

## Original Research Article

# Cemented versus uncemented hemiarthroplasty in elderly patients with displaced femoral neck fractures

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**Received:** 27 February 2018

**Revised:** 28 March 2018

**Accepted:** 29 March 2018

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### ABSTRACT

**Background:** This study compared functional outcome and results between cemented and uncemented bipolar hemiarthroplasty in patients older than 60 years with displaced femoral neck fracture.

**Methods:** Total fifty four patients with displaced femoral neck fracture were enrolled in this study. Out of total twenty eight patients underwent uncemented bipolar hemiarthroplasty and remaining twenty six patients underwent cemented bipolar hemiarthroplasty. Physical examination and radiographs were performed at the first and sixth months after operation and results were recorded. The patient's pain and functions were evaluated with visual analogue scale and Harris Hip Score and then compared to each other.

**Results:** All patients were followed up for at least 6 months. Mean operation and bleeding times were longer in cemented group compared to the uncemented group ( $p>0.05$ ). The mean pain score was significantly less in the cemented group compared to the uncemented group ( $p=0.001$ ). Hip functional outcome based on HHS was more in the cemented ( $p=0.001$ ). The intraoperative and postoperative complication rate was higher in the uncemented group ( $p<0.05$ ).

**Conclusions:** Although higher rates of intraoperative bleeding and surgery time were seen with cemented bipolar hemiarthroplasty in older patients with femoral neck fracture compared to uncemented bipolar hemiarthroplasty, cemented bipolar hemiarthroplasty can cause less complication and improve patient's function in less time.

**Keywords:** Hemiarthroplasty, Femoral neck fractures, Uncemented, Cemented, Displaced, Intracapsular

### INTRODUCTION

It has been seen that females are more prone for femoral neck fracture and mean age of onset is 81 years. In 40-50% females and 13-22% males have risk for femoral neck fractures.<sup>1</sup>

On the basis of epidemiological studies it has been recognized that females with femoral neck fracture have several risk factors including BMI <18.5, insufficient sunlight, low activity, smoking, history of osteoporosis, positive history of hip fracture in his or her mother and prolonged treatment with corticosteroid. Usually it has

been seen that femoral neck fracture occurs after simple fall in which force is transmitted from greater trochanter to femoral neck.<sup>2</sup>

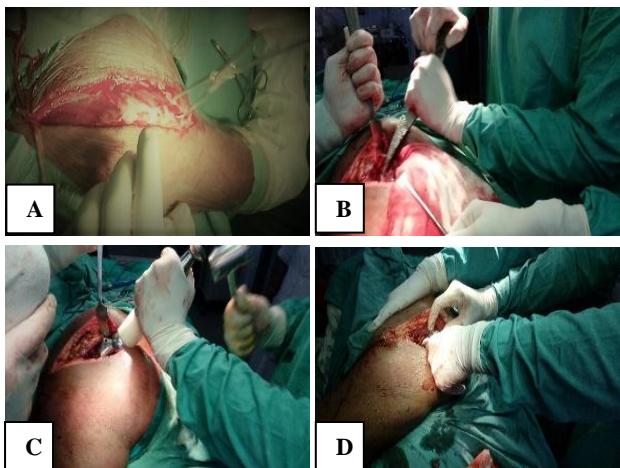
Femoral neck fracture is a most common injury which can lead to increased postoperative morbidity and mortality in elderly patients. Hemiarthroplasty, as an effective treatment<sup>3-4</sup>, contributes to early ambulation and good functional recovery. However, there has been persistent controversy over whether cemented hemiarthroplasty or uncemented hemiarthroplasty is preferable for the patient population. Cemented hemiarthroplasty will have low incidence of

periprosthetic fractures and prosthetic loosening whereas it may lead to embolism and decreased cardiac output with the insertion of bone cement.<sup>5-8</sup> However, there is a higher rate of postoperative prosthesis loosening and mid-thigh pain for uncemented hemiarthroplasty while it may achieve shorter operation time and less intraoperative blood loss.

**METHODS**

In this prospective study, total fifty four patients with displaced femoral neck fracture older than 60 years admitted in Department of orthopaedics, NMCH, Patna, and underwent bipolar hemiarthroplasty during study period of June 2015 to May 2017 were included. Patients are randomly assigned to 2 groups. i.e. Group A and Group B. Out of total twenty eight patients underwent uncemented hemiarthroplasty were included in Group A and twenty six patients underwent cemented hemiarthroplasty were included in Group B. Similar surgical approach (posterior) perioperative and follow up protocol followed for both groups. Exclusion criteria were pathological fracture, simultaneous intertrochanteric fracture, uncontrolled diabetes, severe cardiovascular disease, respiratory disease, uncontrolled neurologic disease and renal disease.

After taking written informed consent from all patients, surgeries were done through posterior (Southern/Moore’s) approach with full aseptic and antiseptic precaution.



**Figure 1 (A-D): Intra-op images (procedure).**

Follow up was performed in the first, sixth month (4 and 24 weeks after surgery) after the operation. The intensity of pain (based on visual analogue scale), hip function (according to Harris hip score), radiological signs of patients x-ray (the presence or absence of acetabular erosion loosening of prosthesis) 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 check list and analyzed by SPSS (Statistical package for Social Sciences). Frequency, ratio, mean and standard deviation of variables were calculated, to compare quantitative variables for which chi-square was used. P<0.05 was considered significant for all analysis.

**RESULTS**

All fifty four patients with fracture neck of femur fulfilled the inclusion criteria and data from hospital records and follow up were evaluated. Out of them 19 (35%) were male and 35 (65%) were female. All patients were followed up for minimum 6 months. The mean age was 79 (70-92) years with cemented groups and 71.7 (64-76) years old in un-cemented group. The mean operation time was 95 minutes in cemented group and 75 minutes in un-cemented group. The mean of intra operative bleeding volume was 450cc and 400cc in cemented and un-cemented groups respectively (p>0.05) (Table 1).

**Table 1: Demographic data of two group patients.**

Variable	Un-cemented (N=28)	Cemented (N=26)	P value
Age (years)	71.7 (64-76)	79 (70-92)	0.45
Right side (No)	8 (28%)	12 (46%)	0.8
Left side (No)	20 (72%)	14 (54%)	0.23
Male (No)	13 (46%)	6 (23%)	0.04*
Female (No)	15 (54%)	20 (77%)	0.02*
Duration of hospitalization (day)	12 (7-15)	13 (7-18)	0.67
Operative time (minutes)	75 (70-90)	95 (85-105)	0.001*
Intraoperative blood loss (ml)	400	450	0.9

\*Significant at p=0.05.

**Table 2: Mean±SD degree of residual pain at the follow up assessment.**

Postoperative week	Un-cemented (N=28) Visual analoguescale (VAS)	Cemented(N=26) Visual analogue scale (VAS)	P value
4 <sup>th</sup> week	3.2±1	2.8±0.7	0.02*
24 <sup>th</sup> week	2.6±0.9	1.8±0.6	0.001*

\*Significant at p=0.05.

**Table 3: Hip functional outcome in cemented and un-cemented group, according to HHS (Harris Hip Score) at 6 months.**

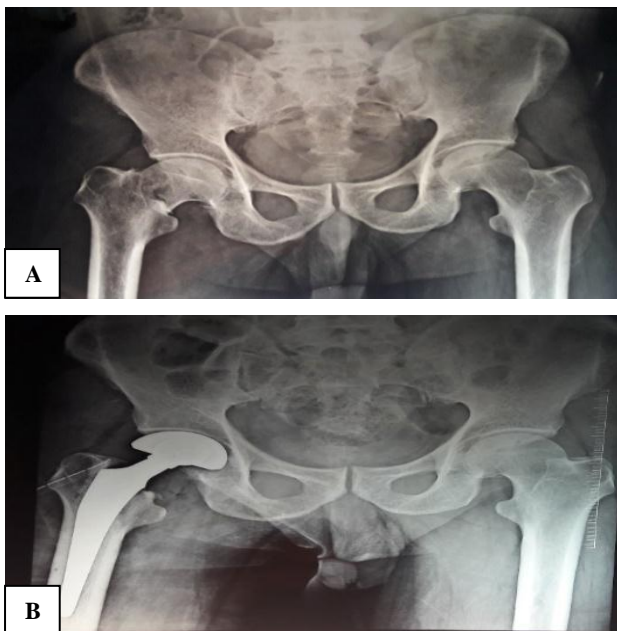
Group	Good +Excellent	Excellent	Good	Fair	Poor
<b>Cemented</b>	11 (39.3%)	8 (30.8%)	10 (38.5%)	4 (15.4%)	4 (15.4%)
<b>Un-cemented</b>	18 (69.3%)	5(17.9%)	6 (21.4)	12 (42.9%)	5 (14.3%)

The meaning of pain, according to VAS criteria was  $2.7 \pm 0.8$  after one month and  $1.8 \pm 0.6$  after 6 month in cemented group that was  $3.2 \pm 1$  and  $2.6 \pm 0.9$  in un-cemented group, respectively and there were significant differences (Table 2).

Intra-operative and post-operative total complication rate was 18.9% in cemented group and 25.5% in un-cemented group which was higher significantly ( $p < 0.05$ ).

#### Follow up x-ray

Case-cemented bipolar prosthesis.



**Figure 2: (A) Pre-op x-ray; (B) post-operative x-ray.**

#### DISCUSSION

Femoral neck fracture is more common in older people, and the mortality rate is high. About preferred treatment of femoral neck fracture is still being debated.<sup>1</sup> Because of high complications and mortality rate with non-operative treatment, recent studies are on the introduction of operative treatment that has the lowest cost and complications and results in better function in older people. Because of the need for reoperation in case of other available methods of surgical treatment, hemiarthroplasty is more preferred.<sup>9</sup>

In this prospective study, we compared cemented and un-cemented hemiarthroplasty in patients who underwent

hemiarthroplasty in the last two years in this center. We compared the Harris Hip Score (HHS) in both cemented and un-cemented hip arthroplasty and showed significant improvement in patients benefited from a cemented method. Some studies in patients which were followed for six months. The mean HHS was 83.1. Functional results in cemented group were excellent in 33%, good in 43%, fair in 17%, and poor in 7% which is similar to result of our study. The mean duration of hospitalization was 15.3 (4-29) days which in our study was 10 (3-17) days. The patients in some studies were painless in 70% had minimal pain in 20% and moderate pain in 10% after 6 months.<sup>10,11</sup>

In two valuable review studies, cemented group's patients had less pain at three months after surgery and better mobility after six months.<sup>12,13</sup> The incidence of residual pain at 6 months after surgery were 23.6% and 34.4% in cemented, un-cemented groups, respectively, which was statistically significant (Relative risk 0.69, 95% CI 0.53-0.90:0,07).<sup>13-15</sup> However, in some studies, although complications, intraoperative and postoperative fractures and subsidence in considerably more common in un-cemented group, but the mean of visual analogue scale was noted significantly different between the groups.<sup>5,12,16</sup> In our study the mean pain score was less in cemented group and it was statistically significant ( $p < 0.05$ ). Carpintero et al. in a systematic review has showed that the mean time of surgery and bleeding volume was more in cemented group that is similar to our study.<sup>17</sup> In our study, the mean operation time was 95 minutes in cemented group and 75 minutes in un-cemented group, respectively. The mean bleeding volume was 450 cc in cemented group and 400cc in un-cemented group ( $p > 0.05$ ).

Deep vein thrombosis, pulmonary emboli, fat emboli, displacement and fracture of femoral stem, superficial and deep infections are hemiarthroplasty postoperative complications.<sup>13,15,18</sup> In our study the total complication rate was 18.5% in cemented group and 25.5% in un-cemented group, which was significantly higher in cemented group ( $p < 0.05$ ).

#### CONCLUSION

In summary, this study found that a cemented hemiarthroplasty led to less residual pain in the hip, early and improved return of mobility, reduced complications and hospital stay compared to un-cemented hemiarthroplasty. There was no increase in complications or mortality related to the use of cement. In conjunction with other studies which have also reported

improved outcomes for a cemented rather than an uncemented hemiarthroplasty, we suggest that when a hemiarthroplasty is used for a fracture of the hip in elderly patients it should be cemented. At last, compared with uncemented hemiarthroplasty, the existing evidence indicates that cemented hemiarthroplasty can achieve better hip function, lower residual pain and less reoperation rate.

## ACKNOWLEDGMENTS

We are grateful to Vice Chancellor for research of Aryabhata Knowledge University of Medical Sciences for supporting this research.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the institutional ethics committee*

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**Cite this article as:** Chaurasia T, Charan R. Cemented versus uncemented hemiarthroplasty in elderly patients with displaced femoral neck fractures. *Int J Res Orthop* 2018;4:519-22.