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Original Article

Dynamic hip screw versus cannulated cancellous screws fixation for osteosynthesis of femoral neck fractures in adults: a retrospective comparative study

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Abstract: Objective: Femoral neck fractures in young adults are relatively rare and often present challenges in achieving optimal treatment outcomes. Several surgical techniques have been proposed for managing these fractures. This study aims to compare the clinical and radiological outcomes of femoral neck fractures treated with either a dynamic hip screw combined with an anti-rotation screw (DHS/AS) or cannulated cancellous screws (CCS). Method: This retrospective comparative study included 60 patients with a minimum follow-up period of one year. Key factors assessed included fracture union, complications such as avascular necrosis (AVN), non-union, varus collapse, femoral neck shortening, screw backout, and functional outcomes measured by the Harris Hip Score (HHS). Results: Sixty patients with a minimum follow-up of 12 months were analyzed, with 30 patients each in the DHS/AS and CCS groups. Fracture union was achieved in 87.0% of patients in the DHS/AS group and 83.3% in the CCS group ($P = 0.25$), with comparable mean time to union (5.1 ± 0.8 vs. 4.9 ± 0.7 months; $P = 0.61$). Nonunion occurred in 12.9% and 16.6% of patients, respectively ($P = 0.25$). Femoral neck shortening was significantly lower in the DHS/AS group (3.8 ± 2.0 mm) compared with the CCS group (10.5 ± 6.0 mm; $P = 0.01$). Similarly, screw backout was significantly less with DHS/AS (1.8 ± 2.2 mm vs. 9.1 ± 3.4 mm; $P = 0.002$). Mean varus collapse was lower in the DHS/AS group ($1.6° \pm 1.5°$ vs. $4.8° \pm 5.9°$), although the difference was not statistically significant ($P = 0.15$). Avascular necrosis developed in three patients in the CCS group and in none of the DHS/AS group. Functional outcome was significantly better following DHS/AS fixation, with a higher mean Harris Hip Score (89.5 ± 7.4 vs. 79.3 ± 10.1; $P = 0.02$). Conclusion: Compared to multiple cannulated screws, fixation with DHS/AS provides superior clinical outcomes and is a more effective approach for treating femoral neck fractures.

Keywords: Femoral neck fracture, dynamic hip screw, cannulated cancellous screw

Introduction

Femoral neck fractures are one of the commonest injuries presenting to orthopaedic departments and represent a major cause of morbidity worldwide [1, 2]. The incidence of hip fractures continues to rise with increasing life expectancy; however, femoral neck fractures in young and middle-aged adults remain relatively uncommon, accounting for approximately 3-10% of cases, and are usually the result of high-energy trauma such as road traffic accidents or falls from height [3]. These fractures are considered surgical emergencies and are associated with high complication rates and a substantial risk of revision surgery, leading to suboptimal functional outcomes if not managed appropriately [4].

Femoral neck fractures in adults are associated with several well-recognized risks that significantly influence prognosis and treatment outcomes. The most feared complication is avascular necrosis (AVN) of the femoral head, which occurs due to disruption of the retinacular blood supply at the time of injury or secondary to instability following fixation. The incidence of AVN has been reported to range from 10% to 30%, particularly in displaced fractures (Garden type III and IV) and in cases where surgical fixation is delayed [4-6]. Another major risk is non-union, which is multifactorial in origin and is strongly associated with fracture displacement, delayed surgery, inadequate reduction, and high shear forces encountered in vertically oriented Pauwel's type III fractures [7-9]. Mechanical complications such as varus collapse, femoral neck shortening, and implant failure are also frequently encountered and can significantly compromise hip biomechanics and limb length, ultimately affecting functional outcome [10-12]. Collectively, these complications often lead to poor hip function and may necessitate secondary surgical procedures, making femoral neck fractures in adults one of the most challenging injuries to manage in orthopaedic practice [4, 5].

There is sufficient evidence supporting arthroplasty in low-demand elderly patients; however, in physiologically young and active adults, preservation of the native femoral head and restoration of normal hip biomechanics remain the primary goals of treatment [13]. Current treatment strategies therefore emphasize early anatomical reduction and stable internal fixation to minimize the risks of AVN, non-union, and mechanical failure while facilitating early mobilization and functional recovery [14, 15]. Vertically oriented and displaced fractures are subjected to high shear forces and carry a higher risk of non-union and mechanical failure, necessitating fixation methods that provide superior angular and rotational stability [5, 14]. While cannulated cancellous screws offer the advantage of minimal invasiveness and bone preservation, more stable constructs such as a dynamic hip screw with an anti-rotation screw are often preferred in unstable fracture patterns to reduce complications such as varus collapse, femoral neck shortening, and implant failure, thereby improving functional outcomes [10-12, 16-18].

Multiple fixation methods have been described, including cannulated cancellous screws (CCS), dynamic hip screw (DHS), and locking plate constructs, each with inherent advantages and limitations. CCS offers the benefits of minimal invasiveness and reduced soft tissue disruption; however, its relatively weaker biomechanical construct may predispose to fixation failure, particularly in unstable and vertical fracture patterns [16-20]. In contrast, DHS provides superior angular and rotational stability, maintains neck-shaft alignment, and is especially advantageous in fractures subjected to high shear forces [16-18]. Despite numerous clinical and biomechanical studies, the optimal fixation method for femoral neck fractures in adults remains controversial [21, 22]. Therefore, this study aims to compare DHS and CCS for femoral neck fracture fixation in patients less than 55 years of age.

Material and methods

Study design

This was a retrospective comparative study conducted between December 2016 and January 2020 on patients with fracture neck of femur. The selection of the surgical method for femoral neck fractures in adults is guided by a combination of patient-related and fracture-specific factors, with the primary objective of achieving anatomical reduction, stable fixation, and preservation of the femoral head in young and active individuals [4, 13]. Important determinants include patient age, physiological status, and bone quality, as well as fracture displacement (Garden classification), fracture orientation (Pauwel's classification), and the time interval between injury and surgery [4, 7, 15]. Patients were divided into two groups. Group A underwent fixation with a dynamic hip screw (DHS) combined with an anti-rotation screw (**Figure 1**), while Group B was treated with multiple cannulated cancellous screws (CCS) in an inverted triangular configuration (**Figure 2**). Ethical clearance was obtained from the institutional ethics committee (Regd.) of our hospital (JNMC, AMU, Aligarh, UP, India) [196/FM/IEC] and informed written consent was taken from all participants.

Inclusion and exclusion criteria

Patients were included in the study if they fulfilled all of the following criteria: (1) Age between 18 and 55 years, representing physiologically young and active adults in whom femoral head preservation is the preferred treatment strategy. (2) Radiologicaly confirmed fracture of the femoral neck, diagnosed on standard anteroposterior and lateral radiographs of the hip. (3) Fresh fractures, defined as injuries presenting within three weeks of trauma, to minimize the influence of delayed biology on fracture healing. (4) Intracapsular femoral neck fractures classified as Garden type II, III, or IV

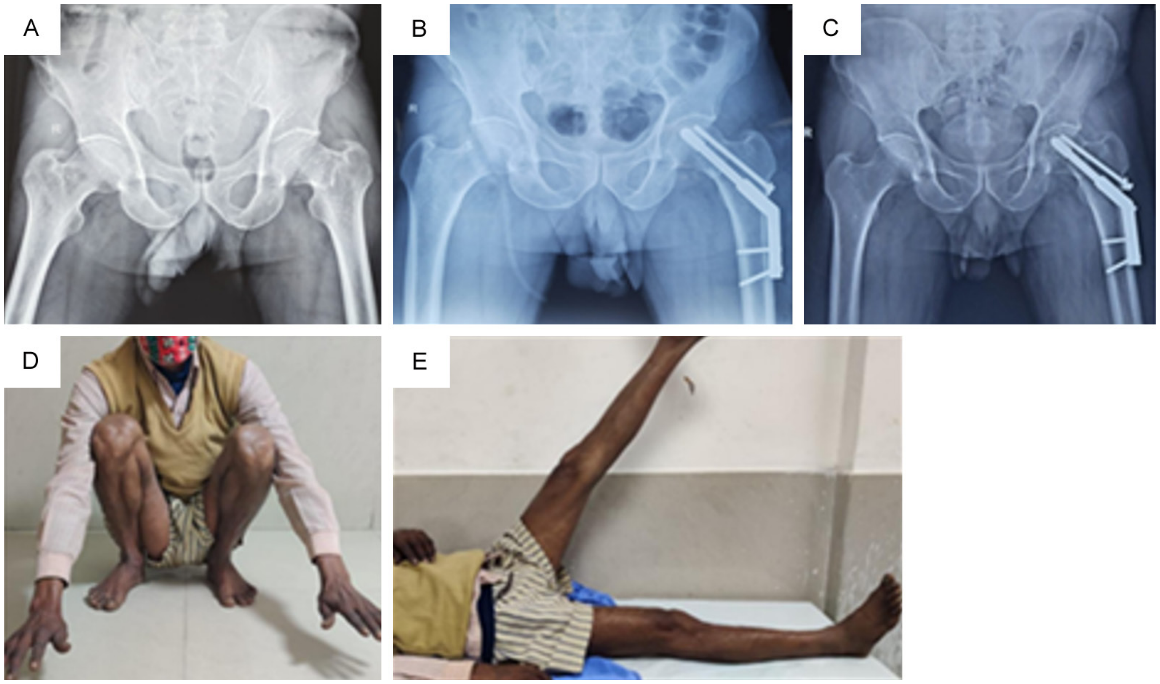

Figure 1. 45 year/male patient presented with injury to left hip. X-ray showed fracture neck of left femur (A), CRIF with DHS and AS was done. Immediate postoperative x ray showed well placed implant (B), X-ray at 1 year follow-up showed union with some neck shortening (C), Functional outcome at 1 year (D, E).

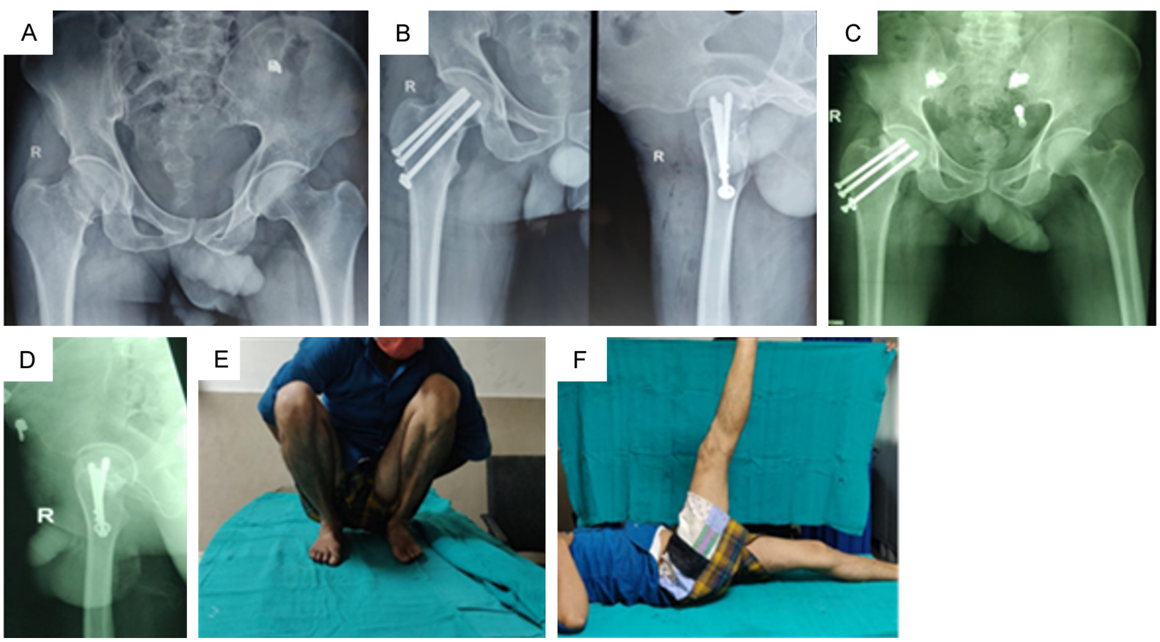

Figure 2. 35 year/male patient presented with injury to right hip. X-ray showed fracture neck of left femur (A), CRIF with three CCS was done. Immediate postoperative x ray showed screws in inverted triangular configuration (B), X-ray at 1 year follow-up showed union with some neck shortening (C, D), Functional outcome at 1 year (E, F).

and Pauwel's type II or III. (5) Patients who were ambulatory prior to injury, with or without assistive devices, indicating acceptable pre-injury functional status. (6) Patients who underwent internal fixation using either dynamic hip screw with anti-rotation screw (DHS/AS) or multiple cannulated cancellous screws (CCS). (7) Patients who were medically fit for surgery under regional or general anaesthesia. (8) Patients who provided written informed consent and were willing to comply with postoperative rehabilitation and follow-up protocols. (9) Patients with a minimum follow-up period of one year, allowing adequate assessment of fracture union.

Patients were excluded from the study if they met any of the following criteria: (1) Age below 18 years or above 55 years, as treatment principles and fracture biology differ significantly in these age groups. (2) Pathological fractures of the femoral neck due to malignancy, metabolic bone disease, or infection. (3) Associated ipsilateral femoral shaft fractures, which could alter surgical planning, fixation strategy, and rehabilitation protocol. (4) Polytrauma patients with multiple long-bone fractures or life-threatening injuries, as these factors could confound functional and radiological outcomes. (5) Old or neglected fractures presenting more than three weeks after injury. (6) Patients with pre-existing hip pathology, such as advanced osteoarthritis, avascular necrosis, previous fracture, or prior surgery involving the affected hip. (7) Non-ambulatory patients prior to injury or those with significant neuromuscular disorders affecting gait and functional assessment. (8) Patients who were unfit for surgery due to severe medical comorbidities or anaesthetic contraindications. (9) Patients managed with primary arthroplasty or fixation methods other than DHS/AS or CCS. (10) Patients who were unwilling to participate, declined surgical treatment, or were lost to follow-up before one year.

Data collection and measuring tool

All patients were evaluated clinically and radiologicaly preoperatively and then at 6-week intervals until fracture union, followed by every 3 months. Only patients with a minimum follow-up of one year were included. Baseline characteristics and outcome measures were collected using operative notes, day to day progress report from case sheets, discharge tickets and follow-up evaluation. Standardized anteroposterior and lateral radiographs (20° abduction and 15° internal rotation) were used for assessment, accounting for magnification relative to implant size. Closed or open reduction under C-arm guidance was performed on a fracture table under regional anaesthesia. In Group A, fixation was done with a DHS lag screw supplemented by a 7 mm cannulated anti-rotation screw placed 1.5 cm superior and parallel to the lag screw. In Group B, three 7 mm cannulated cancellous screws were inserted in an inverted triangular fashion. Operative time was recorded from incision to closure. Blood loss was calculated as: (number of soaked mops × 50 ml) + suction drain collection - irrigation fluid used. Two doses of antibiotics were administered in the post-operative period. Range of motion exercises started on postoperative day 2. Partial weight-bearing was initiated the next day, with full weight-bearing allowed after radiological evidence of union. Sutures were removed on day 14.

Outcome measures

The following outcomes were assessed: (1) Fracture union: Defined by bridging trabeculae on radiographs and ability to bear weight. (2) Nonunion: No radiological signs of union or persistent fracture gap at 6 months. (3) Femoral neck shortening: Measured as the difference in head-to-trochanter distance between immediate postoperative and final follow-up radiographs (>5 mm considered significant). (4) Varus collapse: Neck-shaft angle difference between immediate postoperative and final follow-up radiographs (>5° considered significant). (5) Screw backout: Measured as screw protrusion beyond lateral cortex (>5 mm considered significant). (6) Avascular necrosis (AVN): Avascular necrosis of the femoral head was assessed using a combination of clinical evaluation and serial radiological examination during follow-up. All patients underwent standardized anteroposterior and lateral radiographs of the hip immediately postoperatively and subsequently at 6-week intervals until fracture union, followed by 3-monthly intervals thereafter. Radiological assessment focused on identifying classical features of AVN, including increased subchondral sclerosis, cystic changes, loss of femoral head sphericity, subchondral crescent sign, segmental collapse, and secondary degenerative changes of the hip joint. AVN was diagnosed when these characteristic radiographic changes were evident on follow-up radiographs in the absence of fracture non-union or implant-related failure [5, 6].

Clinical assessment included evaluation for persistent or progressive groin pain, reduced range of motion of the hip and functional deterioration despite radiological evidence of fracture union. Patients with clinical suspicion of AVN but inconclusive radiographic findings were closely followed until definitive radiological changes became apparent. Advanced imaging modalities such as MRI were not routinely employed due to financial constraints and limited availability; therefore, AVN diagnosis in this study was based on radiographically evident disease, consistent with commonly used criteria in similar clinical studies [15, 23]. (7) Functional outcome: Functional outcome was assessed using the Harris Hip Score (HHS), a validated and widely used scoring system for evaluating hip function following trauma and surgical intervention [6]. The HHS was recorded at the final follow-up visit for all patients. The HHS is a 100-point scale comprising four domains: pain (44 points), function (47 points), absence of deformity (4 points), and range of motion (5 points). Pain assessment was based on patient-reported severity and its impact on daily activities. Functional assessment included evaluation of gait (limp, need for support, walking distance) and activities of daily living such as stair climbing, sitting, and use of public transport. Range of motion was measured clinically using a goniometer, and deformity assessment included limb length discrepancy, fixed adduction, flexion, and internal rotation deformities. Based on the total score, functional outcomes were graded as excellent (90-100 points), good (80-89 points), fair (70-79 points), and poor (<70 points). The HHS provided an objective measure for comparing postoperative functional recovery between the two fixation groups and correlating clinical outcomes with radiological findings [24, 25].

Statistical analysis

Statistical analysis was performed using SPSS software version 25.0 (IBM Corp., Armonk, NY, USA). Data were first assessed for completeness and normality of distribution.

For comparison between the two independent groups (DHS/AS group and CCS group): Continuous variables (age, time to surgery, operative time, blood loss, and time to union, femoral neck shortening, screw backout, and Harris Hip Score) were expressed as mean ± standard deviation and compared using the independent samples Student's t-test when data followed a normal distribution. Categorical variables (sex distribution, fracture classification, union rate, non-union, presence of avascular necrosis, and varus collapse) were reported as number of cases (n) and percentage (%) in each group and compared using the Chi-square test. When the expected cell frequency was less than five, the Fisher's exact test was applied.

For comparisons within the same group over time: Paired continuous variables (immediate postoperative versus final follow-up measurements of femoral neck length, neck-shaft angle, and radiological parameters) were analyzed using the paired Student's t-test. In cases where data did not meet parametric assumptions, Wilcoxon rank test were considered.

All statistical tests were two-tailed, and a *p*-value <0.05 was considered statistically significant.

Observation and results

Patient demographics

Between December 2016 and January 2020, 66 patients with femoral neck fractures were enrolled. Five were lost to follow-up and one died of myocardial infarction, leaving 60 patients for final analysis. Group A (DHS with anti-rotation screw) had 30 patients and group B (CCS) had 30 patients. The groups were well-matched for baseline characteristics (**Table 1**). The mean age was 44.2 ± 9.5 years in Group A and 40.1 ± 7.8 years in Group B. Males comprised 68.3% of the study population. Road traffic accidents were the leading cause of injury (58.3%), followed by falls from height (25%) and trivial trauma (16.7%). According to Garden's classification, 25% fractures were type II, 48.3% were type III, and 26.7% were type IV fractures. By Pauwel's classification, 48.3% fractures were type II and 51.7% were type III. No patients presented with type I fractures.

Operative details

The mean interval from injury to surgery was significantly longer in Group A (7.9 ± 4.3 days)

Table 1. Demography and preoperative parameters

	Group A (n = 30)	Group B (n = 30)	Total (N = 60)	*p* value
1. Age (mean ± SD) (years)	44.2 ± 9.5	40.1 ± 7.8	42.2 ± 8.8	0.07
2. Gender (M/F) (%)	20/10 (66.7/33.3)	21/9 (70/30)	41/19 (68.3/31.7)	0.78
3. Mode of injury				
Road traffic accident (RTA)	20 (66.7%)	15 (50%)	35 (58.3%)	
Fall from height (FFH)	6 (20%)	9 (30%)	15 (25%)	0.42
Trivial trauma	4 (13.3%)	6 (20%)	10 (16.7)	
4. Garden's classification				
I	0	0	0	
II	9 (30%)	6 (20%)	15 (25%)	
III	11 (36.7%)	18 (60%)	29 (48.3%)	0.19
IV	10 (33.3%)	6 (20%)	16 (26.7%)	
5. Pauwel's classification				
I	0	0	0	
II	14 (46.7%)	15 (50%)	29 (48.3%)	0.80
III	16 (53.3%)	15 (50%)	31 (51.7%)	

Table 2. Comparison of different parameters in DHS/AS and CCS Fixation method

Parameters	Group A (n = 30)	Group B (n = 30)	*p* value
Time from trauma to operation (mean ± SD) (days)	7.9 ± 4.3	5.5± 3.2	0.04
Operative time (mean ± SD) (minutes)	70.5 ± 14.7	62.8 ± 14	0.12
Intraoperative blood loss (mean ± SD) (ml)	144.4 ± 70.5	101 ± 30.3	0.04
Follow up (mean ± SD) (months)	13.4 ± 5.1	13.6 ± 4.6	0.94
Union (%)	27 (87%)	25 (83.3%)	0.25
Union time (mean ± SD) (months)	5.1 ± 0.8	4.9 ± 0.7	0.61
Varus Collapse (mean ± SD) (degrees)	1.6 ± 1.5	4.8 ± 5.9	0.15
Femoral neck shortening (mean ± SD) (mm)	3.8 ± 2	10.5 ± 6	0.01
Screw backout (mean ± SD) (mm)	1.8 ± 2.2	9.1 ± 3.4	0.02
Harris Hip Score (mean ± SD)	89.5 ± 7.4	79.3 ± 10.1	0.02
Non union	4 (12.9%)	5 (16.6%)	0.25

compared to Group B (5.5 ± 3.2 days, P = 0.04) (**Table 2**). Operative time was slightly longer in Group A (70.5 ± 14.7 minutes) than in Group B (62.8 ± 14 minutes), though not statistically significant (P = 0.12). Intraoperative blood loss was significantly higher in Group A (144.4 ± 70.5 ml) compared to Group B (101 ± 30.3 ml, P = 0.04).

Union and nonunion

The overall union rate was 87% in Group A and 83.3% in Group B (P = 0.25). The mean time to union was 5.1 ± 0.8 months in Group A and 4.9 ± 0.7 months in Group B (P = 0.61). Nonunion occurred in 9 patients (14.7%). 4 patients (12.9%) in Group A and 5 patients (16.6%) in Group B (P = 0.25).

Mechanical complications

11 patients developed significant varus collapse, all from Group B. Mean varus collapse was 1.6° ± 1.5° in Group A [16 patients] and 4.8° ± 5.9° in Group B [27 patients] (P = 0.15). Femoral neck shortening was significantly higher in Group B [18 patients] (10.5 ± 6.0 mm) compared to Group A [9 patients] (3.8 ± 2.0 mm, P = 0.01). Screw backout were more common in Group B [25 patients] (9.1 ± 3.4 mm) then Group A [4 patients] (1.8 ± 2.2 mm, P = 0.002).

Avascular necrosis (AVN)

Avascular necrosis occurred in 3 patients (10%) in the CCS group and none in DHS/AS group (P = 0.23).

Functional outcome

At final follow-up, the mean Harris Hip Score (HHS) was significantly better in Group A (89.5 ± 7.4) compared to Group B (79.3 ± 10.1, P = 0.02). Poor functional outcome was observed in only 1 patient from Group A and 2 patients from Group B, despite 9 patients developing nonunion. Notably, none of the nonunion cases underwent reoperation.

Discussion

The treatment of femoral neck fractures in young adults remains a topic of on-going debate in the literature, often leading to its designation as an "unsolved fracture" [14, 26]. While managing these fractures, the mode of injury, fracture pattern and other related injuries should be taken into account [27]. The main objective in treating femoral neck fractures in young adults is to achieve precise anatomical reduction and secure internal fixation, enabling early recovery and a quick return to daily activities [14]. Various methods have been described for fixation of these fractures but there is inconsistent evidence regarding optimal fixation technique [20]. Surgeons commonly opt for CCS, DHS, or a combination of both, enabling fracture fragments to glide along the implant under axial loading. However, the question of which implant offers the best outcome remains unresolved. Keeping this unanswered question in mind, we conducted this study, where we compared the radiological and functional outcome of patients having fracture neck of femur managed by either DHS with AS (anti-rotation screw) or CCS. The demographic parameters of the two groups were comparable. The variation in the average time from injury to fracture union between the two groups was statistically significant; however, it was an incidental finding. Kaplan et al. [23] and Sahin et al. [24] have lesser time to operation from trauma in comparison to our study which was due to delay in presentation of patient in hospital, OT availability and anaesthesia fitness. The difference in mean operative time between the two groups was statistically insignificant in our study however multiple studies revealed longer operative time taken in DHS surgery than in CCS [23, 25]. The difference may be due to using minimally invasive technique of screw insertion in those studies while shifting in some patients to an open technique in our study. The difference in mean intraoperative blood loss was statistically significant in our study. Similar findings were seen in other studies [28]. This might be related to larger incision in DHS/AS group. We have analyzed various aspect of union in detail.

(1) Union rate and time: Our study found no statistically significant difference in union rates (87% in DHS/AS vs. 83.3% in CCS, P = 0.256) or union time (5.1 months vs. 4.9 months, P = 0.619) between the two groups. These findings are consistent with Gupta et al. [25], who reported no significant difference in union rates between DHS and CCS. However, Siavashi et al. [4] suggested that DHS may have a slight advantage in union rate, likely due to its more rigid construct, reducing micromotion at the fracture site. A meta-analysis by Slobogean et al. [5] also found that nonunion rates were generally lower in DHS than CCS, particularly in displaced fractures.

(2) Nonunion and risk factors: Despite the comparable union rates, nonunion was observed in 9 patients (14.7%), with a slightly higher rate in CCS (16.6%) than DHS/AS (12.9%), although this difference was not statistically significant. Several studies, including Tidermark et al. [8] and Parker et al. [7], have highlighted that fracture displacement (Garden's Type III/IV), delayed surgery, and increased Pauwel's angle (>50°) are strong predictors of nonunion. In our study, patients with Pauwel's Type III fractures had lower union rates (75% in DHS, 66.6% in CCS), supporting the idea that shear stress plays a key role in nonunion development [9]. Interestingly, some nonunion cases in our study did not have poor functional outcomes. This aligns with findings from Weil et al. [12], who suggested that certain cases of fibrous nonunion may still allow reasonable function, particularly if pseudarthrosis formation provides partial stability. Additionally, some patients may have adapted their activity levels, resulting in acceptable HHS scores despite radiological nonunion.

(3) Avascular necrosis (AVN): AVN is one of the most feared complications of femoral neck fractures, occurring in 10-30% of cases depending on fracture displacement and time to surgery [6]. In our study, three cases of AVN were observed, all in the CCS group, while none were recorded in the DHS/AS group. This differ-

ence, although not statistically significant, suggests that DHS may offer better vascular preservation due to its biomechanical stability. Similar findings were reported by Kaplan et al. [23] and Jettoo et al. [19], who noted higher AVN rates in CCS fixation. One possible explanation is that DHS minimizes rotational instability, which may help preserve femoral head perfusion. However, a systematic review by Hoshino et al. [15] found no clear implant superiority regarding AVN risk, emphasizing the role of early surgical intervention (<24 hours) in reducing AVN incidence.

(4) Mechanical stability: femoral neck shortening and screw backout: Our study demonstrated that femoral neck shortening was significantly greater in CCS (10.5 mm) compared to DHS/AS (3.8 mm, P = 0.011). This finding is consistent with Barnes et al. [10], who reported that CCS fixation is associated with greater collapse due to its weaker biomechanical construct. Similarly, screw backout was significantly higher in the CCS group (9.1 mm vs. 1.8 mm, P = 0.002), suggesting insufficient purchase in osteoporotic or high-shear fractures. These findings align with Lu-Yao et al. [11], who found that CCS was more prone to mechanical failure, particularly in Pauwel's Type III fractures.

(5) Functional outcomes: Harris hip score (HHS): The HHS was significantly better in the DHS/AS group (89.5 vs. 79.3, P = 0.024). This is in agreement with Sahin et al. [24] and Siavashi et al. [4], who found that patients treated with DHS had better long-term hip function and lower revision rates. The likely reason is less femoral neck shortening and greater rotational stability in the DHS group, which helps maintain normal hip biomechanics. HHS was poor in only 1 patient in DHS and 2 in CCS, despite 9 cases of nonunion, further supporting the idea that not all nonunion cases result in poor function [12].

While CCS has traditionally been favoured in younger patients due to better bone preservation, our study demonstrates that DHS provides superior mechanical stability, reducing complications such as femoral neck shortening and screw backout. Given the higher activity demands of young patients, implant failure with CCS may lead to greater long-term bone loss and functional impairment. Therefore, DHS may be a more reliable choice for displaced or high-shear fractures in young adults, despite slightly greater initial bone removal. Our study has certain limitations. Blinding of outcome assessors was not performed, which may introduce detection bias. The exclusion of polytrauma patients and those unwilling to undergo surgery may have led to a sample that is not fully representative of all femoral neck fractures in young adults. Performance bias could also be a factor, as the experience and skill level of the surgeons performing the procedures were not standardized. Additionally, the sample size is relatively small, and the follow-up period of one year may not be sufficient to assess late complications like AVN. A larger multicentre study with longer follow-up would provide more definitive conclusions.

Conclusion

Our study suggests that DHS with an anti-rotation screw is a superior fixation method for femoral neck fractures in young adults compared to CCS. Although union rates were comparable, DHS resulted in better mechanical stability, less femoral neck shortening, lower screw backout rates, and significantly improved functional outcomes (HHS). Additionally, no AVN cases were observed in the DHS group, suggesting a potential advantage in vascular preservation. These findings support the preferential use of DHS/AS over CCS in young patients with femoral neck fractures, particularly in Pauwel's Type III fractures where shear forces are high. However, further high-quality randomized trials with longer follow-up are needed to confirm these results.

Disclosure of conflict of interest

None.

Abbreviations

DHS/AS, Dynamic hip screw/Anti-rotation screw; CCS, Cannulated Cancellous Screw; AVN, Avascular Necrosis; NOF, Neck of Femur; HHS, Harris Hip Score; ROM, Range of motion.

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