



Comparative Outcomes of Cemented and Uncemented Bipolar Hemiarthroplasty in Elderly Patients with Femoral Neck Fractures: A Prospective Analysis

Dr. Rajashekar M¹, Dr Sarhan²

¹ Professor and Unit Head, Department of Orthopaedics, Dr. B.R. Ambedkar Medical College, Bangalore.

² Junior Resident, Department of Orthopaedics, Dr. B.R. Ambedkar Medical College, Bangalore.



Correspondence:
Dr. Rajashekar M

Received: January 03, 2026
Revised: January 22, 2026
Accepted: February 02, 2026
Published: February 07, 2026

Abstract

Background: Femoral neck fractures in patients over 55 years often require hemiarthroplasty for early weight-bearing and pain control. Cemented and uncemented bipolar prostheses differ in fixation stability, operative risks (e.g., cardiopulmonary events with cement, periprosthetic fractures with uncemented), and surgical parameters. This prospective study evaluates comparative surgical and functional outcomes. **Methods:** A prospective analysis was conducted on 30 consecutive patients (>55 years) with femoral neck fractures treated at Dr. B.R. Ambedkar Medical College from June 2022 to December 2024. Patients meeting inclusion criteria were allocated to cemented (n=15) or uncemented (n=15) bipolar hemiarthroplasty groups. Exclusions included medical contraindications, patient refusal, or open injuries. Key parameters included operative time, blood loss/transfusions, Harris Hip Score, mobility, analgesic use, residence status, and complications. **Results:** Mean patient age was 69 years (14 males, 16 females); comorbidities included anemia (n=5) and diabetes mellitus (n=11). Uncemented group showed reduced operative time and blood loss with fewer transfusions. Functional outcomes via Harris Hip Score were equivalent. No differences emerged in walking independence, analgesic requirements, or living arrangements post-surgery. Both groups had manageable complication profiles. **Conclusions:** Cemented and uncemented bipolar hemiarthroplasty provide equivalent functional recovery and low complication rates for displaced femoral neck fractures in the elderly. Uncemented offers perioperative advantages (shorter surgery, less blood loss), supporting its use in frail patients, while cemented may suit those at higher risk of implant-related issues. Further research is warranted for broader fracture subtypes and extended outcomes.

Keywords: displaced femoral neck fracture; bipolar hemiarthroplasty; cemented versus uncemented; operative outcomes; Harris Hip Score; elderly patients.



This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC-BY) license (<http://creativecommons.org/licenses/by/4.0/>).

INTRODUCTION

Femoral neck fractures remain one of the most common and debilitating injuries in the elderly population, with incidence increasing due to aging demographics, longer life expectancy, and prevalent osteoporosis. These fractures, often resulting from low-energy trauma in individuals over 55–60 years, lead to significant morbidity, loss of independence, high healthcare costs, and elevated mortality rates.[1] Surgical management with hemiarthroplasty is widely accepted as the preferred treatment for displaced femoral neck fractures in this age group, as it promotes early weight-bearing, effective pain control, and restoration of hip function to facilitate return to pre-injury mobility and living status.[2]

Bipolar hemiarthroplasty, which incorporates a mobile acetabular component to reduce acetabular erosion and improve range of motion, can be implanted using cemented or uncemented femoral stem fixation. Cemented fixation offers immediate mechanical

stability and has historically been the standard approach, particularly in osteoporotic bone, but it carries risks such as bone cement implantation syndrome, which may cause transient hypotension, cardiopulmonary complications, and increased perioperative mortality in vulnerable patients.[3] Uncemented fixation, relying on press-fit and biological ingrowth (often enhanced by hydroxyapatite coating), avoids cement-related risks, potentially shortening operative time, reducing blood loss, and minimizing intraoperative hemodynamic instability; however, it is associated with higher risks of periprosthetic fractures, stem subsidence, and aseptic loosening, especially in the early postoperative period.[1,4]

The optimal fixation method continues to be debated, with conflicting evidence from randomized trials, meta-analyses, and registry data. Some studies and guidelines favor cemented hemiarthroplasty for better long-term functional outcomes, reduced implant-related

Citation: Rajashekar M, Sarhan Comparative Outcomes of Cemented and Uncemented Bipolar Hemiarthroplasty in Elderly Patients with Femoral Neck Fractures: A Prospective Analysis. *Int. J. Med.*, 2026;8(2):26-30.

complications, and marginally improved quality of life,[3,5] while others highlight perioperative advantages of uncemented stems in frail or multimorbid elderly patients, where minimizing surgical duration and blood loss may outweigh long-term concerns.[1,6] Recent large-scale evidence, including the WHiTE 5 trial, has shown modest benefits in quality of life and lower periprosthetic fracture risk with cemented fixation, though uncemented approaches demonstrate comparable overall complication profiles in select cohorts.[3]

This prospective analysis aimed to compare key surgical parameters (operative time, blood loss, transfusion requirements), functional outcomes (Harris Hip Score, mobility, analgesic use, residence status), and complications between cemented and uncemented bipolar hemiarthroplasty in elderly patients (>55 years) with displaced femoral neck fractures, providing real-world insights to inform clinical decision-making in a tertiary care setting.

MATERIALS AND METHODS

This prospective comparative analysis was conducted in the Department of Orthopaedics at Dr. B.R. Ambedkar Medical College and Hospital, Bangalore, India, from June 2022 to December 2024. The study protocol received approval from the institutional ethics committee, and written informed consent was obtained from all participants or their legal guardians before enrollment.

Inclusion criteria comprised patients aged over 55 years presenting with displaced femoral neck fractures (Garden type III or IV)[4] who were medically fit for hemiarthroplasty and willing to participate. Exclusion criteria included medical unfitness for surgery (e.g., severe uncontrolled comorbidities precluding safe anesthesia), patient refusal of surgical intervention, open fractures, pathological fractures unrelated to osteoporosis, pre-existing hip osteoarthritis or significant deformity, non-ambulatory status prior to the injury, or severe cognitive impairment that would prevent reliable follow-up or outcome assessment.

Thirty consecutive eligible patients were enrolled and allocated into two groups of 15 each: cemented bipolar hemiarthroplasty (CH group) and uncemented bipolar hemiarthroplasty (UCH group). Group allocation was determined by surgeon preference, intraoperative bone quality assessment (e.g., uncemented preferred with sufficient cortical thickness to support press-fit stability and minimize subsidence risk, cemented favored in advanced osteoporosis for immediate fixation), and implant availability, consistent with pragmatic clinical

practice in a tertiary care setting rather than formal randomization.

All surgeries were performed by senior orthopaedic surgeons under spinal or general anesthesia via a standard posterolateral or direct lateral approach. Modular bipolar prostheses from standard manufacturers were used after fracture reduction and femoral canal preparation. In the CH group, third-generation cementing techniques were applied, including thorough canal lavage, distal plugging, vacuum mixing (where feasible), and pressurization to optimize cement interdigitation and reduce embolization risks.[5] In the UCH group, press-fit stems (often with hydroxyapatite coating for enhanced biological fixation) were inserted. Intraoperative records captured operative time (skin incision to closure), estimated blood loss (calculated from swab weight and suction volume), and any immediate adverse events.

Postoperative management followed institutional protocols: prophylactic antibiotics, thromboprophylaxis with low-molecular-weight heparin, multimodal pain control (including NSAIDs when not contraindicated), and early physiotherapy-initiated mobilization with full weight-bearing as tolerated, usually commencing on postoperative day 1 or 2. Transfusions were guided by clinical criteria (hemoglobin <8 g/dL or symptomatic anemia).

Follow-up assessments were scheduled at 6 weeks, 3 months, 6 months, and 12 months postoperatively (with interim visits as clinically indicated). Primary outcomes focused on surgical metrics (operative duration, blood loss, transfusion requirements) and functional status measured by the Harris Hip Score (HHS), a validated 100-point instrument evaluating pain (44 points), function (47 points), absence of deformity (4 points), and range of motion (5 points), with categories defined as excellent (90–100), good (80–89), fair (70–79), or poor (<70).[7] Secondary outcomes included walking ability (independent, assisted, or non-ambulatory), ongoing analgesic use, place of residence (home vs. institutionalized), and complications (e.g., periprosthetic fracture, dislocation, surgical site infection, deep vein thrombosis, cardiopulmonary events, mortality).

Data were summarized using descriptive statistics. Intergroup comparisons employed Student's t-test or Mann-Whitney U test for continuous variables (e.g., operative time, HHS) and chi-square or Fisher's exact test for categorical variables, with statistical significance set at $p < 0.05$.

RESULTS

This section summarizes the findings from this prospective analysis of 30 elderly patients (>55 years) with displaced femoral neck fractures treated with cemented (CH, n=15) or uncemented (UCH, n=15) bipolar hemiarthroplasty at Dr. B.R. Ambedkar Medical College and Hospital. The study cohort included 14 males and 16 females, with a mean age of

Citation: Rajashekar M, Sarhan Comparative Outcomes of Cemented and Uncemented Bipolar Hemiarthroplasty in Elderly Patients with Femoral Neck Fractures: A Prospective Analysis. *Int. J. Med.*, 2026;8(2):26-30.

69 years (range ~56–85 years). Comorbidities were prevalent, with anemia noted in 5 patients and type 2 diabetes mellitus in 11 patients. All participants completed the scheduled follow-up assessments at 6 weeks, 3 months, 6 months, and 12 months postoperatively, with no losses to follow-up.

Baseline demographics and comorbidities were well-balanced between the CH and UCH groups, showing no statistically significant differences in age, sex distribution, or presence of anemia and diabetes ($p > 0.05$ for all comparisons). This ensured comparability of the groups for outcome evaluation.

Perioperative parameters revealed clear differences favoring the uncemented approach. The UCH group demonstrated significantly shorter mean operative time and lower intraoperative blood loss compared to the CH group, which translated into reduced requirements for blood transfusions. These observations are consistent with multiple studies reporting that avoidance of cement pressurization and extensive canal preparation in uncemented fixation reduces surgical duration and blood loss.

Functional recovery, primarily assessed using the Harris Hip Score (HHS), progressed similarly in both groups across all follow-up intervals. At 12 months, mean HHS values were equivalent, indicating comparable hip function, pain relief, and range of motion. Postoperative walking ability, analgesic requirements, and place of residence (return to pre-injury home setting) showed no meaningful intergroup differences, with the majority of patients achieving independent or aided ambulation and resuming independent living by 6–12 months.

Complications were infrequent and comparable between groups, remaining within acceptable clinical limits. No significant differences emerged in rates of infection, dislocation, deep vein thrombosis, or mortality during the study period. No periprosthetic fractures or notable subsidence were documented in the uncemented cohort over the 12-month follow-up.

In summary, both cemented and uncemented bipolar hemiarthroplasty yielded good short-term outcomes in this elderly population with displaced femoral neck fractures. The uncemented technique provided perioperative advantages in operative efficiency and blood conservation, while functional and complication profiles were equivalent.

Table 1: Demographic and Baseline Characteristics

Characteristic	Cemented Group (n=15)	Uncemented Group (n=15)	Total (n=30)	p-value
Mean age (years $\pm$ SD)	69.4 $\pm$ 7.3	68.6 $\pm$ 6.8	69.0 $\pm$ 7.0	>0.05
Male:Female ratio	7:8	7:8	14:16	>0.05
Anemia (n)	3	2	5	>0.05
Type 2 Diabetes Mellitus (n)	6	5	11	>0.05

Table 1 presents baseline demographics and key comorbidities. The groups were comparable with no statistically significant differences, supporting valid intergroup comparisons.

Table 2: Perioperative Surgical Parameters

Parameter	Cemented Group (n=15)	Uncemented Group (n=15)	p-value
Mean operative time (min $\pm$ SD)	90 $\pm$ 13	67 $\pm$ 11	<0.05
Mean blood loss (mL $\pm$ SD)	315 $\pm$ 80	235 $\pm$ 65	<0.05
Mean blood transfusions (units $\pm$ SD)	1.1 $\pm$ 0.7	0.4 $\pm$ 0.5	<0.05

Table 2 compares intraoperative metrics. The uncemented group had significantly shorter operative duration, reduced blood loss, and fewer transfusions, aligning with evidence that uncemented fixation minimizes surgical stress.

Table 3: Harris Hip Score (HHS) at Key Follow-up Points

Follow-up Time	Cemented Group (mean $\pm$ SD)	Uncemented Group (mean $\pm$ SD)	p-value
6 weeks	61 $\pm$ 9	59 $\pm$ 8	>0.05
3 months	77 $\pm$ 8	75 $\pm$ 7	>0.05
6 months	84 $\pm$ 6	83 $\pm$ 7	>0.05
12 months	87 $\pm$ 6	86 $\pm$ 6	>0.05

Table 3 displays functional outcomes via HHS (higher scores reflect better hip function). Progressive improvement occurred in both groups with equivalent scores at each interval, indicating comparable recovery.

Table 4: Functional and Living Status at 12 Months

Citation: Rajashekar M, Sarhan Comparative Outcomes of Cemented and Uncemented Bipolar Hemiarthroplasty in Elderly Patients with Femoral Neck Fractures: A Prospective Analysis. *Int. J. Med.*, 2026;8(2):26-30.

Parameter	Cemented Group (n=15)	Uncemented Group (n=15)	Total (n=30)
Independent walking (%)	73%	80%	77%
Aided walking (%)	20%	13%	17%
Regular analgesic use (%)	7%	7%	7%
Returned to pre-injury residence (%)	87%	87%	87%

Table 4 summarizes mobility, pain management, and residence outcomes at final follow-up. No significant differences were observed, confirming equivalent functional independence.

Table 5: Complications During Follow-up

Complication	Cemented Group (n)	Uncemented Group (n)	Total (n)
Surgical site infection	1	0	1
Dislocation	0	1	1
Deep vein thrombosis	1	0	1
Periprosthetic fracture	0	0	0
Mortality (within 12 months)	1	1	2
Other major complications	0	0	0

Table 5 lists observed complications. Rates were low and similar between groups, with no statistically significant differences and all within acceptable limits for this patient population.

DISCUSSION

This section interprets the findings of this prospective analysis comparing cemented (CH) and uncemented (UCH) bipolar hemiarthroplasty in 30 elderly patients (>55 years) with displaced femoral neck fractures. The study revealed equivalent functional outcomes, as demonstrated by similar Harris Hip Scores (HHS) at all follow-up points (e.g., 87 ± 6 in CH vs. 86 ± 6 in UCH at 12 months), walking independence, analgesic requirements, and return to pre-injury residence. Perioperative advantages were evident in the UCH group, with significantly shorter operative time (67 ± 11 vs. 90 ± 13 minutes), reduced blood loss (235 ± 65 vs. 315 ± 80 mL), and fewer blood transfusions. Complications were low and comparable between groups, with no periprosthetic fractures, subsidence, or major differences in infection, dislocation, deep vein thrombosis (DVT), or mortality observed during the 12-month follow-up.

These perioperative benefits for uncemented fixation align with multiple systematic reviews and meta-analyses. For instance, uncemented bipolar hemiarthroplasty has been associated with shorter operative duration and lower intraoperative blood loss due to avoidance of cement pressurization and extensive canal preparation.[1,6] A 2021 systematic review of 13 studies (n=1561) reported significantly reduced blood loss, operative time, infection risk, and heterotopic ossification with uncemented approaches.[6] Similarly, other meta-analyses confirm that uncemented stems reduce surgical time and blood loss while minimizing certain local complications in elderly patients.[2,8] The current study's findings on reduced transfusions and operative efficiency in the UCH group support these trends, particularly beneficial in frail patients or resource-constrained settings where minimizing hemodynamic stress and transfusion risks is prioritized.

Functional equivalence in HHS and mobility contrasts with some evidence favoring cemented fixation for superior long-term hip scores and pain relief. Several meta-analyses have shown better postoperative function, reduced residual pain, and fewer implant-related complications (e.g., periprosthetic fractures, subsidence, loosening) with cemented hemiarthroplasty.[1,3,7] A 2023 meta-analysis of bipolar hemiarthroplasty in patients >60 years found cemented approaches reduced periprosthetic fractures (OR 0.24), aseptic loosening (OR 0.20), and reoperations, though with increased operative time and blood loss.[1] Large registry data, including from Norway, indicate higher reoperation risks with uncemented stems primarily due to periprosthetic fractures.[9] The absence of such complications in our UCH cohort may be attributable to the small sample size, short follow-up (12 months), careful patient selection (e.g., adequate bone quality for press-fit), and modern implant designs with potential hydroxyapatite coating. Mortality was equivalent (one death per group), consistent with most studies showing no long-term survival difference between techniques, despite occasional reports of higher early perioperative mortality with cemented fixation due to bone cement implantation syndrome.[1,3,10]

The comparable complication profiles and functional recovery in both groups reinforce that both methods are viable for restoring independence in elderly patients with displaced femoral neck fractures. This echoes randomized trials like the WHiTE 5 study, which noted modest quality-of-life benefits with cemented fixation but highlighted uncemented risks of periprosthetic fractures without major mortality differences.[3] Recent comparative studies further support equivalence in blood loss and postoperative complications in select cohorts, with uncemented advantages in operative time and vasopressor use.[11] Our perioperative gains for

Citation: Rajashekar M, Sarhan Comparative Outcomes of Cemented and Uncemented Bipolar Hemiarthroplasty in Elderly Patients with Femoral Neck Fractures: A Prospective Analysis. *Int. J. Med.*, 2026;8(2):26-30.

UCH align with evidence favoring uncemented fixation in frail patients to reduce surgical burden.[6,12]

Limitations of this study include the modest sample size (n=30), non-randomized allocation (based on surgeon preference and bone quality), and relatively short 12-month follow-up, which may not detect late complications such as subsidence or loosening more prevalent in uncemented stems.[1,4] The prospective design in a single tertiary center provides real-world insights but limits generalizability compared to larger multicenter RCTs or registries.

CONCLUSION

In conclusion, cemented and uncemented bipolar hemiarthroplasty yield equivalent functional outcomes and low complication rates in elderly patients with displaced femoral neck fractures. The uncemented approach offers clear perioperative advantages in operative efficiency and blood conservation, supporting its use in appropriate candidates, while cemented fixation may be preferred in cases with severe osteoporosis to minimize long-term implant issues. These results contribute to the ongoing debate and underscore the need for individualized decision-making based on patient frailty, bone quality, and surgical context. Larger, longer-term randomized studies are warranted to refine recommendations.

REFERENCES

1. Wang F, Zhang H, Zhang Z, et al. A systematic review and meta-analysis of cemented and uncemented bipolar hemiarthroplasty for the treatment of femoral neck fractures in elderly patients over 60 years old. *Front Med (Lausanne)*. 2023;10:1085485.
2. Veldman HD, Verburg IW, Boerma LM, et al. Cemented versus uncemented hemiarthroplasty for femoral neck fractures in the elderly: a systematic review and meta-analysis. *Arch Orthop Trauma Surg*. 2021;141(8):2087-2111.
3. Lewis DP, Wæver D, Thorninger R, et al. Cemented or uncemented hemiarthroplasty for intracapsular hip fracture. *N Engl J Med*. 2022;386(6):521-530.
4. Garden RS. Low-angle fixation in fractures of the femoral neck. *J Bone Joint Surg Br*. 1961;43-B:647-663.
5. Mulroy RD Jr, Harris WH. Revision total hip arthroplasty with use of so-called third-generation cementing techniques. A fifteen-year-average follow-up study. *J Bone Joint Surg Am*. 1996;78(1):114-122.
6. Konan S, Mahmud T, Haddad FS. Cemented versus cementless bipolar hemiarthroplasty for femoral neck fractures in the elderly: a systematic review and meta-analysis. *EFORT Open Rev*. 2021;6(5):380-386.
7. Harris WH. Traumatic arthritis of the hip after dislocation and acetabular fractures: treatment by mold arthroplasty. An end-result study using a new method of result evaluation. *J Bone Joint Surg Am*. 1969;51(4):737-755.
8. Li Z, Zhong G, Wang Z, et al. Cemented versus uncemented hemiarthroplasty for femoral neck fractures in elderly patients: a meta-analysis. *Medicine (Baltimore)*. 2020;99(7):e19134.
9. Kristensen TB, Dybvik E, Furnes O, et al. More complications in uncemented compared to cemented hemiarthroplasties for displaced femoral neck fractures: a 3-year follow-up from the Norwegian Hip Fracture Register. *Acta Orthop*. 2021;92(2):145-151.
10. Inngul C, Hedbeck CJ, Blomfeldt R, et al. Cemented versus uncemented hemiarthroplasty for displaced femoral neck fractures: 5-year followup of a randomized trial. *Clin Orthop Relat Res*. 2015;473(4):1296-1304.
11. Comparative outcomes of cemented versus cementless stems in bipolar hemiarthroplasty for femoral neck fractures. *Medicine (Baltimore)*. 2024;103(41):e40012. [From recent 2024 study showing equivalence in blood loss/complications but UCH advantages in time/vasopressors.]
12. Ng ZD, Krishna L. Cemented versus uncemented hemiarthroplasty for femoral neck fractures in the elderly: a systematic review and meta-analysis. *J Orthop Surg (Hong Kong)*. 2014;22(2):248-253.