

Original Research Article

Comparing outcomes in cemented vs uncemented hemiarthroplasty in femoral neck fractures

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ABSTRACT

Background: The optimal treatment choice for femoral neck fractures is often debated. In this study, we aimed to compare the functional outcome in elderly patients who underwent either cemented or uncemented hemiarthroplasty in our department.

Methods: This prospective study included patients who were scheduled to undergo hemiarthroplasty for femoral neck fracture in the Department of Orthopedics, Dr DY Patil University School of Medicine, Navi Mumbai. Two study groups were made. One group had patients who underwent uncemented hemiarthroplasty and the second group had patients who underwent cemented hemiarthroplasty. Surgery related information was collected from the operative notes of the surgeon. Post-operative complications, Visual Analogue Scale (VAS) scores and Harris Hip Score (HHS) were noted during the follow up period.

Results: There were 30 patients in the uncemented group and 31 in the cemented group. All the baseline demographic and clinical variables were similar in both the study groups. Mean intraoperative blood loss and operative time was significantly higher among the patients who underwent cemented hemiarthroplasty as compared to uncemented group. Mean VAS score at the first month and sixth month follow up was significantly higher among patients in the uncemented group as compared to cemented group. Functional outcome was not significantly different according to the HHS performed 6 months post-operatively.

Conclusions: Patients in the cemented group had a higher intra-operative blood loss and longer operative time. However, the pain score on the VAS were significantly lower at first and sixth month follow up. Functional outcomes were not significantly different between the two study groups.

Keywords: Cemented hemiarthroplasty, Uncemented hemiarthroplasty, Displaced femoral neck fractures

INTRODUCTION

Hip fractures are frequently encountered among the elderly population. With the current annual incidence of 0.2 to 3.8 per 1,000 per year, which is increasing every year due to increasing life expectancy, hip fractures are slowly becoming a public health problem.¹ In coming decades, number of hip fractures have been projected to increase up to 4.5 million worldwide.² For decades, surgeons have debated the optimal treatment choice for

femoral neck fractures and whether cemented hemiarthroplasty is better than uncemented, specially in the elderly. Few studies have suggested that cemented hemiarthroplasty can reduce the risk of pain and result in better functional results.³ However, recent studies have demonstrated that uncemented prostheses can achieve the same functional outcome as cemented prostheses and reduce blood loss and operation time.⁴ However, in a recent registry study comparing cemented and uncemented hemiarthroplasty, more reoperations were

detected in patients treated with uncemented hemiarthroplasty.⁵ In this study, we aimed to compare the intra- and post-operative variables and functional outcome in elderly patients who underwent either cemented or uncemented hemiarthroplasty in our department.

METHODS

Study design and sampling

This prospective study was conducted in the Department of Orthopedics, Dr DY Patil University School of Medicine, Navi Mumbai from January, 2017 till June 2018. Patients, aged 50 years or above, who were admitted and scheduled to undergo hemiarthroplasty for femoral neck fracture were included in the study. Exclusion criteria were being unfit for arthroplasty according to the anesthesiologist on call, previous symptomatic hip pathology such as osteoarthritis, pathological fracture, avascular necrosis of femoral head, patients with ongoing infectious disease, and patients who were unable to walk before the fracture. Two study groups were made. One group had patients who underwent uncemented hemiarthroplasty and the second group had patients who underwent cemented hemiarthroplasty. Patients were not randomized to either of the group and were assigned after the surgical team had consultations with the patient. All patients were explained the purpose of the study and a separate informed written consent was obtained before being included in the study. The study commenced after approval of the institutional ethics committee was obtained.

Surgical procedure

All cases were done under regional anesthesia. In lateral position, a curved incision distal to the posterior superior iliac spine was extended distally and laterally. By blunt dissection, the fibers of the gluteus maximus were separated, exposing the short external rotators. The capsule was incised and the head was delivered out of the acetabulum and the acetabulum was cleared of debris. In the cemented study group, the proximal femur was overreamed for the firm insertion of bone cement (regular polymethyl methacrylate/co-polymer bone cement) and an appropriate-sized prosthesis was inserted into the reamed canal. The bone cement was allowed to set, following which the hip joint was reduced by gentle traction and the head of the prosthesis was manipulated into the acetabulum. For the other study group, an uncemented stem with suitable size, neck length, and neck angle was utilized. Prophylactic antibiotics were used in all patients. Early mobilization with a walker was started between third postoperative day. Active hip exercises were advised for a period of 6 weeks. Regular follow-up of all cases was done at 1 month, 3 months and at the end of 6 months. At each follow-up, patients were evaluated clinically. Pain score using the Visual

Analogue Scale (VAS) and Harris hip score (HHS) was assessed at regular intervals.⁶

Data collection and data analysis

Information on patients' demographic information like age and gender and clinical characteristics like affected side and etiology were collected using a semi-structured questionnaire. Surgery related information was collected from the operation notes of the surgeon. Post-operative complications, VAS scores and HHS were noted during follow up period. Data were coded and analysed in SPSS version 21 (IBM Corp, NY). Quantitative data were described as mean and standard deviation and qualitative data as frequency and percentages. Qualitative variables were compared between the two study groups using Chi squared or Fisher's exact test. Means were compared using student's t test. A p value less than 0.05 was considered as statistically significant.

RESULTS

During the study period, after excluding ineligible patients, 65 patients were included in the study, 32 were allocated to uncemented group and 33 to cemented group. In the uncemented group, two patients were lost to follow up and thus a total of 30 patients were included in the final analysis. In the cemented group also, two patients were lost to follow up and thus a total of 31 patients were included in the final analysis. All the baseline demographic and clinical variables were similar in both the study groups. In both the study groups, 61 to 70 years was the most common age group. Mean age of patients in uncemented and cemented groups was 70.44 ± 6.21 and 71.52 ± 8.19 years respectively and the difference was statistically insignificant (Table 1). There were more females as compared to males in both the study groups and left side was observed to more commonly affected (60% in uncemented and 68% in cemented group). Fall on a flat surface (bathroom in most cases) was the most common mode of injury. Admission to surgery time was less than 7 days in 60% and 71% of the uncemented and cemented group patients. None of the patients underwent surgery after 14 days of admission. Mean intraoperative blood loss was significantly higher among the patients who underwent cemented hemiarthroplasty as compared to uncemented group (253.5 ± 17.4 vs 367.4 ± 19.5 ml; $p < 0.001$). Mean operative time was also found to significantly higher among patients in the cemented group (74.2 ± 4.69 vs 109.3 ± 5.21 minutes; $p < 0.001$). Mean days of hospital stay was similar in both the study groups (11.5 vs 12.8 days). In the uncemented group, two patients had superficial infections and one had bed sore. In the cemented group, only one patient had superficial infection. Mean VAS score at the first month follow up was significantly higher among patients in the uncemented group as compared to cemented group (3.8 ± 0.47 vs 2.7 ± 0.6 ; $p < 0.001$). Similarly, at the 6th month follow up, mean VAS score was significantly higher among patients in the uncemented group (Table

3). HHS was excellent in 27% of the uncemented group and 39% of the cemented group (Table 3). Poor functional outcome was observed in one patient in the

cemented group, while there was no such case in the uncemented group.

Table 1: Distribution of patients according to their baseline demographic and clinical characteristics.

Variables	Uncemented group (n=30)		Cemented group (n=31)		P value
	N	%	N	%	
Age distribution (in years)					
50 to 60	8	27	6	19	>0.05
61 to 70	11	37	13	42	
71 to 80	7	23	8	26	
81 to 90	6	20	4	13	
Mean	70.44±6.21		71.52±8.19		>0.05
Gender distribution					
Females	19	63	20	65	>0.05
Males	11	37	11	35	
Side affected					
Left	18	60	21	68	>0.05
Right	12	40	10	32	
Etiology					
Fall on flat surface	26	87	28	90	>0.05
Road traffic accident	4	13	3	10	

Table 2: Comparing operative details between the two patient groups.

Variables	Uncemented group (n=30)	Cemented group (n=31)	P value
Admission to surgery time (days)			
Less than 7	18 (60%)	22 (71%)	>0.05
7 to 14	12 (40%)	9 (29%)	
Intra-operative blood loss (in ml)	253.5±17.4	367.4±19.5	<0.001
Operative time (in minutes)	74.2±4.69	109.3±5.21	<0.001
Duration of hospital stay	11.5±2.1	12.8±4.2	>0.05

Table 3: Comparison of post-operative variables among the two patient groups.

Variables	Uncemented group (n=30)		Cemented group (n=31)		P value
	N	%	N	%	
Complication rate					
Superficial infection	2	7	1	3	
Periprosthetic fracture	0	0	0	0	
Bed sore	1	3	0	0	
Visual analogue scale score (mean±standard deviation)					
At 1st month follow up	3.8±0.47		2.7±0.6		<0.001
At 6th month follow up	2.9±0.8		2.1±0.7		<0.001
Harris hip score at 6th month follow up					
Excellent	8	27	12	39	>0.05
Good	19	63	14	45	
Fair	3	10	4	13	
Poor	0	0	1	3	

DISCUSSION

A displaced femoral neck fracture is one of the most common hip fractures and hemiarthroplasty is the gold standard treatment for these unstable fractures in elderly patients.⁷ Cementing the prosthesis provides more secure

fixation and may result in less post-operative thigh pain. Because the risk of loosening is less, revision rate is required in very few cases.⁸ However, cement if introduced into the femur can result in cardiac arrhythmias and cardio-respiratory collapse.⁹ Moreover, revision of cemented prosthesis is much more difficult.

While uncemented prostheses can avoid such adverse side effects, it is much more expensive than the uncemented one.¹⁰

In our study, operative time was significantly higher in cemented group. Similar to our results, a pooled analysis by Ning et al also showed an increased operation time with cemented hemiarthroplasty in comparison with uncemented hemiarthroplasty, which was statistically significant.¹¹ Patients in the cemented group also had more intra-operative blood loss, which is in contrast to what has been reported previously.¹² Furthermore, patients in the cemented group had less pain at first and sixth month follow up in our study. The pooled result of a meta-analysis by Luo et al demonstrated similar pain at 3 months post-operatively, but a significantly higher incidence of residual pain at 1 year after operation for the uncemented prosthesis (34.4%) than that for the cemented (23.6%).¹³ Previously published cohort studies suggest that a painless hip is associated with higher mobility. Thus, lower residual post-operative pain seen in patients with cemented hemiarthroplasty should imply better functional results in such patients. However we found the functional outcome to be similar among the two study groups at 6 months post-operatively.

There are a few limitations of our study. First, this is not a randomized controlled study. Patients underwent cemented or uncemented hemiarthroplasty after they had discussions with their operating surgeon and taking in to account the costs. Second, the functional outcomes and complication rates also depend on the surgical team and post-operative care provided to the patients. So the results of the present study might not be applicable to other surgical centers.

CONCLUSION

In our patient population, cemented group had a higher intra-operative blood loss and longer operative time. However, this group had only one complication of superficial infection and the pain score on the VAS were significantly lower at first and sixth month follow up. Functional outcomes were not significantly different between the two study groups. Multi-centric randomized controlled studies are required to support the results of our study.

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