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ORIGINAL RESEARCH

A comparison and evaluation of dynamic hip screws versus multiple cannulated cancellous screws for treating femoral neck fractures in young Indian individuals

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ABSTRACT

Introduction: Femoral neck fractures present significant challenges in clinical treatment, with prognosis often being uncertain. At present, no single internal fixation method has proven to be superior to others for managing these fractures. As a result, there is a need for further investigation into different internal fixation systems. This study aims to compare the clinical outcomes of using a dynamic hip screw system versus multiple cannulated compression screws for treating femoral neck fractures. **Methods:** This randomized controlled trial was carried out in the Department of Orthopedics at GMERS, Valsad. **Results:** Six months post operatively, Harris Hip Score evaluations indicated that the Dynamic Hip Screw (DHS) was a superior implant compared to the cannulated screws. The DHS group experienced one fixation failure, while the cannulated screw group had three failures. Additionally, surgeries using cannulated cancellous screws were associated with significantly shorter operation times, reduced radiation exposure, and lower blood loss. **Conclusion:** The findings of this study support the hypothesis that the Dynamic Hip Screw (DHS) is a superior implant compared to cannulated cancellous (CC) screws for managing femoral neck fractures in young adults with Pauwels type II and III fractures, particularly in terms of functional outcomes. While the complication rate does not appear to be influenced by the choice of implant, a longer follow-up is needed to further validate these results. Despite DHS being associated with longer surgery duration, increased radiation exposure, higher blood loss, and a higher infection rate, it provides better outcomes in terms of radiological union and functional status compared to CC screws.

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

INTRODUCTION

Intracapsular fractures of the femoral neck have long posed a significant challenge for orthopedic surgeons and remain one of the more difficult fractures to manage, particularly in younger patients. With increasing frequency of high energy trauma, the incidence of fracture of neck of femur is increasing in young adults [1, 2]. While these injuries primarily affect the elderly and have a major impact on healthcare systems and society, the treatment approaches can differ based on regional practices and cultural preferences. In Western countries, total hip arthroplasty is often employed due to lifestyle and medical considerations. However, in our country, where cultural practices like squatting or sitting cross-legged are common, total hip replacement may not be ideal or practical due to its cost and limitations on movement. Preserving the natural hip joint is therefore highly desirable.

Given these factors, our study aims to assess the immediate outcomes of internal fixation for femoral neck fractures, considering the specific living conditions of the average Indian. In younger patients, fixation is considered as a orthopedic emergency [3, 4]. Both cannulated screw and DHS have the capacity for compression in the fracture site[5] but their strength for maintaining reduction is not the same.

Additionally, the configuration of cannulated screws can also influence outcomes. This study aims to compare the results of femoral neck fracture fixation using Dynamic Hip Screws versus cannulated screws.

AIM AND OBJECTIVES

This study was conducted with the following aims and objectives:

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- To assess which of two different fixation methods yields the best results in the treatment of femoral neck fractures in adults.
- To evaluate the duration required for fracture union.
- To analyze the complications associated with each fixation method.

MATERIALS AND METHODS

A randomized controlled trial was conducted in the Department of Orthopedics at GMERS Medical College, Valsad. During this study period, 40 patients with femoral neck fractures were identified and enrolled based on specific inclusion and exclusion criteria.

The **Inclusion Criteria** were:

1. Patients aged between 15 and 59 years
2. Recent history of trauma
3. Patients consenting to undergo surgery
4. No additional fractures in either lower limb
5. Fractures classified as Type II or III according to Pauwels classification

The **Exclusion Criteria** were:

The following criteria were used to exclude patients from the study:

1. Age below 15 years or above 60 years
2. Neglected femoral neck fractures
3. Patients unwilling to undergo surgery
4. Pathological fractures
5. Pauwels type I fractures

We had 20 patients in each group (DHS and CC). This study was primarily an observational prospective study. In both groups, the initial step involved reducing the fracture using a fracture table and C-arm imaging. Anatomical reduction was defined as a 160° angle between the head and neck trabecular lines in the anteroposterior view of the hip joint, and a 180° angle in the lateral view. Five degrees of varus and valgus from the anatomic position were acceptable [6].

In Group A, fixation was performed using cannulated screws. Three screws were inserted parallel to each other [2]. In group B, fixations were done with DHS and one cannulated screw of about 1.5 cm parallel and superior to the Dynamic Hip Screw [7, 8]. The patients were allowed to bear partial weight while walking for a period of 10-12 weeks depending upon radiological union of fracture. Follow-up appointments were scheduled every three months for at least one year. A failure in reduction was identified as a 5-degree increase in the varus or valgus angle between the femoral head and neck. Assessments were made on leg length discrepancy, Harris Hip Score, infection, and the healing of the fracture site. Nonunion was defined as lack of union after six months of follow-up [9].

OBSERVATION AND ANALYSIS

This study included a total of 40 cases of femoral neck fractures, with 20 cases in Group A (treated with cannulated screws) and 20 cases in Group B (treated with dynamic hip screws, DHS). The most frequently affected age group was between 25 and 40 years, with an average age of 29.4 years. Group A consisted of 16 males and 4 females, while Group B had 15 males and 5 females. Road traffic accidents were the most common cause of injury in both groups. The right side was affected in 55% of the patients. The majority of patients were from strenuous (laborer) occupations, compared to those in moderate (household) or sedentary jobs.

There were 28 transcervical fractures and 12 subcapital fractures observed. Out of these, 14 fractures were relatively stable, while 26 were relatively unstable. Additionally, 7 patients had associated injuries. More than 95% of the cases were operated on within one week of the injury, with an average interval between injury and surgery of approximately 4 days. The average duration of surgery and fluoroscopy for cannulated screw fixation was shorter compared to that for dynamic hip screw (DHS) fixation. Intraoperative blood loss was minimal with the cannulated screw fixation method. Radiological union was considered to be achieved when fracture lines were obliterated and trabecular continuity between the two fragments was visible on both AP and lateral X-rays in three cortices.

Union was observed in 35 cases within 3 months, 4 cases within 4 months, and 1 case took longer than 4 months to show union.

Intra operative details		
	Intra operative details	**Method of Fixation**
	DHS	**CC**
Mean surgical time (minutes)	70-90	50-70
Fluoroscopy Time	70	65
Blood loss (intra operative)	120-150ml	70-80ml

Union	**Method of Fixation**		**Percentage (%)**
	DHS	**CC**	
8-10weeks	6(15%)	3(7.5%)	9(22.5%)
10-12weeks	12(30%)	14(35%)	26(65%)
12-16weeks	2(5%)	3(7.5%)	5(12.5%)

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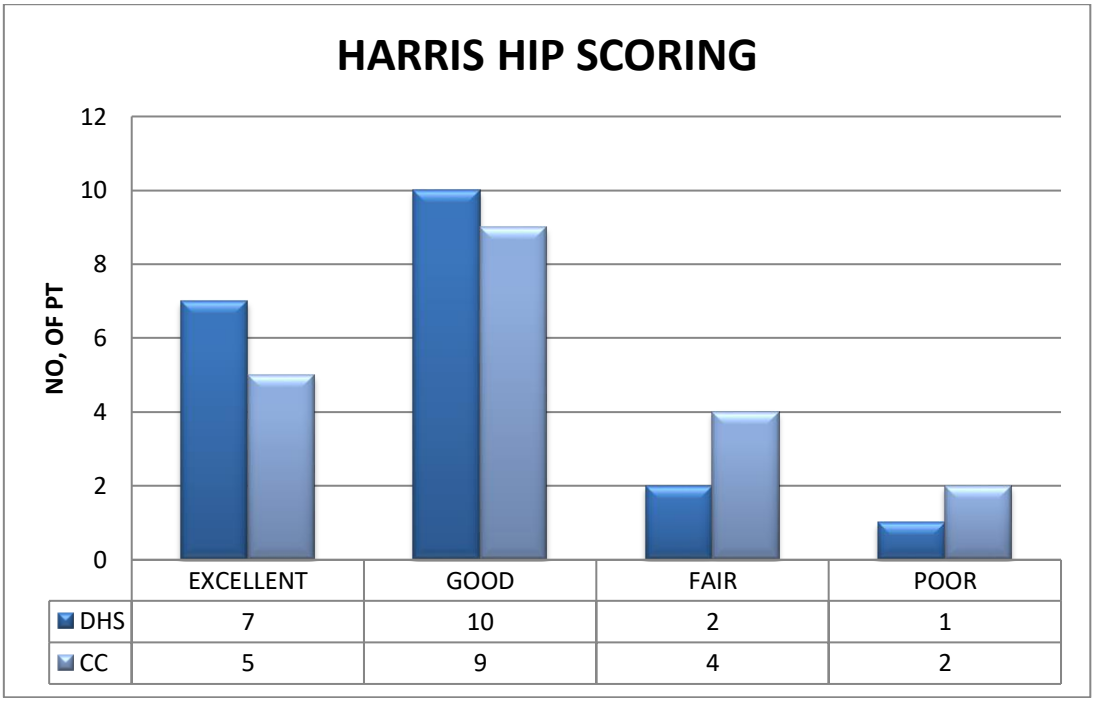
>17 weeks	0	0	0
Total	20	20	40

Table 1: Method of fixation

Complication	Method of fixation	
	DHS	CC
Infection (Superficial)	2	0
Infection (deep)	0	0
joint stiffness	0	0
Implant Failure	2	3
Varus deformity	1	2
Limping	1	1
None	14	14
Total	20	20



CASE 1 [DHS PLATE]

Figure 1 PRE OP

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Figure 2 IMMEDIATE POST OP

Figure 3 6 MONTHS POST OP

Figure 4 CLINICAL PICTURES

CASE 2 [CC SCREW]

Figure 5 PRE OP

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Figure 6 IMMEDIATE POST OP

Figure 7 6 MONTHS POST OP

Figure 8 CLINICAL PICTURES

DISCUSSION

The analysis shows no significant statistical differences between Group A (cannulated screws) and Group B (dynamic hip screws, DHS), indicating that the groups were comparable in terms of age, sex, and other factors. There was one fixation failure in the DHS group, compared to three failures in the cannulated screw group. However, cannulated screw fixation is associated with notably lower mean surgical time, fluoroscopy time, and blood loss compared to DHS.

Most of our patients, 28 (70%), were able to walk outdoors without support. Even those with poorer outcomes could walk outdoors, though not always independently; they required walking aids. Limping is a common result of internal fixation, primarily due to changes in the abductor mechanism caused by weight-bearing impaction of the neck. The exact cause of this limping cannot be precisely determined.

Various criteria were employed to evaluate the functional results following internal fixation. The primary criterion was how effectively the patient could return to their pre-injury functional status.

In India, cultural practices often require individuals to squat and sit cross-legged comfortably. To achieve this, patients need a good range of motion in hip flexion, abduction, adduction, and external rotation, as well as full knee flexion. The primary goal of the surgery was to help patients return to this high level of functional ability.

The noticeable difference between functional and radiological outcomes in our study is largely due to pain and limp, which are major factors in the Harris Hip Score system. This discrepancy reduced the number of "good" and "excellent" results observed. While pain and limp were present in most cases, none were severe enough to necessitate additional surgical procedures.

Multiple cannulated screws can be safely used to treat femoral neck fractures through minimally invasive techniques. This method provides good stability by compressing the fracture site through the lag effect of the screws, maintaining reduction with less blood loss, smaller incisions, and minimal scarring, which improves cosmetic appearance and promotes effective fracture healing.

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Dynamic Hip Screws (DHS) offer greater stability and allow for controlled collapse of the fracture, enabling earlier weight-bearing compared to the cannulated screw method. However, DHS involves longer surgery duration, increased radiation exposure, and more blood loss than the cannulated screw technique.

Both methods have their own advantages and drawbacks. They are both well-established and require considerable surgical skill for effective femoral neck fixation. Larger multicenter studies are needed for a more comprehensive evaluation of these techniques. Our findings suggest that the outcome of femoral neck fractures is more closely related to the degree of initial dislocation and any subsequent vascular damage rather than the specific fixation method used. Therefore, we recommend using the technique with which the surgeon is most experienced.

CONCLUSION

The results of this study suggest that Dynamic Hip Screws (DHS) may be a superior choice compared to cannulated screws for managing femoral neck fractures in young adults, particularly for Pauwels type II and III fractures, in terms of functional outcomes. However, the complication rate does not appear to be influenced by the choice of implant. A longer follow-up period is needed to further validate these findings.

While DHS is associated with longer surgery duration, increased radiation exposure, higher blood loss, and a higher infection rate compared to cannulated screws, it generally provides better results in terms of radiological union and functional status.

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