–94), indicating good to excellent outcomes. None of the patients developed implant failure, deep infection, or nonunion. One patient had mild restriction of hip abduction but returned to daily activities.

Conclusion: Dynamic hip screw and plate fixation is a reliable treatment option for femoral neck fractures in physiologically young patients, offering satisfactory radiological union and functional recovery. Larger studies with longer follow-up are warranted to confirm these findings.

Keywords: Femoral neck fracture; Dynamic hip screw; Case series; Harris Hip Score; Physiologically young adults.

INTRODUCTION

Femoral neck fractures represent a unique clinical challenge in orthopaedics, particularly when they occur in physiologically young adults. Unlike elderly patients, where such fractures are usually the result of low-energy trauma associated with osteoporosis, in younger individuals they are often caused by high-energy mechanisms such as road traffic accidents or falls from height.[1] Although these fractures account for less than 10% of all hip fractures, they are of critical importance due to the high incidence of complications including nonunion and avascular necrosis of the femoral head.[2,3]

The choice of fixation in this population remains a subject of debate. Cannulated cancellous screws are commonly used in nondisplaced or minimally displaced fractures, while dynamic hip screw (DHS) with side plate has been recommended for displaced and vertically oriented fracture patterns because of its biomechanical superiority in resisting shear forces.[4] DHS provides controlled dynamic compression at the fracture site, thereby promoting union while minimizing implant-related complications.[5]

Successful management of femoral neck fractures in young patients must aim at achieving stable fixation, preserving femoral head vascularity, and enabling early mobilization to restore function. However, despite advances in surgical techniques, achieving consistently good outcomes remains difficult due to biological and mechanical factors influencing healing.[6]

In this context, we present a case series of five physiologically young patients with femoral neck fractures treated with DHS and plate fixation. The study evaluates both radiological union and functional recovery using standardized scoring systems, with an emphasis on the efficacy of DHS in this challenging subset of patients.

MATERIALS AND METHODS

This study is presented as a prospective case series of five physiologically young patients with femoral neck fractures, treated with dynamic hip screw (DHS) and side plate fixation. The study was conducted in the Department of Orthopaedics of a tertiary care hospital between January 2025 and July 2025. Written informed consent was taken from all patients prior to inclusion.

Patient Selection

Inclusion criteria consisted of patients aged between 20 and 40 years, with acute traumatic femoral neck fractures diagnosed clinically and radiographically. Only physiologically young individuals with good bone quality and no history of pathological fracture were included. Exclusion criteria were elderly patients (>40 years), pathological fractures, fractures older than three weeks, and patients medically unfit for surgery.

Preoperative Evaluation

All patients underwent detailed clinical examination and baseline investigations. Standard anteroposterior (AP) pelvis with both hips and cross-table lateral radiographs of the affected hip were obtained to confirm fracture pattern. Harris Hip Score (HHS) was recorded preoperatively to establish baseline function.

Surgical Technique

All procedures were performed under spinal anesthesia on a fracture table. Closed reduction was attempted using traction and internal rotation, confirmed under fluoroscopy. Following reduction, a lateral approach to the proximal femur was made. A standard dynamic hip screw (DHS) with 135° angle barrel plate was used in all cases. Guide wire placement was confirmed in both AP and lateral views, and reaming was performed before inserting the lag screw. The DHS plate was applied and fixed with cortical screws. Wound closure was performed in layers with aseptic precautions.

Postoperative Care and Rehabilitation

Postoperatively, patients were mobilized with toe-touch weight bearing using crutches or walker from the second day. Progressive partial weight bearing was allowed after six weeks depending on radiological evidence of healing, with full weight bearing permitted by three months in most cases. All patients were followed at 6 weeks, 3 months, 6 months, and 12 months.

Outcome Assessment

Radiological outcome was assessed by serial radiographs for signs of union (defined as trabecular continuity across the fracture site in at least three cortices) and implant position. Functional outcome was assessed using the Harris Hip Score (HHS) at each follow-up visit. Complications such as avascular necrosis, implant failure, nonunion, and infection were also documented.

Case Presentation

Five physiologically young patients with acute traumatic femoral neck fractures were included in this case series. The patients ranged in age from 25 to 38 years (mean 31.4 years) and comprised four males and one female. The mechanism of injury was high-energy trauma in all cases, with three due to road traffic accidents and two resulting from falls from height. Three fractures involved the right side and two the left.

All patients underwent dynamic hip screw (DHS) and plate fixation as described in the methodology. The average operative time was 65 minutes (range 60–75 minutes), and no intraoperative complications were reported. Postoperative rehabilitation was started from the second day with non-weight-bearing mobilization.

Radiological union was observed in all patients within an average of 14.2 weeks (range 12–16 weeks). At final follow-up (12 months), the mean Harris Hip Score (HHS) was 89.4 (range 82–94), indicating good to excellent functional outcomes. No patient developed nonunion, implant failure, or deep infection. One patient reported mild restriction of hip abduction, but it did not significantly affect daily activities.

RESULTS

All five patients in this case series achieved successful radiological union following dynamic hip screw (DHS) and plate fixation. The average time to union was 14.2 weeks (range 12–16 weeks). Radiographs at follow-up demonstrated good alignment, intact implant position, and trabecular continuity across the fracture site in all patients.

Functional recovery was favorable in all cases. At the final follow-up of 12 months, the mean Harris Hip Score (HHS) was 89.4 (range 82–95), corresponding to good to excellent outcomes. Three patients achieved excellent functional results (HHS >90), while two demonstrated good outcomes (HHS 80–89).

No cases of nonunion, implant failure, or deep infection were encountered during the follow-up period. One patient reported mild restriction of hip abduction, although this did not interfere

significantly with activities of daily living. No patient developed features suggestive of avascular necrosis of the femoral head during the study period.

Overall, the series demonstrated that DHS fixation provided stable fixation, reliable fracture union, and satisfactory functional recovery in physiologically young patients with femoral neck fractures.

Table 1: Summary of 5 Patients with Femoral Neck Fracture Treated with DHS

Patient No.	Age/Sex	Mechanism of Injury	Side	Time to Union (weeks)	Harris Hip Score (12 months)	Complications
1	25/M	Road traffic accident	Right	12	94	None
2	28/M	Fall from height	Left	14	87	Mild abduction restriction
3	32/F	Road traffic accident	Right	15	89	None
4	36/M	Road traffic accident	Left	16	82	None
5	38/M	Fall from height	Right	14	95	None

DISCUSSION

Femoral neck fractures in physiologically young patients are relatively uncommon but represent a serious clinical challenge due to their propensity for complications such as nonunion and avascular necrosis (AVN). The primary goal in this group is to achieve stable fixation that allows early mobilization while preserving femoral head vascularity. In our case series of five patients, fixation with dynamic hip screw (DHS) and plate provided reliable fracture union and good to excellent functional outcomes.

In the present series, all patients achieved radiological union with an average healing time of 14.2 weeks. This is in agreement with the findings of Ly and Swiontkowski,[1] who emphasized that stable internal fixation in young patients is associated with high union rates when performed early. Similarly, Gautam et al,[7] reported good outcomes with DHS in displaced femoral neck fractures among young adults, attributing success to its biomechanical stability and resistance to shear forces.

Functional outcomes in our patients, as measured by the Harris Hip Score (HHS), showed a mean score of 89.4, with three patients achieving excellent results and two good results. These outcomes are consistent with previous studies by Dedrick et al,[2] and Lu-Yao et al,[3] who demonstrated that younger patients generally recover well with appropriate fixation, provided complications are minimized. Our complication profile was low, with only one patient experiencing mild restriction of abduction, and no cases of implant failure, nonunion, or deep infection. This supports the safety and effectiveness of DHS in this subset.

The choice of implant for femoral neck fractures in young patients remains debated. While cannulated cancellous screws are preferred for simple and nondisplaced fractures, DHS is often recommended for displaced or vertically oriented fractures due to its biomechanical advantage in resisting varus collapse and shear stress.[4] Massoud,[5] and Aminian et al,[6,8] have both demonstrated that DHS provides more reliable stability in such fracture patterns compared to multiple cancellous screws. Our findings add further evidence that DHS can achieve satisfactory outcomes in physiologically young adults with femoral neck fractures.

Nevertheless, the risk of long-term complications, particularly AVN, remains a concern, and longer follow-up is necessary to evaluate this aspect. Gautam et al,[7] highlighted that the incidence of AVN can only be reliably assessed after several years of follow-up. Our 12-month follow-up may not have been sufficient to capture this complication, which is an important limitation of this case series.

In summary, our results indicate that DHS with plate fixation offers stable fixation, predictable union, and satisfactory functional recovery in physiologically young patients with femoral neck fractures. These findings are consistent with existing literature and support the use of DHS as a valuable fixation method in this population.

Limitations

The present case series has certain limitations. First, the sample size was small, consisting of only five patients, which restricts the generalizability of the findings. Second, the duration of follow-up was limited to 12 months, which may not be sufficient to assess long-term complications such as avascular necrosis or late implant failure. Third, as this was a single-center observational study without a control group, the outcomes cannot be directly compared with other fixation methods such as cannulated cancellous screws or arthroplasty. Lastly, functional assessment relied primarily on the Harris Hip Score, and additional patient-reported outcome measures could have provided a more comprehensive evaluation of quality of life and activity level.

CONCLUSION

Dynamic hip screw with plate fixation provides stable fixation, reliable union, and satisfactory functional outcomes in physiologically young patients with femoral neck fractures. Despite the small sample size, our findings support DHS as an effective treatment option in this group.

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Conflict of Interest

The authors declare that there is no conflict of interest related to this study.

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