

# Evaluation Of The Functional Outcomes Following Management Of Intracapsular Femur Neck Fracture Using Cemented Bipolar Hemiarthroplasty- An Original Research

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## ABSTRACT

**Background:** Fracture of the intracapsular femur neck is a commonly reported fracture in the Department of Orthopedics. The management of the intracapsular femur neck fracture using cemented bipolar hemiarthroplasty has yielded good outcomes in elderly subjects.

**Aim:** The present study was conducted to evaluate functional outcomes following management of intracapsular femur neck fracture using cemented bipolar hemiarthroplasty.

**Materials & Methods:** The present prospective clinical study was conducted on 28 subjects diagnosed with an intracapsular femur neck fracture. After management, the results were assessed and categorized as: Poor, fair, good, and excellent based on the Harris Hip Score.

**Results:** On assessing the Harris Hip scores grading in the study subjects, it was seen that poor scores were seen in 10.71% (n=3) subjects, the Harris hip scores were fair in 25% (n=7) study subjects, the good scores were noted in 50% (n=14) study subjects, and the excellent scores were seen in 14.28% (n=4) study subjects. Concerning the radiological parameters in the study subjects, it was seen that radiological gradings were excellent, good, and poor in 50% (n=14), 39.28% (n=11), and 10.71% (n=3) study subjects respectively. The ectopic eruption was present in 17.85% (n=5) of study subjects and was absent in 88.14% (n=23) study subjects. Neck shaft angle was  $>140^\circ$  in 46.42% (n=13) study subjects and was  $110^\circ$ - $140^\circ$  in 53.57% (n=15) study subjects. Femoral anteversion was  $15\pm 5^\circ$  in 46.42% (n=13) study subjects,  $<10^\circ$  in 21.42% (n=6) study subjects, and was  $>20^\circ$  in 32.14% (n=9) study subjects.

**Conclusion:** The present study concluded that one of the best ways for managing intracapsular femur neck fracture is cemented bipolar arthroplasty which shows good clinical outcomes in

elderly subjects. To assess the complications continuous radiological and clinical testing is vital.

**Keywords:** Femoral neck, Femoral neck Fracture, Harris Hip Score, Hemiarthroplasty.

## INTRODUCTION

In older subjects with fractures, replacement of the femoral head is a good management option. However, the efficacy and clinical outcomes assessed following management are still controversial. Hip fracture has a high prevalence globally with 1.3 million fractures reported every year as per the report of 1990. By the end of 2050, this incidence is expected to increase to 4.5 million with the highest incidence is expected in Africa and Asia. Nearly 50% of the reported hip fractures are intracapsular fractures. Management of this fracture has been a controversial topic, especially in adult subjects. Fractures of the femoral neck are classified based on the fracture migration degree and the Garden classification of 1961 is the most common classification system used. Concerning the recurrence, complications, comorbidity risk, and distributed arteries being the complications of internal fixation treatment, Garden classification is based on anteroposterior radiographic images and degree of fracture displacement. However, Garden's classification has a few limitations including the viewer's poor integrity.<sup>1</sup>

IF or internal fixation remains a reliable and widely accepted treatment modality for displaced femoral neck fracture management in subjects of age less than 65 years owing to fewer failures in young subjects compared to older subjects where there is an increased risk of recurrence surgery needs and long-term implantation risks. Hemiarthroplasty was first used in 1943 by Moore and Bohlman whose prostheses are still used widely for managing fractures of the femur neck in various geographical regions. In the previous studies, promising results were reported and marked a stepping stone compared to internal fixation. However, various problems remained associated and persisted. The main complication associated were femoral stem loosening, protrusion of prosthetic head into the pelvis, and acetabular erosion.<sup>2</sup>

In the late 1960s, Christiansen introduced bipolar hemiarthroplasty where the prosthesis had an inbuilt trunnion bearing allowing few movements between the prosthesis head and stem. This showed better clinical outcomes, however, acetabular erosion still was an associated complication. The bipolar prosthesis was then introduced by Bateman in 1974 where the head element was mobile and to allow movements in the acetabulum, an additional head surface was present. The bipolar prosthesis had many advantages over unipolar endoprosthesis including the rapid return to unassisted activity, greater satisfactory results percentage, less stem loosening with cement use, less acetabular erosion incidence, less pain postoperatively, and greater movement range. Owing to the better and acceptable results with hemiarthroplasty along with the less cost associated, total hip arthroplasty is not a widely accepted method for treating these fractures.<sup>3</sup>

After 1970, cement use had gained popularity when PMMA (Polymethylmethacrylate) use was adopted by Charnley. The PMMA that was earlier used to repair dentures, was later used for anchorage of the femoral head prosthesis in the femur at the time of total hip arthroplasties. Hence, a good treatment option for managing femur neck fracture is cemented bipolar

hemiarthroplasty in older subjects. However, one study had shown increased mortality postoperatively after cemented bipolar hemiarthroplasty, and the evidence in literature is limited.<sup>4</sup> Hence, the present study was conducted to evaluate functional outcomes following management of intracapsular femur neck fracture using cemented bipolar hemiarthroplasty.

## **MATERIALS AND METHODS**

The present prospective clinical study was conducted to evaluate functional outcomes following management of intracapsular femur neck fracture using cemented bipolar hemiarthroplasty. The study was carried out at Department of Orthopaedics, Apollo Health city, Hyderabad, Telangana. The study population was comprised of the subjects visiting the Department of Orthopedics of the Institute.

The study included 28 subjects from both genders having intracapsular femur neck fractures managed at the Department of Orthopedics of the Institute. The inclusion criteria for the study were subjects having a confirmed diagnosis of intracapsular femur neck fracture that was displaced, subjects of age 50 years or more, and subjects who were willing to participate in the study. The exclusion criteria for the study were subjects having an open fracture, patients having contraindication of surgery or general anesthesia, and subjects who were less than 50 years of age.

After final inclusion, detailed history was recorded for all the subjects followed by the clinical examination. After the diagnosis of intracapsular femur neck fracture was confirmed, subjects were managed surgically using cemented bipolar hemiarthroplasty. Before surgery, all the subjects underwent pre-anesthetic evaluation and routine investigations. After the anesthetic clearance, the elective surgery was done on all the subjects followed by critical evaluation for 10-12 days. The subjects were then discharged after suture removal and were regularly assessed at subsequent recalls with radiological and clinical assessments.

The follow-up after surgery was done at 4 weeks, 6 weeks, and 6 months after discharge. The results were categorized as excellent, good, fair, and poor based on HARRIS HIP SCORE<sup>5</sup> after considering the functional outcomes of the surgery. The collected data were subjected to the statistical evaluation using SPSS software version 21 (Chicago, IL, USA) and one-way ANOVA and t-test for results formulation. The data were expressed in percentage and number, and mean and standard deviation. The level of significance was kept at  $p < 0.05$ .

## **Results**

The present prospective clinical study was conducted to evaluate functional outcomes following management of intracapsular femur neck fracture using cemented bipolar hemiarthroplasty. The study included 28 subjects from both genders having intracapsular femur neck fractures. The demographic characteristics of the study subjects are listed in Table 1. There were 60.71% (n=17) males and 39.28% (n=11) females in the study. The majority of the study subjects were in the age range of 61-70 years with 39.28% (n=11) subjects followed by 32.14% (n=9) subjects in the age range of >70 years, and at least, 28.57% (n=8) subjects were in the age range of 51-60 years. The hospital stay duration was 11-15 years in 50% (n=14) subjects followed by 28.57% (n=8) subjects with 6-10 days duration, and 3-5 days in 21.42%

(n=6) study subjects. The left side was involved in 42.85% (n=12) study subjects and right side in 57.14% (n=16) study subjects (Table 1).

On assessing the Harris Hip scores grading in the study subjects, it was seen that poor scores were seen in 10.71% (n=3) subjects, the Harris hip scores were fair in 25% (n=7) study subjects, the good scores were noted in 50% (n=14) study subjects, and the excellent scores were seen in 14.28% (n=4) study subjects as shown in Table 2.

Concerning the radiological parameters in the study subjects, it was seen that radiological gradings were excellent, good, and poor in 50% (n=14), 39.28% (n=11), and 10.71% (n=3) study subjects respectively. Ectopic eruption was present in 17.85% (n=5) study subjects and was absent in 88.14% (n=23) study subjects. Neck shaft angle was  $>140^\circ$  in 46.42% (n=13) study subjects and was  $110^\circ$ - $140^\circ$  in 53.57% (n=15) study subjects. Femoral anteversion was  $15\pm 5^\circ$  in 46.42% (n=13) study subjects,  $<10^\circ$  in 21.42% (n=6) study subjects, and was  $>20^\circ$  in 32.14% (n=9) study subjects as depicted in Table 3.

## Discussion

The present prospective clinical study was conducted to evaluate functional outcomes following management of intracapsular femur neck fracture using cemented bipolar hemiarthroplasty. The study included 28 subjects of both genders having intracapsular femur neck fractures. There were 60.71% (n=17) males and 39.28% (n=11) females in the study. The majority of the study subjects were in the age range of 61-70 years with 39.28% (n=11) subjects followed by 32.14% (n=9) subjects in the age range of  $>70$  years, and least, 28.57% (n=8) subjects were in the age range of 51-60 years. The hospital stay duration was 11-15 years in 50% (n=14) subjects followed by 28.57% (n=8) subjects with 6-10 days duration, and 3-5 days in 21.42% (n=6) study subjects. The left side was involved in 42.85% (n=12) study subjects and right side in 57.14% (n=16) study subjects. These demographics were comparable to the studies of Bhandari M et al<sup>6</sup> in 2005 and Damany DS et al<sup>7</sup> in 2005 where authors assessed subjects with comparable demographics as in the present study.

For assessment of the Harris Hip scores grading in the study subjects, it was seen that poor scores were seen in 10.71% (n=3) subjects, the Harris hip scores were fair in 25% (n=7) study subjects, the good scores were noted in 50% (n=14) study subjects, and the excellent scores were seen in 14.28% (n=4) study subjects. These results were consistent with the results of Moore AT<sup>8</sup> in 2006 and Yurdakul E et al<sup>9</sup> in 2015 where authors reported similar Harris Hip scores as of the present study in their study subjects.

For the radiological parameters in the study subjects, it was seen that radiological gradings were excellent, good, and poor in 50% (n=14), 39.28% (n=11), and 10.71% (n=3) study subjects respectively. The ectopic eruption was present in 17.85% (n=5) of study subjects and was absent in 88.14% (n=23) study subjects. Neck shaft angle was  $>140^\circ$  in 46.42% (n=13) study subjects and was  $110^\circ$ - $140^\circ$  in 53.57% (n=15) study subjects. Femoral anteversion was  $15\pm 5^\circ$  in 46.42% (n=13) study subjects,  $<10^\circ$  in 21.42% (n=6) study subjects, and was  $>20^\circ$  in 32.14% (n=9) study subjects. These results were in agreement with the findings of YS Prashanth et al<sup>10</sup> in 2017 and Peeters CM et al<sup>11</sup> in 2016 where radiographic findings comparable to the present study were reported by the authors in their studies.

## Conclusion

Within its limitations, the present study concludes that one of the best ways for managing intracapsular femur neck fracture is cemented bipolar arthroplasty which shows good clinical outcomes in elderly subjects. To assess the complications continuous radiological and clinical testing is vital. The present study had a few limitations including a small sample size, shorter monitoring period, and geographical area biases. Hence, more longitudinal studies with a larger sample size and longer monitoring period will help reach a definitive conclusion.

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## TABLES

S. No	Characteristics	Percentage (%)	Number (n=28)
1.	<b>Gender</b>		
a)	Males	60.71	17

b)	Females	39.28	11
<b>2.</b>	<b>Age range (years)</b>		
a)	51-60	28.57	8
b)	61-70	39.28	11
c)	>70	32.14	9
<b>3.</b>	<b>Hospital stay duration</b>		
a)	3-5	21.42	6
b)	6-10	28.57	8
c)	11-15	50	14
<b>4.</b>	<b>Side involved</b>		
a)	Left	42.85	12
b)	Right	57.14	16

**Table 1: Demographic characteristics of the study subjects**

S. No	Grading	Percentage (%)	Number (n)
1.	Poor	10.71	3
2.	Fair	25	7
3.	Good	50	14
4.	Excellent	14.28	4
5.	Total	100	28

**Table 2: Harris Hip scores grading in the study subjects**

12.

S. No	Parameter	Percentage (%)	Number (n)
<b>1.</b>	<b>Radiological Grading</b>		
a)	Excellent	50	14
b)	Good	39.28	11
c)	Poor	10.71	3
<b>2.</b>	<b>Ectopic orientation</b>		
a)	Present	17.85	5
b)	Absent	82.14	23
<b>3.</b>	<b>Neck shaft angle</b>		
a)	>140°	46.42	13
b)	110°-140°	53.57	15
<b>4.</b>	<b>Femoral anteversion</b>		
a)	15±5°	46.42	13
b)	<10°	21.42	6
c)	>20°	32.14	9

**Table 3: Radiological parameters in the study subjects**