

# Prospective Comparative Assessment of Cemented Versus Uncemented Hemiarthroplasty of the Hip for Displaced Neck of Femur Fractures

**Balmiki Kumar Das**

Assistant Professor, Department of Orthopaedics, ICARE Institute of Medical Sciences and Research & Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India

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Corresponding author: Dr. Balmiki Kumar Das

Conflict of interest: Nil

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## Abstract

**Aim:** To compare cemented versus uncemented hemiarthroplasty of the hip for displaced neck of femur fractures.

**Methods:** The prospective comparative study was conducted in the Department of Orthopaedics, ICARE institute of Medical sciences and Research & Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India included 50 cases of intracapsular fracture neck of femur in the elderly aged more than 60 years where 25 patients were treated by hemiarthroplasty using uncemented fenestrated prosthesis whereas 25 patients were treated with hemiarthroplasty using cemented non-fenestrated prosthesis.

**Results:** Total 50 patients with fracture neck femur were operated on for hemiarthroplasty, cemented or uncemented, during the study period. The mean age was  $66.30 \pm 5.78$  years with the cemented cohort and  $64.36 \pm 6.20$  years in the uncemented cohort. Of these, 22 (44%) were men and 28 (56%) were female. The most common mechanism of injury was a trivial fall (88%) as opposed to a road traffic accident (12%).

**Conclusion:** Bipolar hemiarthroplasty whether cemented or uncemented is an excellent treatment for fracture neck femur. No significant difference between both methods in terms of functional outcome. Cemented hemiarthroplasty results in more blood loss and takes more operative time but is associated with less post-operative pain and complication and better functional outcome.

**Keywords:** cemented, displaced femoral neck fractures, hemiarthroplasty, uncemented

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## Introduction

Hemiarthroplasty is the most common treatment for displaced fractures of the femoral neck in the elderly [1-3] and is associated with better functional outcome and fewer reoperations than internal fixation [12, 30]. A large number of prostheses have been used, and no definite conclusions have been made regarding which type of arthroplasty is preferred.

With the increase in the aging population and average life expectancy, hip fractures frequently encountered in patients older than 55 years for osteoporosis. [4] The choice of surgical treatment for displaced femoral neck fractures in adults remains as controversial now. The aim of treatment of a displaced femoral neck fracture in patients is to enable them to walk soon on

a stable and painless hip. According to the method of implant fixation, hemiarthroplasty prosthesis can be divided into 2 different types: cemented and uncemented hemiarthroplasty.

The use of uncemented components is known to increase the risk of periprosthetic fracture, and recent data from Rogmark [5] showed a greater risk of reoperations for uncemented hemiarthroplasty in patients with a fracture of the hip. Although cemented fixation has been the standard treatment for patients with a femoral neck fracture, there are reports that the process of cementation increases the risk of cardiopulmonary events. [6] Another disadvantage is that revision hemiarthroplasty will be more difficult in cemented hemiarthroplasty. The question is whether these complications could be avoided by using uncemented fixation.

The fracture neck of the femur is associated with one of the most serious health problems affecting the geriatric population. It is associated with a high risk of morbidity, low quality of life, and premature mortality. It has always presented great challenges for orthopedic surgeons. The incidence of hip fractures is 159/100,000 population in India and out of these 50% are fracture neck of the femur. [7]

Cemented bipolar prosthesis is associated with less post-operative thigh pain, as the prosthesis is firmly fixed within the femur. [6] Bone Cement Implantation Syndrome (BCIS) is side effect of using cement. The syndrome is potentially life threatening and is characterized by hypoxia and/or hypotension in combination with an unexpected loss of consciousness. However, advantages are early ambulation. In the weeks after the surgery, the bond between the femur and the stem is dependent on osseous integration. However, bone quality is generally poor in the elderly, which may lead to periprosthetic fractures during press-fit placement or inadequate bony in-growth

post-operatively, [5] loosening of the implant, pain, and gait abnormality.

The study has been carried out to study the advantages, complications, morbidity and mortality rates, the recovery to physical independence encountered in each of the procedure and to draw a conclusion based on study results as to which of the above type of implant and type of fixation would be better in the management of fracture neck of the femur for elderly.

## Methods

The prospective comparative study was conducted in the Department of Orthopaedics, ICARE institute of Medical sciences and Research & Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India included 50 cases of intracapsular fracture neck of femur in the elderly aged more than 60 years where 25 patients were treated by hemiarthroplasty using uncemented fenestrated prosthesis whereas 25 patients were treated with hemiarthroplasty using cemented non-fenestrated prosthesis.

Patients of age more than 60 years with the closed displaced neck of femur fracture were included in this study. Patients with basicervical neck femur fracture, valgus impacted fracture, pathological fracture, associated with other fractures such as ipsilateral shaft femur fracture and acetabulum fracture, active infection around the hip, and surgically unfit patients were excluded from the study.

Follow-up was performed at 1 month, 3 months, 6 months, and 1 year after the surgery. The intensity of the pain (based on visual analog scale), hip function (according to Harris hip score), radiological signs of patient's x-ray (the presence or absence of acetabular erosion, loosening of the prosthesis, heterotopic ossification), and postoperative complications were recorded.

All data including age, sex, type of treatment, intraoperative bleeding volume,

the mortality rate (during surgery until discharge), and treatment costs were collected by a questionnaire and checklist and analyzed by SPSS-19. Frequency, ratio, a mean, and standard deviation of variables were calculated, to compare quantitative variables for which chi-square

was used. Binary variables were analyzed by Fisher's exact test, and continuous outcomes were analyzed with the use of the Student's t-test (two-tailed).  $P < 0.05$  was considered significant for all analyses.

## Results

**Table 1: Demographic variables of two groups of study patients**

Variables	Uncemented (N=25)	Cemented (N=25)	P-value
Age(year) (Mean $\pm$ SD)	64.36 $\pm$ 6.20	66.30 $\pm$ 5.78	0.070
Male (%)	12(48)	10(40)	0.720
Female (%)	13(52)	15(60)	
Right side (%)	11 (44)	9 (36)	0.450
Left side (%)	14 (56)	15 (60)	
Garden Type 3	10 (40)	8 (32)	0.550
Garden Type 4	15 (60)	17 (68)	
Injury due to fall	20 (80)	22 (88)	0.620
Injury due to RTA	5 (20)	3 (12)	

50 patients with fracture neck femur were operated on for hemiarthroplasty, cemented or uncemented, during the study period. The mean age was 66.30  $\pm$  5.78years with the cemented cohort and 64.36  $\pm$  6.20years in the uncemented

cohort. Of these, 22 (44%) were men and 28(56%) were female. The most common mechanism of injury was a trivial fall (88%) as opposed to a road traffic accident (12%).

**Table 2: Comparison between total functional outcomes at 12 months**

Criteria	Uncemented		Cemented	
	Frequency	Percentage	Frequency	Percentage
Excellent	6	24	5	20
Good	8	32	10	40
Fair	5	20	5	20
Poor	6	24	5	20
Total	25	100	25	100
P value				

Total Functional outcome at 12 months by Harris Hip Score follow up was found to be statistically insignificant. In the uncemented cohort, 6 patients (24%) had excellent results; 8 patients (32%) had good results and 5 patients (20%) had fair

results and 6 patients (24%) had poor results; whereas in the cemented cohort, 5 patients (20%) had excellent results; 10 patients (40%) had good results; 5 patients (20%) had fair results and 5 patients (20%) had poor functional result.

**Table 3: Distribution of complications in both the groups**

Complications	Uncemented		Cemented	
	Frequency	Percentage	Frequency	Percentage
Death	0	0	0	0
Periprosthetic fracture	3	12	0	0
Deep Infection	0	0	0	0
Superficial Infection	2	8	1	4

Dislocation	0	0	1	4
Bedsore	3	12	2	8
BCIS	0	0	1	4
Sciatic Neuropraxia	0	0	1	4

The intraoperative and postoperative total complication rate was 24% in cemented cohort and 32% in the uncemented cohort which was not statistically significant [Table 4] ( $P < 0.05$ ).

### Discussion

Hemiarthroplasty is the most commonly used treatment for displaced femoral neck fractures in the elderly. Although the number of randomized trials is increasing, there are still problems with diversity of implants that are studied, short follow-up time, and interpretation of functional results versus reoperation and, maybe most important, rates of subsequent fractures. [3,9,10]

Many types of arthroplasties are used to treat displaced fractures of the femoral neck in the elderly. [8] There is some evidence of inferior short-term results with decreased mobility and pain when using an uncemented implant, but the diversity of implants used in clinical trials represents a problem. [3]

Neck of femur fractures is common injuries among elderly people and often due to trivial fall. The most common treatment for a displaced femoral neck fracture in the elderly is hemiarthroplasty. The most common fixation method of the femoral stem has been cementing with PMMA bone cement. However, this method has some disadvantages. The duration of surgery is longer than in uncemented techniques. Blood loss is higher and there is a risk of sudden death due to BCIS. There exists a debate about the superiority of the cemented and uncemented prosthesis. In this context, we undertook the present study to evaluate the immediate results of a comparative study of an uncemented hemiarthroplasty with cemented hemiarthroplasty in the geriatric

population. The results were analyzed and observations were made. This study was comparable with similar studies.

Figved et al, [11] found after comparing a cemented hemiarthroplasty with an uncemented, hydroxyapatite-coated implant that mean Harris hip score showed equivalence between the groups throughout the follow-up period of 1 year. In the uncemented group, the mean duration of surgery was shorter and the mean intraoperative blood loss was found to be less.

Lo et al, [12] found less thigh pain (13% versus 46.2%) and higher Harris hip scores (86 versus 79) in the cemented group in comparison with the uncemented group. In the cemented group, radiology revealed fewer radiolucent zones and prosthesis subsidence. Heterotopic ossification was more common in the cemented group.

A meta-analysis study by Li et al, [13] found that the operative time of cemented hemiarthroplasty was more than that of uncemented and was statistically significant. Blood loss during surgery was higher in cemented hemiarthroplasty but was statistically insignificant. Better functional outcome in terms of HHS was found to be higher for cemented hemiarthroplasty and was statistically significant.

A meta-analysis study by Ning et al, [14] compared cemented with uncemented hemiarthroplasty. Operative time of cemented hemiarthroplasty was more but was statistically insignificant. They did not find any statistical difference between the two groups in terms of blood loss, residual thigh pain, complication, and mortality rates. [15,16]

In our study, improvement in terms of functional outcome (HHS) and pain score

(VAS) was observed from 1 month to 12 months in both cemented and uncemented hemiarthroplasty but was not found to be statistically significant. Cemented Hemiarthroplasty takes more operative time and more blood loss when compared to uncemented. This was found to be statistically significant. Other studies showed similar results were done by Figved et al, [11] Xing Man et al, [15] and Lo et al. [12]

### Conclusion

Bipolar hemiarthroplasty whether cemented or uncemented is an excellent treatment for fracture neck femur. No significant difference between both methods in terms of functional outcome. Cemented hemiarthroplasty results in more blood loss and takes more operative time but is associated with less post-operative pain and complication and better functional outcome. For treatment of displaced femoral neck fractures, we recommend performing hemiarthroplasties using femoral stems that have performed well in THAs. Cemented and uncemented prostheses used in this trial can be recommended because they were equally good regarding functional outcome and health-related quality of life, contrary to the generalized and limited published evidence.

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