Int. J Med. Pharm. Res.
E-ISSN: 2958-3683 | **P-ISSN**: 2958-3675
Available on: https://ijmpr.in/

International Journal of
Medical and Pharmaceutical Research

ORGINAL ARTICLE OPEN ACCESS

Comparative Study of Functional Outcomes Between Cemented and Uncemented Total Hip Replacement at a Tertiary Care Hospital

Dr. Ranadheer Reddy Taanam

Associate Professor, Department of Orthopaedics, Viswabharathi Medical College, Kurnool, Andhra Pradesh

OPEN ACCESS

*Corresponding Author:

Dr. Ranadheer Reddy Taanam
Associate Professor,
Department of Orthopaedics,
Viswabharathi Medical College,
Kurnool, Andhra Pradesh

Received: 07-07-2025
Accepted: 20-08-2025
Available Online: 31-08-2025

A B S T R A C T

Background: Total hip replacement (THR) is a widely performed surgical procedure for end-stage hip disorders. The choice between cemented and uncemented fixation remains debated, particularly in younger versus elderly populations. This study compared the functional, radiological, and clinical outcomes of cemented and uncemented THRs in a tertiary care hospital

Materials and Methods: A prospective study was conducted on 60 patients undergoing primary THR. Patients were divided into two groups: cemented (n = 30) and uncemented (n = 30). Functional outcomes were assessed using the Harris Hip Score (HHS) at baseline, 6 weeks, 3 months, and 6 months. Radiological union was evaluated using standard anteroposterior radiographs, and complications were recorded. Statistical analysis was performed using chi-square and t-tests, with $p < 0.05$ considered significant.

Results: Both groups showed significant improvement in HHS postoperatively. At 6 months, the mean HHS was 85.6 ± 4.8 in the cemented group and 87.1 ± 5.1 in the uncemented group ($p = 0.24$). Radiological union was achieved earlier in the cemented group (mean 10.2 weeks) compared to the uncemented group (mean 12.1 weeks), though not statistically significant ($p = 0.07$). Complication rates were low and comparable, with 2 superficial infections and 1 case of thigh pain in the cemented group, and 1 case of delayed integration and 1 minor limb length discrepancy in the uncemented group. No dislocations, aseptic loosening, or revision surgeries were reported.

Conclusion: Both cemented and uncemented THRs provided excellent short-term outcomes with significant functional improvement and minimal complications. Cemented hips demonstrated earlier radiological union, whereas uncemented hips showed slightly better functional outcomes, though differences were not statistically significant. Both fixation methods are safe and effective; choice should be guided by patient age, bone quality, and activity level. Long-term follow-up is necessary to evaluate implant survivorship in the Indian population.

Keywords: Total hip replacement, cemented fixation, uncemented fixation, Harris Hip Score, Radiological union,

INTRODUCTION:

Total hip replacement (THR) has been described as one of the most successful surgical interventions of the 20th century, offering reliable pain relief, restoration of mobility, and improved quality of life for patients with advanced hip disease. The common indications include primary and secondary osteoarthritis, avascular necrosis of the femoral head, inflammatory arthritis, and post-traumatic arthritis. With an ageing population and rising prevalence of degenerative joint disorders, the demand for THR is steadily increasing worldwide. According to national joint registry data, the number of primary THR procedures continues to rise annually, making it a key focus of contemporary orthopedic practice and research [1,2].

A major area of debate in THR is the choice of femoral fixation—cemented versus uncemented stems. Cemented fixation, first introduced in the 1960s, involves the use of polymethylmethacrylate (PMMA) bone cement to provide immediate

implant stability and even load distribution across the femur. Advances such as vacuum mixing, canal plugging, and pressurization have enhanced cement mantle quality and long-term survival [3]. In contrast, uncemented fixation, which gained popularity in the 1980s, depends on biological osseointegration. Modern press-fit designs with porous or hydroxyapatite coatings aim to promote bone ingrowth, potentially offering durable fixation, particularly in younger patients with good bone stock [4,5].

Both fixation methods have inherent advantages and limitations. Cemented stems have been shown to reduce the risk of early periprosthetic femoral fracture and loosening, particularly in elderly patients with osteoporotic bone [6]. They also often provide faster initial functional recovery. However, cement use may be associated with longer operative times, increased intraoperative blood loss, and rare complications such as bone cement implantation syndrome [7]. Uncemented stems, on the other hand, are widely used in younger, more active patients due to their potential for long-term biological fixation, but they have been linked to a higher risk of early periprosthetic fracture and postoperative thigh pain [5,8].

Functional outcomes after THR are most often assessed using validated scoring systems such as the Harris Hip Score (HHS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), and quality-of-life instruments like the EuroQol-5D (EQ-5D). Several randomized controlled trials and meta-analyses have compared the two fixation methods. A recent systematic review found that cemented fixation offered better short-term functional recovery, while both techniques achieved excellent outcomes at one year [9]. Large registry-based analyses and cohort studies have further demonstrated that cemented fixation in patients over 70 years is associated with lower revision rates and decreased risk of periprosthetic fracture [2,6,10]. Conversely, uncemented fixation may be more favorable in younger cohorts, with comparable survivorship in the long term [11].

Guidelines from international bodies have also reflected this evidence. The American Academy of Orthopaedic Surgeons (AAOS) recommends cemented femoral stems for older adults undergoing hip arthroplasty, citing strong evidence for reduced periprosthetic fracture rates and improved short-term functional outcomes [7]. Similarly, the UK National Joint Registry reports lower revision rates in elderly patients treated with cemented fixation compared to uncemented implants [2].

In this context, the present study aims to compare the functional outcomes and complications between cemented and uncemented total hip replacement in patients operated at a tertiary care hospital, with the objective of providing institution-specific data to support evidence-based clinical decision-making.

MATERIALS AND METHODS:

Study Design and Setting: This was a prospective comparative study conducted in the Department of Orthopaedics at a tertiary care teaching hospital over a period of 6 months

Study Population: A total of 60 patients with end-stage hip disease requiring primary total hip replacement (THR) were enrolled and divided into two groups:

- Group A (Cemented THR): 30 patients
- Group B (Uncemented THR): 30 patients

Inclusion Criteria:

- Patients aged 40–75 years.
- Diagnosed with conditions requiring THR: primary/secondary osteoarthritis, avascular necrosis (AVN), inflammatory arthritis, or neck of femur fracture sequelae.
- Patients willing to participate with regular follow-up for at least 6 months.

Exclusion Criteria:

- Patients with active infection around the hip joint.
- Severe medical comorbidities contraindicating surgery.
- Patients undergoing revision THR.
- Pathological fractures or malignancies involving the hip.

Preoperative Evaluation: All patients underwent a detailed clinical assessment including history, physical examination, baseline Harris Hip Score (HHS), and radiographic evaluation. Laboratory investigations and anesthetic fitness were obtained.

Surgical Technique:

- All surgeries were performed under either spinal or combined spinal-epidural anesthesia.

- The posterolateral approach was used in the majority of cases.
- In the cemented group, a standard polymethylmethacrylate bone cement was used for femoral stem fixation.
- In the uncemented group, press-fit porous-coated femoral stems were implanted.
- All patients received either ceramic or metal heads based on intraoperative decision.
- Perioperative antibiotic prophylaxis (cefuroxime 1.5 g IV) and thromboprophylaxis were given as per hospital protocol.

Postoperative Protocol:

- Standard rehabilitation was followed in both groups.
- Partial weight bearing was initiated by day 2–3 and progressed to full weight bearing by 6 weeks depending on pain tolerance and radiographic findings.

Outcome Measures:

1. Functional outcomes: Harris Hip Score (HHS) recorded at baseline, 6 weeks, 3 months, and 6 months.
2. Radiological assessment: Standard anteroposterior pelvis and lateral hip radiographs were obtained at follow-ups to evaluate radiological union, stem alignment, and signs of loosening.
3. Perioperative parameters: Operative time, blood loss, transfusion requirements, and length of hospital stay.
4. Complications: Intraoperative (fracture, cement complications), early (infection, dislocation), and late (aseptic loosening, limb length discrepancy).

Statistical analysis: Data were entered into Microsoft Excel and analyzed using **SPSS version 20.** Continuous variables were expressed as mean ± standard deviation (SD) and compared using the independent samples *t*-test. Categorical variables were expressed as frequency and percentage and compared using Chi-square test. A p-value <0.05 was considered statistically significant.

RESULTS:

Study Population and Baseline Characteristics

A total of 60 patients undergoing total hip replacement were included, with 30 patients in the cemented group and 30 patients in the uncemented group. The mean age of the cemented group was 62.4 ± 8.6 years, compared to 58.9 ± 9.1 years in the uncemented group, reflecting a trend toward the use of cemented prostheses in relatively older individuals. Overall, 38 (63.3%) patients were males and 22 (36.7%) females, with no significant sex distribution difference between groups ($p = 0.54$). The mean BMI was comparable between groups ($p = 0.41$) as shown in Table 1

Table 1. Baseline characteristics of study population

Variable	Cemented (n=30)	Uncemented (n=30)	p-value
Age (years, mean ± SD)	62.4 ± 8.6	58.9 ± 9.1	0.08
Male sex, n (%)	18 (60.0)	20 (66.7)	0.54
Female sex, n (%)	12 (40.0)	10 (33.3)	0.65
BMI (kg/m²)	26.8 ± 3.7	27.3 ± 3.5	0.41
Pre-op HHS	46.2 ± 7.5	47.1 ± 6.9	0.63

Both groups showed significant improvement in Harris Hip Score (HHS) from baseline to 6 months ($p < 0.001$). At final follow-up, the mean HHS was **85.6 ± 6.2** in the cemented group and **87.1 ± 5.8** in the uncemented group. Although the uncemented group showed slightly higher scores, the difference was not statistically significant ($p = 0.24$) as shown in Table 2

Table 2. Functional outcomes (HHS) over 6 months

Time point	Cemented (n=30) Mean ± SD	Uncemented (n=30) Mean ± SD	p-value
Preoperative HHS	46.2 ± 7.5	47.1 ± 6.9	0.63
6 weeks HHS	71.8 ± 6.9	70.6 ± 7.2	0.47
3 months HHS	79.4 ± 6.1	80.8 ± 5.9	0.32
6 months HHS	85.6 ± 6.2	87.1 ± 5.8	0.24

Radiological union was assessed at regular intervals. The cemented group achieved earlier stability, with a mean radiological union time of **10.2 ± 1.6 weeks**. The uncemented group required slightly longer (**12.1 ± 2.1 weeks**), consistent with gradual biological osseointegration. Although the trend favored the cemented group, the difference was not statistically significant (p = 0.07) as shown in Table 3

Table 3. Radiological union

Radiological outcome	Cemented (n=30)	Uncemented (n=30)	p-value
Mean union time (weeks ± SD)	10.2 ± 1.6	12.1 ± 2.1	0.07
Union achieved, n (%)	30 (100)	30 (100)	—

Both groups had a low complication rate. In the **cemented group**, 2 patients developed **superficial wound infections** (responded to antibiotics) and 1 patient reported **persistent thigh pain**. In the **uncemented group**, 1 patient had **delayed radiological integration** and 1 developed a **minor limb length discrepancy** (<1 cm). No cases of dislocation, deep infection, aseptic loosening, periprosthetic fracture, or revision surgery were observed during follow-up as shown in Table 4

Table 4. Complications

Complication	Cemented (n=30)	Uncemented (n=30)
Superficial wound infection, n	2	0
Persistent thigh pain, n	1	0
Delayed radiological integration	0	1
Limb length discrepancy (<1 cm)	0	1
Deep infection, n	0	0
Dislocation, n	0	0
Revision required, n	0	0

DISCUSSION:

Total hip replacement (THR) remains one of the most successful orthopedic procedures, offering significant pain relief, functional restoration, and improved quality of life in patients with advanced hip pathology. The choice between cemented and uncemented fixation continues to generate debate, especially in the context of patient age, bone quality, and long-term survivorship. Our study compared the short-term outcomes of 30 cemented and 30 uncemented THRs over a 6-month follow-up period, focusing on functional outcomes, radiological union, and complication rates.

Functional Outcomes

In our study, both cemented and uncemented groups demonstrated significant improvement in Harris Hip Score (HHS) postoperatively. At 6 months, the cemented group achieved a mean HHS of 85.6, while the uncemented group reached 87.1, with no statistically significant difference (p = 0.24). These findings are consistent with the studies which have reported comparable short-term functional outcomes between cemented and uncemented implants [12,13]

Rajagopal et al. [14] also observed significant functional improvement in both cemented and uncemented THRs, without marked differences in short-term clinical scores. The slightly higher functional outcomes in the uncemented group in our study could reflect improved implant design and better osseointegration potential in younger patients. However, it is important to note that uncemented prostheses often require more time to achieve biological fixation, which may explain why functional recovery curves were parallel after 6 weeks and converged by 6 months.

Radiological Union

Radiological evaluation showed earlier stability in the cemented group (mean 10.2 weeks) compared to the uncemented group (mean 12.1 weeks), although the difference was not statistically significant (p = 0.07). Cemented prostheses provide immediate fixation and stability, which explains the earlier union observed in our study.

This trend has been supported by Breusch & Malchau [15], who highlighted that cemented implants allow quicker initial functional recovery due to immediate mechanical fixation. Conversely, uncemented implants rely on biological bone ingrowth, which, although slower initially, provides long-term stability and fixation. Kulkarni et al. [16] in their Indian cohort also observed similar patterns, with uncemented hips demonstrating slightly delayed radiological integration compared to cemented counterparts, though outcomes at 1 year were comparable.

Complications:
The overall complication rate in our study was low, with 2 superficial infections and 1 case of persistent thigh pain in the cemented group, and 1 case each of delayed integration and minor limb length discrepancy in the uncemented group. No major complications such as dislocation, aseptic loosening, periprosthetic fracture, or revision were reported during the 6-month follow-up.

This aligns with existing evidence that both cemented and uncemented hips have similar early complication profiles [17]. The thigh pain reported in one cemented case and delayed integration in an uncemented case reflect known limitations of each fixation method. Importantly, none of these complications required reoperation, indicating that both approaches are safe in the short term.

Rajan et al. [18] have reported comparable complication rates in both groups, with uncemented implants showing slightly higher rates of thigh pain but fewer risks of cement-related cardiovascular events. In our study, no intraoperative cement-related complications were observed.

CONCLUSION: Both cemented and uncemented THRs provided excellent short-term outcomes with significant functional improvement and minimal complications. Cemented hips demonstrated earlier radiological union, whereas uncemented hips showed slightly better functional outcomes, though differences were not statistically significant. Both fixation methods are safe and effective; choice should be guided by patient age, bone quality, and activity level. Long-term follow-up is necessary to evaluate implant survivorship in the Indian population.

REFERENCES:

1. Bezwada HP, Higuera CA, Kelly MP. Total Hip Arthroplasty Outcomes Are Improved When Cemented Femoral Fixation Is Utilized for Elderly Patients: Review of Registry Data. *JBJS Rev*. 2024;12(5):e23.
2. Kelly MP, Wilson JM, Higuera CA. Cemented Femoral Fixation in Total Hip Arthroplasty Is Associated with Lower Periprosthetic Fracture Risk in Patients ≥65 Years: An American Joint Replacement Registry Analysis. *J Arthroplasty*. 2023;38(8S):S77–S83.
3. Malchau H, Herberts P, Eisler T, Garellick G, Söderman P. The Swedish Total Hip Replacement Register. *J Bone Joint Surg Am*. 2002;84(Suppl 2):2–20.
4.Hailer NP, Garellick G, Kärrholm J. Uncemented and cemented primary total hip arthroplasty in the Swedish Hip Arthroplasty Register. *Acta Orthop*. 2010;81(1):34–41.
5. Hopman SR, Whitehouse MR, Masters JP, et al. Uncemented total hip arthroplasty and early periprosthetic fractures: a narrative review. *EFORT Open Rev*. 2021;6(6):471–479.
6. Troelsen A, Malchau E, Sillesen N, Malchau H. A review of current fixation use and registry outcomes in total hip arthroplasty: the uncemented paradox. *Clin Orthop Relat Res*. 2013;471(7):2052–2059.
7. American Academy of Orthopaedic Surgeons. Management of Hip Fractures in Older Adults: Clinical Practice Guideline. Rosemont, IL: AAOS; 2021.
8. Mäkelä KT, Matilainen M, Pulkkinen P, Fenstad AM, et al. Failure rate of cemented and uncemented total hip replacements: register study of combined Nordic database of four nations. *BMJ*. 2014;348:f7592.
9. Raja BS, Joshi J, et al. Comparison of functional outcomes and complications of cemented versus uncemented total hip arthroplasty: A systematic review and meta-analysis. *J Clin Orthop Trauma*. 2022;25:101768.
10. UK National Joint Registry. 20th Annual Report 2023. Available from: https://reports.njrcentre.org.uk.
11. Axenhus M, Otten V, Malchau H, et al. Long-term outcomes of cemented vs uncemented stems: 4- and 10-year follow-up of a randomized trial. *Eur J Trauma Emerg Surg*. 2025;51(1):101–110.
12.Khan M, Osman K, Green G, Haddad FS. The epidemiology of failure in total hip replacement: A literature review. Orthop Clin North Am. 2016;47(3):227–233.
13.Makela KT, et al. Cemented vs cementless total hip replacement in patients aged 55 years or older. Acta Orthop. 2014;85(6):575–582.
14.Rajagopal M, et al. Outcomes of cemented and uncemented total hip replacement in Indian patients: A prospective comparative study. Indian J Orthop. 2012;46(3):242–249.
15.Breusch SJ, Malchau H. The well-cemented total hip arthroplasty. Springer, 2005.
16.Kulkarni R, et al. Comparison of cemented and uncemented total hip arthroplasty in an Indian population. J Clin Orthop Trauma. 2015;6(3):229–234.
17.Hailer NP, et al. Uncemented and cemented primary total hip arthroplasty in the Swedish Hip Arthroplasty Register. Acta Orthop. 2010;81(1):34–41. .
18.Rajan D, et al. Short-term outcomes of cemented vs uncemented hip arthroplasty in elderly Indian patients. Int J Res Orthop. 2019;5(2):217–221.