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**Dr. SK Bhaskar**
Sr. Professor & Head
Department of Orthopaedics
JLN Medical College & Hospital
Ajmer, Rajasthan, India

**Dr. Manish Kumar**
Resident Doctor,
Department of Orthopaedics
JLN Medical College & Hospital,
Ajmer, Rajasthan, India

**Dr. BS Rao**
Associate Professors,
Department of Orthopaedics
JLN Medical College & Hospital
Ajmer, Rajasthan, India

**Corresponding Author:**
**Dr. BS Rao**
Associate Professors,
Department of Orthopaedics
JLN Medical College & Hospital
Ajmer, Rajasthan, India

# Comparison of intracapsular fracture neck of femur treated with dynamic hip screw versus cannulated cancellous screw: A retrospective study

**Dr. SK Bhaskar, Dr. Manish Kumar and Dr. BS Rao**

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**Abstract**
**Objective:** The aim of this study was to compare clinical outcomes of young patients with intracapsular neck of femur fractures operated with dynamic hip system (DHS) or cannulated cancellous screw.
**Methods:** One hundred patients with femoral neck fractures were treated by closed reduction internal fixation with a DHS (n=50; 36 males and 14 females; mean age: 39.1 years) or cannulated cancellous screws (n=50; 36 males and 14 females; mean age: 33.2 years) between January 2014 and December 2018 at JLN Medical College and Hospital, Ajmer, Rajasthan. The groups were retrospectively studied till September 2019 (with minimum follow-up of 9 months) and compared by clinical and radiological outcome and modified Harris hip score.
**Results:** The average follow-up time was 23 months (range, 9-60 months). No statistically significant differences in the rates of nonunion (2% vs. 8%) and avascular necrosis of the femoral head (4% vs. 6%) were observed in DHS and CCS groups. DHS group has significantly less (12%) complication rate than CCS group (28%). The mean modified Harris Hip score was significantly higher in DHS group (90.05) compared to CCS group (85.34) (p value 0.015) with greater range of motion in former group.
**Conclusion:** The DHS and cannulated cancellous screws might be equally effective in terms of postoperative fracture union. However, the DHS has advantages over cannulated compression screws for lesser no. of complications, especially neck shortening, non-union and osteonecrosis, higher range of motion, more clinical and radiologically favourable outcome and a better mean modified Harris hip score.

**Keywords:** DHS, CC screw, intracapsular fracture neck of femur, modified Harris hip score

## Introduction

Intracapsular fracture neck of femur have always presented great challenges to orthopaedic surgeons and remain in many ways today the unsolved fracture as far as treatment and results are concerned [3]. Intracapsular fractures are devastating injuries that most often affect the elderly [4]. Intracapsular fractures are rare in young individuals with normal bone. The incidence of intracapsular fractures is increasing in the modern world due to high energy trauma associated with road traffic accidents [3, 4].

An important part of rationale for prompt treatment of the fracture is preservation of the blood supply to the femoral head which is critical for a satisfactory long-term result. The fracture is regarded as a vascular injury to the bone's blood supply [5, 6]. The degree of vascular compromise is thought to directly correlate with the displacement of the fracture which affects fracture union and leading to complications. Hence intracapsular fracture neck of femur is regarded as an orthopaedic emergency [4] and needs to be reduced with rigid internal fixation which is believed to improve the circulation of femoral head and prevent the non-union and avascular necrosis.

## Aims and Objectives

To compare the clinical and radiological assessment, complication and functional in fracture neck of femur treated with dynamic hip screw and cannulated cancellous screws.

## Material and Methods

### Source of Data

We retrospectively analysed all the 100 cases of intra capsular fracture neck of femur admitted in Department of Orthopaedics, JLN Medical College and Hospital, Ajmer that were operated with DHS or CCS between Jan 2014 to Dec. 2018. This study was approved by ethical committee of our hospital.

### Inclusion Criteria

Patients with age between 15 and 55 years of age with isolated fresh fracture neck of femur.

### Exclusion Criteria

Neglected fracture neck of femur, Pathological fractures, associated fracture shaft femur, Subcapital fracture neck of femur.

### Statistical Analysis

Statistical analysis was performed with the SPSS, version 21 for Windows statistical software package (SPSS Inc., Chicago, IL, USA). The Categorical data was presented as numbers (percent) and were compared among groups using Chi square test. The quantitative data was presented as mean and standard deviation and were compared by student's t-test. Probability was considered to be significant if less than 0.05.

### Outcome Analysis

Outcome analysis done with clinical and radiological assessment, complication and modified Harris Hip Score. Modified Harris Hip Score will be used for evaluation of result.

## Results and Observations

In our series, we retrospectively analysed 100 case of intracapsular neck femur in adults treated with DHS and CCS (each group 50 cases) at JLN Medical College and Hospital Ajmer between Jan 2014 to December 2018. Patients in our study were between 15-55 yrs with *mean age of group A was 39.1 years and of group B was 33.2 years and* Male to female ratio was about 5:2. 74 patients were operated within a week, 17 patients were operated in 2nd week and 7 patients operated in 3rd weeks 2 patients operated within one month. Out of 100 cases 55 were due to RTA, 45 patients were due to fall from height (FFH). In the present study, cases were classified in Garden's Type I (25 cases), Type II (36 cases), Type III (22 cases) & Type IV (17 cases).

### Postoperative Complications

There was no post-operative infection no hematoma. 4 cases treated with CC screws went into non-union and one non-union cases treated with DHS. 2 cases in group A and 3 cases in group B went into osteonecrosis

**Table 1:** Post operative complication

| | Group A | | Group B | | Total | | P value LS |
|---|---|---|---|---|---|---|---|
| | No | % | No | % | No | % | |
| Complication absent | 43 | 86 | 36 | 72 | 79 | 79.00 | 0.140 |
| Complication present | 7 | 14 | 14 | 28 | 21 | 21.00 | |
| 1. Loosening of screw | 3 | 6 | 5 | 10 | 8 | 8.00 | 0.715 |
| 2. Screw penetration | 1 | 2 | 2 | 4 | 3 | 3.00 | 1.000 |
| 3. Non-union | 1 | 2 | 4 | 8 | 5 | 5.00 | 0.362 |
| 4. Osteonecrosis | 2 | 4 | 3 | 6 | 5 | 5.00 | 1.000 |

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### Functional results on the basis of Modified Harris Hip Score (Grading)

Out of 50 cases of group A, 34 cases (68%) had excellent, 11(22%) had good, 1(2) had fair and 4 cases (8%) had poor results. In group B, 18 cases (36%) had excellent, 19 cases (38%) had good and 5 cases (10%) had fair results and 8 cases (16%) had poor results.

**Table 2:** Results of modified harris hip score

| | Group A | | Group B | | Total | |
|---|---|---|---|---|---|---|
| | No | % | No | % | No | % |
| Excellent | 34 | 68 | 18 | 36 | 52 | 52.00 |
| Good | 11 | 22 | 19 | 38 | 30 | 30.00 |
| Fair | 1 | 2 | 5 | 10 | 6 | 6.00 |
| Poor | 4 | 8 | 8 | 16 | 12 | 12.00 |
| Total | 50 | 100 | 50 | 100 | 100 | 100.00 |

Chi-square =11.056 with 3 degrees of freedom; P= 0.015 (S). Out of 100 cases 52 had excellent, 30 had good, 6 had fair and 12 had poor results. CRIF with DHS i.e. group A had about 68% excellent results. CRIF with CCS i.e. group B had about 36% excellent results.

## Discussion

Preservation of the femoral head with internal fixation is desirable in younger and more active patients with a femoral neck fracture. A healed femoral neck fracture, without the development of osteonecrosis, leads to a good functional outcome [7, 8]. Initial fracture displacement and disruption of the femoral head blood flow are contributing factors that are outside of the surgeon's control. The ability to achieve a good outcome by decreasing fixation failure and the rate of nonunion depends on several factors that the surgeon can control-namely, timing of surgery, the quality of reduction and obtaining a stable fixation [9, 11].

The treatment of intracapsular fracture neck of femur in young adults with anatomical closed reduction and stable internal fixation using Dynamic hip screw was found to give a high percentage of excellent and good results [1, 2, 7, 8] due to better compression across the fracture site and leading to early mobilization. Baitner *et al* [17]. in a biomechanical study showed that specimens stabilized using a sliding hip screw showed less inferior femoral head displacement, less shearing displacement and a much greater load to failure than did those stabilized with multiple cancellous lag screws.

Early surgical fixation by anatomical reduction preserve the blood flow and leads to restoration of blood flow in displaced fracture. In our study average delay was 6.22 days. Delay in surgery was due to late referral and late presentation in our tertiary center.

Osteosynthesis with DHS with Derotation screw and CC screws preserve a living femoral head that is better than a replacement, furthermore these procedures are less invasive than arthroplasty. Total joint replacement or hemiarthroplasty can be performed with similar results if osteosynthesis fails.

### Functional Results

The functional results in current study were made based on Modified Harris Hip Scoring system. In our study mean Modified Harris Hip score for DHS group was(90.05) as compared to CCS group (85.34).Results of our study are similar to the studies conducted by Tolga Kaplan *et al* [16], Mandeep S *et al* [18], Chen C *et al* [12]and Hou WR *et al* [13].

## Complications

**Loosening of screw and screw penetration:** In our study 3 patients had screw break out (loosening of screw) and one patient had screw penetration in group A and 5 patients had screw break out (loosening of screw) (p =0.715) and 2 patient had screw penetration in group B. (p =1.0)

**Non-union:** The rate of nonunion in present study was 8% in case of CCS and 2% in case of DHS group which is comparable to other studies (table 3). However the results were not statistically significant (p =0.362). S Kumar *et al* [19] reported that the risk factors for nonunion include delay in surgery, posterior communition, early loss of reduction and convergent screw fixation.

**AVN:** It was seen in 6% patients with CCS fixation and 4% cases with DHS fixation which compared favourably with other groups. The results did not reveal significant difference with p value=1.0.The rate of AVN depends on the quality of reduction and not on implant selection. The rate of osteonecrosis in the present study is slight less than that reported in other study, but this could go up once the patient follow-up increases. This argument is supported by the observations of Asnis and Wanek-Sgaglione L who described avascular necrosis in 11% of their patients at 2 years increasing to 22% at 8 years. The occurrence of AVN did affect the functional outcome in our series. Of the patients with osteonecrosis only two patient had symptoms severe enough to demand an operative intervention. This has been the phenomenon in other studies.

AVN and Non-union compared with other various studies.

**Table 3:** Comparison of complication with other studies

| Series | AVN (%) | | Non-union (%) | |
|---|---|---|---|---|
| | DHS | CCS | DHS | CCS |
| Tolga Kaplan *et al* [16] | 30 | 18 | 3 | 9 |
| Azhar Lakhani *et al* [14] | 12.9 | 6.4 | 0 | 10 |
| S Kumar *et al* [19] | - | 5 | - | 17.5 |
| Stephan *et al* [15] | 12 | 7 | 10 | 3 |
| Mandeep S *et al* [18] | 4.8 | 13.6 | 9.5 | 13.6 |
| Present study | 4 | 6 | 2 | 8 |

## Conclusion

Result of our study support the hypothesis that osteosynthesis with fixed angle device i.e. DHS with or without derotation screw and CC screws alone fixation preserve living femoral head that is better than a replacement. In group A (DHS group) lesser number of complications specially non-union, osteonecrosis and neck shortening high range of motion, more clinical and radiological outcome and a better Harris hip score as compared to CC screw group, we recommend fixed angle device i.e. DHS with or without derotation screw as a better and more stable implant for treatment of intracapsular fracture neck femur.

## Clinical Photographs

**Case 1: c-c screw**

**1a: Pre-operative** **1b: Post-operative 9month** **1c: Squatting** **1d: Full weight bearing**

**Fig 1:** a. preop ccs case xray, b. post-op xray c. clinical photograph of squatting d. Full weight bearing

**Case 2: DHS**

**2a: Pre-operative** **2b: 1 year post op** **2c: Squatting** **2d: Full weight bearing**

**Fig 2:** a. Preop dhs case xray, b. Post-op xray, c. Clinical photograph of squatting d. Full weight bearing

**Complications**

**3a: Avascular necrosis** **3b: Non-union** **3c: Loosening of screws**

**Fig 3:** a. AVN of dhs case b. Non-union of ccs case c. Loosening of ccs case

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