Doi: https://doi.org/10.3329/ewmcj.v14i2.86292

Original Article

POSTOPERATIVE COMPLICATIONS OF FEMORAL NECK FRACTURES TREATED WITH BIPLANE DOUBLE SUPPORTED SCREW FIXATION METHOD (BDSF)

Mozumder B[1], Dey RP [2], Ghosh S[3] , Akanda MMU[4], Das CK[5], Shohag AKMMH [6]

Article History:
Received: 14th December, 2025
Accepted: 10th January 2026

Abstract:

Background: *In orthopedic practice femoral neck fractures are a commonly encountered injury and that result in signiûcant morbidity and mortality.*

Objective: *The aim of this study was to assess the postoperative complications of femoral neck fractures treated with biplane double supported screw fixation method.*

Methodology: *This was a single group prospective hospital based clinical trial and was conducted in the Department of Orthopedic Surgery in Chittagong medical college hospital for a period of one and half year from July 2018 to July 2020. Sample size was 30 with (AO /OTA-31B) fracture as per set criteria treated with BDSF enrolled through inclusion and exclusion criteria.*

Result: *Most of the study population (36.7%) was in 18-35 years. The mean age of the patients was 41.87 ± 13.950 years (range: 18-65 years). There was male predominance with male to female ratio about 3:1. maximum of the cases (66.7%) were due to RTA. Left side was affected in majority of the cases (56.7%). Maximum (53.3%) patient's operation after injury time was at 10-14 days (mean ± SD: 10.27 ± 2.690 days) and duration of operation was within 45-60 minutes in about 53.3% patients (mean ± SD: 65.05 ± 13.856 minutes). There was no superficial infection, deep infection, hip stiffness or AVN. 02 patients dropped out at 3rd and 4th follow up. Out of 28 patients only 01 (3.6%) patients had delayed-union and 02 (7.1%) patients had non-union.*

Conclusion: *Following treatment for a Femoral Neck Fracture (FNF) using Biplane Double-Supported Screw Fixation (BDSF), post-operative problems include screw back-out, implant failure, avacular necrosis (AVN), and non-union (fracture not healing).*

Keywords:
Post operative complication, Femoral Neck Fracture, BDSF

EWMCJ Vol. 14, No. 2, July 2026: 187-190

Introduction

Fracture neck of femur are devastating injuries that most often affects the young and elderly and have a tremendous impact on the healthcare system and society in general. It continues to be regarded as the "unsolved fracture" [1]. The incidence of hip picture is increasing throughout the world. The annual number is estimated to rise from 1.7 million in 1990 to 6.3 million by the year 2050 [2]. More than 250,000 hip fractures occur annually in the United States and are evenly divided between femoral neck and intertrochanteric fractures [3]. This number is projected to double by the year 2050 [4]. Seventy-ûve percent of hip fractures occur in women [5]. The incidence in

1. Dr. Biplab Mozumder , Assistant Professor, Department of Paediatric Orthopaedic Surgery, Jamalpur Medical College
2. Dr. Raju Prasad Dey, Consultant, Department of Orthopedic and traumatology, OSD, DGHS, Mohakhali, Dhaka
3. Dr. Saikat Ghosh, RMO, Upazilla health complex, Kutubdia, Coxbazar
4. Md. Mayeen Uddin Akanda Medical Officer, Department of Orthopedic and traumatology, 250 beded General Hospital, Jamalpur
5. Chandan Kumar Das, Senior Consultant, Department of Orthopedic and traumatology, Apollo-Imperial Hospital, Chattogram
6. A.K.M. Mahmudul Hasan Shohag, Assistant Registrar, Department of Orthopaedic and Traumatology, Jamalpur Medical College Hospital

Address of Correspondence: Dr. Biplab Mozumder , Assistant Professor, Department of Paediatric Orthopaedic Surgery, Jamalpur Medical College. Phone: 01676008580, Email: biplabmozumder19@gmail.com

younger patients is very low and is associated mainly with high-energy trauma. The majority occur in the elderly (average age of 72 years) as a result of low-energy falls [6]. The treatment of choice for most femoral neck fractures is operative to allow early patient mobilization, decrease the risk for complications, and improve patient outcomes. Non-operative management should be considered only in patients who are seriously ill and present excessive surgical risk. In the majority of patients, operative management is indicated; the choice of a speciûc treatment option is based on the stability and orientation of the fracture and patient factors such as age, function, and bone quality. In general, surgery should be performed on an urgent or emergent basis to minimize the risk for perioperative complications, improve patient comfort, and decrease the length of hospitalization [7,8,9]. The recently introduced novel method of biplane double-supported screw fixation (BDSF; Filipov's method) provides improved cortical screw support and increased fixation strength [10,11,12]. Osteosynthesis of femoral neck fractures is related up to 46% rate of complications [13,14]. While the late avascular necrosis (AVN), ranging from 9 to 32%, depends on various biological and surgical factors, the other common complication—fixation failure, rating between 9 and 30%—is mainly due to insufficient fixation strength in osteoporotic bone [15,16,17]. The latter could be reduced by optimizing the primary stability of the internal fixation construct.

Materials and Methods

This single-group prospective hospital-based clinical trial was conducted in the Department of Orthopaedic Surgery, Chittagong Medical College Hospital, Bangladesh, from July 2018 to July 2020. Thirty adult patients aged 18–65 years with femoral neck fractures classified as AO/OTA-31B were enrolled using purposive sampling and treated with Biplane Double Supported Screw Fixation (BDSF). Inclusion criteria were fresh fractures (d"3 weeks), fitness for surgery, and informed consent, while pathological fractures (other than osteoporosis), polytrauma, age >65 years, and failed previous fixation were excluded. Ethical approval was obtained from the Institutional Review Board of CMCH. Under spinal anesthesia, closed reduction was achieved on a fracture table and fixation performed using three 6.5-mm cannulated screws placed in a biplane configuration providing calcar and posterior cortical support. Postoperatively, antibiotics were administered for 24 hours, early quadriceps exercises were initiated, and weight-bearing was progressed according to age and radiological union. Patients were followed at 1, 2, 6, and 12 months. Postoperative complications, radiological union, and functional outcome using the Harris Hip Score were evaluated. Data were analyzed using SPSS version 20.1.

Results:

Most of the study population (36.7%) was in 18-35 years and 36-50 years of age group both. The mean age of the patients was 41.87 ± 13.950 years (range: 18-65 years) (Table I).

Table-I

Distribution of the study population by their age (n=30)

Age (years)	Frequency	Percentage
18-35	11	36.7%
36-50	11	36.7%
51-65	08	26.7%
Total	30	100%
Mean ± SD	41.87 ± 13.950	
Range	18-65 years	

Bar diagram shows the gender distribution of the study patients and it depicts that, there was male predominance with male to female ratio about 3:1.

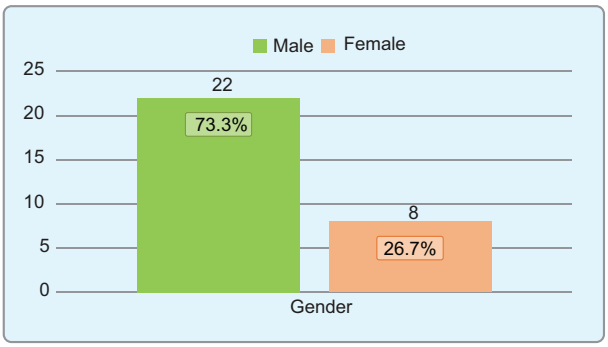

Figure-1: *Gender distribution of the patients (n=30)*

In the present study, out of 30 cases, maximum of the cases (66.7%) were due to RTA. Left side was affected in majority of the cases (56.7%) (Table II).

Table-II
Fracture description of the patients (n=30)

Variables		n (%)
Mechanism of injury	RTA	20 (66.7%)
	Fall from height	10 (33.3%)
Side of injury	Right	13 (43.3%)
	Left	17 (56.7%)

Maximum (53.3%) patient's operation after injury time was at 10-14 days (mean ± SD: 10.27 ± 2.690 days) and duration of operation was within 45-60 minutes in about 53.3% patients (mean ± SD: 65.05 ± 13.856 minutes) (Table-III).

Table-III
Operation after injury interval and duration of operation (n=30)

Variables	N	%
Operation after injury		
5-9 days	13	43.3
10-14 days	16	53.3
15-19 days	01	3.3
Total	30	100
Mean ± SD	10.27 ± 2.690 days	
Range	5-17 days	
Duration of operation		
45-60 minutes	16	53.3
61-75 minutes	06	20.0
76-90 minutes	08	26.7
Total	30	100
Mean ± SD	65.05 ± 13.856 minutes	
Range	45-90 minutes	

There was no superficial infection, deep infection, hip stiffness or AVN. 02 patients dropped out at 3rd and 4th follow up. Out of 28 patients only 01 (3.6%) patients had delayed-union and 02 (7.1%) patients had non-union.

Table-IV
Post-operative complications

Complications	N	Percentage
Superficial infection	0	0%
Deep infection	0	0%
Delayed Union	1	3.6%
Non union	2	7.1%
Hip stiffness	0	0%
AVN	0	0%

Discussion

In this present study, most of the study population (36.7%) was in 18-35 years and 36-50 years of age group both. The mean age of the patients was 41.87 ± 13.950 years (range: 18-65 years). A recent study conducted by Kalia *et al.* (2018) stated that the average age was 67.8 years [18]. The youngest patients were aged 52 years while eldest being 88 years. Majority of the patient i.e 18 out of 25 patient belong to 60-80 years of age group. Out of 30 patients, 22(73.3%) were male and 8(26.7%) were female, may be due to more outdoor activities of the males and hence making them more prone to trauma. Filipov (2011) found the subjected patients comprised 88 studied patients, 27 (30.68%) are men and 61 (69.31%) women [10]. Most injury was predominantly in left sided. In this study, out of 30 patients, 17 (56.7%) were injured on right side and 13 (43.3%) were injured on left side. Kalia *et al.* (2018) showed in their study, out of the 25 patients, 14 were right side (56%) and 11 (44%) were left side. So right were predominant [18]. In the present study, out of 30 cases, maximum of the cases 20 (66.7%) were due to RTA. Filipov (2011) was showed 62.5% RTA was the maximum cause [10]. Maximum (53.3%) patient's operation after injury time was at 10-14 days (mean ± SD: 10.27 ± 2.690 days) and duration of operation was within 45-60 minutes in about 53.3% patients (mean ± SD: 65.05 ± 13.856 minutes). Kalia et al. (2018) have done their operation within 45-60 minutes in 60% cases [18]. Concerning complications, out of 30 patients, there was no superficial infection, deep infection, hip stiffness or AVN. Only 01 (3.6%) patients had delayed-union, and 02 (7.1%) patients had non-union. One patient was treated by modular prosthesis another one by hemi-arthoplasty by bi-polar prosthesis. In their series Kalia et al. (2018) found that one patient had femoral head resorption due to the chondrolysis and required a total hip arthroplasty. None of the cases had an implant failure [18]. Filipov et al. (2017) showed that, rate of nonunion was 3.4%, including fixation failure (2.4%), pseudoarthrosis (0.5%) and nonunion with AVN (0.5%). Rate of AVN was 12.1% (males 4.8%, females 13.9%, P = 0.12). Campbel's operative orthopedics shows that in conventional screw fixation method (inverted triangle) there is about 23% chance of osteonecrosis and about 9% of nonunion[19].

Conclusion

In our study post operative complications were very less. This technique was a safe and cost effective

option for femoral neck fracture operation. Only 3.6% patients had delayed-union and 7.1% patients had non-union. Further studies would be beneficial in providing evidence.

Acknowledgements
The authors are grateful to the entire staff of department of Orthopaedic Surgery at Chittagong Medical College Hospital, Chittagong during the study period.

Conflict of Interest
Authors declare no conflict of Interest.

Ethical approval:
Approved by IRB, Chittagong Medical College.

References:

1. Garden RS. Low-angle fixation in fractures of the femoral neck. *J Bone Joint Surg Br*. 1961;43-B:647–63.az
2. Cooper C, Campion G, Melton LJ III. Hip fractures in the elderly: a world-wide projection. *Osteoporos Int*. 1992;2:285–9.
3. National Center for Health Statistics. National Hospital Discharge Survey (NHDS). Available from: http://205.207.175.93/hdi/ReportFolders/ReportFolders.aspx. Accessed December 31, 2014.
4. Gullberg B, Johnell O, Kanis JA. World-wide projections for hip fracture. *Osteoporos Int*. 1997;7:407–13.
5. Jordan KM, Cooper C. Epidemiology of osteoporosis. *Best Pract Res Clin Rheumatol*. 2002;16:795–806.
6. Johnell O, Kanis JA. An estimate of the worldwide prevalence and disability associated with osteoporotic fractures. *Osteoporos Int*. 2006;17:1726–33.
7. Kim JW, Byun SE, Chang JS. The clinical outcomes of early internal fixation for undisplaced femoral neck fractures and early full weight-bearing in elderly patients. *Arch Orthop Trauma Surg*. 2014;134:941–6.
8. Jain R, Koo M, Kreder HJ, et al. Comparison of early and delayed fixation of subcapital hip fractures in patients sixty years of age or less. *J Bone Joint Surg Am*. 2002;84(9):1605–12.
9. Simunovic N, Devereaux PJ, Sprague S, et al. Effect of early surgery after hip fracture on mortality and complications: systematic review and meta-analysis. *CMAJ*. 2010;182:1609–16.
10. Filipov O. Biplane double-supported screw fixation (F-technique): a method of screw fixation at osteoporotic fractures of the femoral neck. *Eur J Orthop Surg Traumatol*. 2011;21(7):539–43.
11. Filipov O. The method of biplane double-supported screw fixation (BDSF) at femoral neck fractures—principle and clinical outcomes. *J IMAB*. 2013;19(1):423–8.
12. Filipov O, Gueorguiev B. Unique stability of femoral neck fractures treated with the novel biplane double-supported screw fixation method: a biomechanical cadaver study. *Injury*. 2015;46(2):218–26.
13. Gjertsen JE, Vinje T, Engesaeter LB, Lie SA, Havelin LI, Furnes O, et al. Internal screw fixation compared with bipolar hemiarthroplasty for treatment of displaced femoral neck fractures in elderly patients. *J Bone Joint Surg Am*. 2010;92(3):619–28.
14. Rogmark C, Johnell O. Primary arthroplasty is better than internal fixation of displaced femoral neck fractures: a meta-analysis of 14 randomized studies with 2,289 patients. *Acta Orthop*. 2006;77(3):359–67.
15. Damany DS, Parker MJ, Chojnowski A. Complications after intracapsular hip fractures in young adults: a meta-analysis of 18 published studies involving 564 fractures. *Injury*. 2005;36(1):131–41.
16. Loizou CL, Parker MJ. Avascular necrosis after internal fixation of intracapsular hip fractures: a study of the outcome for 1023 patients. *Injury*. 2009;40(11):1143–6.
17. Lu-Yao GL, Keller RB, Littenberg B, Wennberg JE. Outcomes after displaced fractures of the femoral neck: a meta-analysis of one hundred and six published reports. *J Bone Joint Surg Am*. 1994;76(1):15–26.
18. Kalia A, Singh J, Ali N. Role of biplane double-supported screw fixation for fracture neck femur in elderly population: a prospective study. *Open Orthop J*. 2018;12:514–24.
19. Filipov O, Stoffel K, Gueorguiev B, Sommer C. Femoral neck fracture osteosynthesis by the biplane double-supported screw fixation method reduces the risk of fixation failure: clinical outcomes in 207 patients. *Arch Orthop Trauma Surg*. 2017;137:779–88.

Peer-Review History:
The peer review history for this paper can be accessed here: https://ewmch.com/review/