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Original Article

Cemented Versus Uncemented Hemiarthroplasty for Femoral Neck Fractures in Elderly Patients

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ABSTRACT

Background: Fracture of the femoral neck is a common injury in the elderly population and is associated with significant morbidity and functional disability. Hemiarthroplasty is widely used for the management of displaced femoral neck fractures. However, the choice between cemented and uncemented hemiarthroplasty remains controversial.

Objective: To compare the clinical outcomes, operative parameters, complications, and functional results of cemented versus uncemented hemiarthroplasty in elderly patients with femoral neck fractures.

Materials and Methods: This prospective comparative study was conducted in the Department of Orthopaedics at Smt. NHL Municipal Medical College from January 2023 to December 2025. A total of 60 elderly patients (≥60 years) with displaced femoral neck fractures treated with hemiarthroplasty were included. Patients were divided into two groups: Group A (cemented hemiarthroplasty, n=30) and Group B (uncemented hemiarthroplasty, n=30). Patients were evaluated for operative time, intraoperative blood loss, postoperative complications, duration of hospital stay, and functional outcome using the Harris Hip Score (HHS) during follow-up.

Results: The mean operative time and intraoperative blood loss were higher in the cemented group (90 ± 10 minutes and 320 ± 50 ml) compared to the uncemented group (75 ± 8 minutes and 260 ± 40 ml). Complication rates were comparable between the groups, although periprosthetic fractures were slightly more common in the uncemented group. Functional outcomes assessed by Harris Hip Score were better in the cemented group, with a mean HHS of 86.5 ± 7 compared to 82.3 ± 8 in the uncemented group.

Conclusion: Both cemented and uncemented hemiarthroplasty are effective treatment options for femoral neck fractures in elderly patients. Cemented hemiarthroplasty demonstrated slightly better functional outcomes, whereas uncemented hemiarthroplasty had shorter operative time and less intraoperative blood loss.

Keywords*: Femoral neck fracture, Hemiarthroplasty, Cemented hemiarthroplasty, Uncemented hemiarthroplasty, Elderly patients, Harris Hip Score.*

INTRODUCTION

Fracture of the femoral neck is one of the most common injuries encountered in the elderly population and represents a major public health concern worldwide. The incidence of femoral neck fractures has been increasing due to the aging population, increased life expectancy, and the rising prevalence of osteoporosis. These fractures are associated with significant morbidity, mortality, loss of independence, and high healthcare costs. Early surgical management is considered the standard treatment to restore mobility, reduce complications related to prolonged immobilization, and improve functional outcomes (1).

Femoral neck fractures in elderly patients are commonly classified as intracapsular fractures and often result from low-energy trauma such as simple falls from standing height. Due to poor bone quality, compromised blood supply to the femoral head, and limited healing potential in elderly individuals, displaced femoral neck fractures are usually treated with arthroplasty rather than internal fixation. Hemiarthroplasty has become a widely accepted treatment option for displaced femoral neck fractures in elderly patients because it allows early mobilization and provides reliable pain relief (2).

Hemiarthroplasty involves replacement of the femoral head with a prosthetic implant while preserving the acetabulum. The prosthesis may be fixed to the femoral canal using bone cement (cemented hemiarthroplasty) or inserted without cement using a press-fit technique (uncemented hemiarthroplasty). Each technique has its own advantages and limitations, and the choice of fixation remains a topic of debate among orthopaedic surgeons (3).

Cemented hemiarthroplasty provides immediate stable fixation of the prosthetic stem within the femoral canal and allows early weight-bearing. It has been associated with better postoperative pain relief, improved functional outcomes, and lower rates of implant loosening. However, the use of bone cement may increase operative time, intraoperative blood loss, and the risk of bone cement implantation syndrome, which can cause hypotension and cardiopulmonary complications in elderly patients (4).

On the other hand, uncemented hemiarthroplasty avoids the risks associated with bone cement and generally requires shorter operative time. It relies on biological fixation through bone ingrowth into the prosthetic surface. However, uncemented prostheses may be associated with a higher risk of postoperative thigh pain, periprosthetic fractures, and early implant instability, particularly in patients with osteoporotic bone (5).

Several studies have compared cemented and uncemented hemiarthroplasty in terms of operative parameters, complication rates, and functional outcomes. While many authors report superior functional outcomes and lower revision rates with cemented implants, others suggest that uncemented prostheses may be preferable in selected patients due to shorter operative time and reduced physiological stress during surgery (6).

Given the ongoing debate regarding the optimal method of fixation, further clinical studies are necessary to evaluate the relative advantages and disadvantages of cemented and uncemented hemiarthroplasty. Therefore, the present prospective comparative study was conducted to evaluate and compare the clinical outcomes, operative parameters, complications, and functional results of cemented versus uncemented hemiarthroplasty in elderly patients with fractures of the femoral neck treated at Smt. NHL Municipal Medical College.

MATERIALS AND METHODS

Cemented versus Uncemented Hemiarthroplasty for Femoral Neck Fractures in Elderly Patients

Study Design and Setting

This study was a **prospective comparative study** conducted in the Department of Orthopaedics at Smt. NHL Municipal Medical College and its affiliated teaching hospital. The study was conducted over a two-year period, from January 2023 to December 2025, after obtaining approval from the Institutional Ethics Committee.

Study Population

A total of **60 elderly patients** diagnosed with **a fracture of the neck of the femur** and treated with hemiarthroplasty were included in the study. Patients were admitted through the emergency department or outpatient department and evaluated clinically and radiologically.

Patients were divided into **two groups of 30 each**:

- **Group A:** Cemented hemiarthroplasty
- **Group B:** Uncemented hemiarthroplasty

The allocation to either group was based on surgeon preference and patient characteristics.

Inclusion Criteria

1. Patients aged **≥60 years**.
2. Patients with a **displaced fracture of the neck of the femur** confirmed by radiography.
3. Patients treated with **hemiarthroplasty (cemented or uncemented prosthesis)**.
4. Patients who provided **informed written consent** and were willing to undergo follow-up.

Exclusion Criteria

1. Patients aged **<60 years**.
2. Patients with **pathological fractures**.
3. Patients with **previous surgery on the affected hip**.

4. Patients with **polytrauma or multiple fractures** affecting rehabilitation.
5. Patients medically unfit for surgery.

Preoperative Assessment
All patients underwent:

- Detailed **clinical history and physical examination**
- **Radiographic evaluation** with anteroposterior and lateral views of the hip
- Routine **laboratory investigations** including complete blood count, renal function tests, and coagulation profile
- Pre-anaesthetic assessment to determine fitness for surgery

Surgical Procedure
All procedures were performed in the **operating theatre under spinal or general anaesthesia** using standard aseptic precautions. A **posterolateral surgical approach** to the hip was used.

- In **cemented hemiarthroplasty**, the femoral stem prosthesis was fixed using **polymethylmethacrylate bone cement**.
- In **uncemented hemiarthroplasty**, the prosthesis was inserted using a **press-fit technique without cement**.

The choice of prosthesis size was determined intraoperatively based on femoral canal preparation.

Postoperative Management
Postoperative management included:

- Intravenous antibiotics and analgesics
- Thromboprophylaxis when indicated
- Early mobilization with physiotherapy beginning on the **first postoperative day**
- Weight bearing as tolerated with the assistance of a walker.

Follow-Up and Outcome Assessment
Patients were followed up at **6 weeks, 3 months, 6 months, and 12 months** postoperatively. Clinical and radiological evaluation was performed at each visit.

Outcome measures included:

- **Functional outcome using the Harris Hip Score (HHS)**
- **Postoperative complications** such as infection, dislocation, periprosthetic fracture, and implant loosening
- **Operative time, intraoperative blood loss, and hospital stay**

The Harris Hip Score is widely used to evaluate hip function after arthroplasty procedures.

Statistical Analysis
Data were entered into **Microsoft Excel** and analysed using **SPSS software**. Continuous variables were expressed as **mean ± standard deviation**, while categorical variables were expressed as **percentages**.

- **Student's t-test** was used for comparison of continuous variables.
- **Chi-square test** was used for categorical variables.
  A **p-value <0.05** was considered statistically significant.

RESULTS AND OBSERVATIONS
A total of **60 elderly patients with a fractured neck of the femur** were included in the study. Patients were divided into two groups:

- **Group A:** Cemented Hemiarthroplasty (n = 30)
- **Group B:** Uncemented Hemiarthroplasty (n = 30)

The observations were analysed with respect to **age distribution, gender distribution, side of fracture, operative parameters, complications, and functional outcome using the Harris Hip Score (HHS).**

Table 1. Age Distribution of Patients

Age Group (Years)	Cemented (n=30)	Uncemented (n=30)	Total
60–65	8	7	15
66–70	9	8	17
71–75	7	9	16
>75	6	6	12
Total	**30**	**30**	**60**

Most patients were in the **66–70 year age group**, accounting for **28.3%** of cases.

Table 2. Gender Distribution

Gender	Cemented	Uncemented	Total	Percentage
Male	12	14	26	43.3%
Female	18	16	34	56.7%
Total	**30**	**30**	**60**	**100%**

Females constituted the majority of patients (**56.7%**) due to a higher incidence of osteoporosis in elderly women.

Table 3. Side of Fracture

Side	Cemented	Uncemented	Total
Right	17	16	33
Left	13	14	27
Total	**30**	**30**	**60**

Right-sided fractures were slightly more common (**55%**).

Table 4. Mean Operative Time

Group	Mean Operative Time (minutes)
Cemented Hemiarthroplasty	90 ± 10
Uncemented Hemiarthroplasty	75 ± 8

Operative time was **longer in cemented hemiarthroplasty** compared to uncemented hemiarthroplasty.

Table 5. Mean Intraoperative Blood Loss

Group	Mean Blood Loss (ml)
Cemented Hemiarthroplasty	320 ± 50
Uncemented Hemiarthroplasty	260 ± 40

Blood loss was slightly **higher in the cemented group**.

Table 6. Postoperative Complications

Complication	Cemented (n=30)	Uncemented (n=30)
Superficial Infection	2	1
Deep Infection	1	0
Dislocation	1	2
Periprosthetic Fracture	0	2
No Complication	26	25

Overall complication rate was **comparable between both groups**, with slightly higher **periprosthetic fractures in the uncemented group**.

Table 7. Length of Hospital Stay

Group	Mean Hospital Stay (Days)
Cemented	9 ± 2
Uncemented	8 ± 2

Hospital stay was **similar in both groups**.

Table 8. Functional Outcome (Harris Hip Score at Final Follow-Up)

Outcome Category	Cemented	Uncemented
Excellent (>90)	12	8
Good (80–89)	10	11
Fair (70–79)	6	7
Poor (<70)	2	4
Total	**30**	**30**

The **cemented hemiarthroplasty group showed slightly better functional outcomes**, with more patients achieving **excellent Harris Hip Scores**.

Table 9. Mean Harris Hip Score

Group	Mean HHS
Cemented Hemiarthroplasty	86.5 ± 7
Uncemented Hemiarthroplasty	82.3 ± 8

Patients treated with **cemented hemiarthroplasty had higher mean functional scores than** those treated with uncemented hemiarthroplasty.

DISCUSSION

Fracture of the femoral neck in elderly patients is a common orthopedic problem associated with significant morbidity, mortality, and functional impairment. With increasing life expectancy and the rising prevalence of osteoporosis, the incidence of these fractures continues to increase worldwide. Hemiarthroplasty has become the preferred treatment for displaced femoral neck fractures in elderly patients because it allows early mobilization, pain relief, and restoration of function (1). The present prospective comparative study evaluated the clinical and functional outcomes of cemented versus uncemented hemiarthroplasty in 60 elderly patients.

In the present study, the majority of patients were in the age group of 66–70 years. This finding is consistent with previous studies that reported a higher incidence of femoral neck fractures in the elderly population due to decreased bone mineral density and increased risk of falls (2). Age-related osteoporosis and reduced protective reflexes contribute significantly to the occurrence of these fractures in older individuals.

Females constituted the majority of patients in our study (56.7%). This observation is in agreement with several earlier studies that have demonstrated a higher incidence of hip fractures among elderly women compared to men. The higher prevalence in females is largely attributed to postmenopausal osteoporosis, which leads to reduced bone strength and increased susceptibility to fractures following minor trauma (3).

Regarding the side of fracture, right-sided fractures were slightly more common than left-sided fractures in the present study. Similar findings have been reported in other studies, although the difference between sides is generally not considered clinically significant and may be related to the pattern of falls or limb dominance (4).

In the present study, the mean operative time was longer in the cemented hemiarthroplasty group (90 ± 10 minutes) compared to the uncemented group (75 ± 8 minutes). This difference can be attributed to the additional time required for preparation and insertion of bone cement during the procedure. Similar findings have been reported by Langslet et al., who observed longer operative times in cemented hemiarthroplasty compared to uncemented procedures (5).

Intraoperative blood loss was also slightly higher in the cemented group (320 ± 50 ml) compared to the uncemented group (260 ± 40 ml). The increased operative time and additional surgical steps involved in cementing may contribute to this difference. However, the difference in blood loss between the two groups was not clinically significant, which is consistent with previous studies comparing the two techniques (6).

Postoperative complications observed in this study included superficial infection, deep infection, dislocation, and periprosthetic fracture. The overall complication rates were comparable between both groups. However, periprosthetic fractures were observed more frequently in the uncemented group. This finding is supported by previous studies that have reported a higher incidence of intraoperative and postoperative periprosthetic fractures with uncemented stems, particularly in patients with osteoporotic bone (7).

The mean duration of hospital stay was similar in both groups, with an average of 9 ± 2 days for the cemented group and 8 ± 2 days for the uncemented group. Early mobilization and standardized postoperative rehabilitation protocols likely contributed to comparable hospital stays between the two groups. Similar findings have been reported in other comparative studies (8).

Functional outcome was assessed using the Harris Hip Score (HHS) at final follow-up. In the present study, the cemented hemiarthroplasty group demonstrated slightly better functional outcomes compared to the uncemented group. The mean HHS was 86.5 ± 7 in the cemented group and 82.3 ± 8 in the uncemented group. A greater number of patients in the cemented group achieved excellent functional results. These findings are consistent with previous studies which reported improved postoperative mobility and reduced thigh pain in patients treated with cemented prostheses (9).

The improved functional outcome observed in cemented hemiarthroplasty may be attributed to better fixation of the prosthetic stem within the femoral canal, resulting in greater implant stability and improved load distribution. In contrast, uncemented stems rely on biological fixation, which may take time to achieve and may be less reliable in osteoporotic bone (10).

Overall, the findings of the present study suggest that both cemented and uncemented hemiarthroplasty are effective treatment options for displaced femoral neck fractures in elderly patients. However, cemented hemiarthroplasty demonstrated slightly better functional outcomes, whereas uncemented hemiarthroplasty had shorter operative time and lower intraoperative blood loss. The choice of fixation method should therefore be individualized based on patient factors, bone quality, and surgeon preference.

CONCLUSION

Both cemented and uncemented hemiarthroplasty are effective treatment options for displaced femoral neck fractures in elderly patients. Cemented hemiarthroplasty showed slightly better functional outcomes with higher Harris Hip Scores, whereas uncemented hemiarthroplasty had shorter operative time and less intraoperative blood loss. Overall, cemented hemiarthroplasty provides more stable fixation and may be preferred in elderly patients with osteoporotic bone.

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