

Functional Outcomes Following Primary Total Hip Arthroplasty at a Tertiary Care Centre: A Prospective Observational Study

Dr Rishabh Singh

Department of Orthopaedics, VDGMCC, Latur, Maharashtra, India

Abstract

Background: Primary total hip arthroplasty (THA) is performed to relieve pain and restore function in patients with advanced hip pathology. Patient-reported and clinician-based outcome measures provide an objective assessment of recovery. This study evaluated functional outcomes following primary THA at a tertiary care centre.

Methods: A prospective observational study was conducted in the Department of Orthopaedics, VDGMCC, Latur, from January 2023 to December 2024. Fifty patients aged 45–85 years undergoing primary THA were included. Functional outcome was assessed using the Harris Hip Score (HHS) and WOMAC Index. Patients were assessed preoperatively and during postoperative follow-up. Radiographs were used to assess implant position and complications. Statistical analysis used paired testing for preoperative and postoperative continuous outcomes, with $p < 0.05$ considered statistically significant.

Results: Fifty patients were included; 32 (64%) were male and 18 (36%) female. Mean age was 62.4 ± 9.7 years. Indications were avascular necrosis in 30 (60%), fracture neck of femur in 12 (24%), primary osteoarthritis in 7 (14%), and inflammatory arthritis in 1 (2%). Uncemented implants were used in 38 (76%) and cemented implants in 12 (24%). Mean HHS improved from 43.8 ± 6.2 preoperatively to 64.7 ± 5.9 at 6 weeks, 78.3 ± 6.7 at 3 months and 88.6 ± 7.1 at 6 months ($p < 0.001$). At 6 months, 21 patients (42%) had excellent, 20 (40%) good, 7 (14%) fair and 2 (4%) poor HHS results. WOMAC pain, stiffness, physical function and total scores also improved significantly (all $p < 0.001$). Reported complications included superficial infection (4%), dislocation (2%), deep-vein thrombosis (2%) and transient nerve palsy (2%); 90% had no recorded complication.

Conclusion: In this single-centre cohort, primary THA was associated with substantial improvement in hip function, pain and physical function by 6 months. Early mobilization and structured rehabilitation were integral to recovery. Larger multicentre studies with longer follow-up are required to assess predictors of outcome and implant survivorship.

Keywords: Total hip arthroplasty; Harris Hip Score; WOMAC; functional outcome; hip replacement; avascular necrosis; tertiary care

1. Introduction

Total hip arthroplasty (THA) is an established treatment for end-stage hip disease and is intended to provide durable pain relief, restore mobility and improve health-related quality of life. Its indications include osteoarthritis, avascular necrosis (AVN), inflammatory arthropathy and selected femoral neck fractures. With improvements in implant design, fixation, bearing surfaces, perioperative care and rehabilitation, assessment of THA has increasingly shifted from radiographic success alone toward functional and patient-centred outcomes.

Outcome assessment after THA requires reproducible instruments. The Harris Hip Score (HHS) incorporates pain, function, deformity and range of motion, whereas the WOMAC Index captures pain, stiffness and physical function from the patient's perspective. Both clinician-derived and patient-reported measures are useful because improvement after THA may not be fully represented by radiographic assessment alone.

Published evidence has consistently demonstrated improvement in pain and physical function following THA, although the magnitude and speed of recovery vary with age, preoperative disability, comorbidity, diagnosis, rehabilitation and other patient and treatment factors. Local outcome data remain useful because patient characteristics, access to rehabilitation, expectations and healthcare resources differ between populations.

The present study was undertaken to evaluate functional outcomes after primary THA in a tertiary care centre using standardized functional measures. Secondary observations included the distribution of indications, implant fixation, complications and the clinical course of postoperative recovery.

2. Materials and Methods

Study design and setting

This prospective observational study was conducted in the Department of Orthopaedics, VDGMC, Latur, over 24 months from January 2023 to December 2024. The thesis protocol states that Institutional Ethics Committee approval was obtained (IEC/TCC/2022-156, dated 15 December 2022) and that written informed consent was obtained from participants.

Participants

Fifty consecutive patients fulfilling the study criteria were enrolled. The stated inclusion criteria were age above 45 and below 85 years, hip fracture/osteoporosis treated with total hip arthroplasty, fracture presentation within 1–14 days where applicable, and either sex. Exclusion criteria included revision arthroplasty, active infection, malignancy or metabolic bone disease, bilateral arthroplasty in a single sitting, incomplete records or loss to follow-up, associated pelvic fractures, pathological fractures, pregnancy/lactation, compound pelvic fractures, unwillingness to participate and psychiatric illness with associated comorbidity as specified in the thesis.

Operative and perioperative protocol

Operations were performed by experienced orthopaedic surgeons using standardized arthroplasty protocols. Approaches included posterior (Southern/Moore), direct lateral (Hardinge), anterolateral (Watson-Jones) and direct anterior approaches. Fixation was cemented, uncemented or hybrid according

to patient factors, bone quality and surgeon preference. Implant components included femoral stems, acetabular cups and bearing surfaces; the thesis reports use of components from Zimmer Biomet, DePuy Synthes and Smith & Nephew. Perioperative antibiotic prophylaxis, thromboprophylaxis and postoperative pain management were provided according to institutional protocol.

Rehabilitation

Mobilization was initiated from postoperative day one where clinically appropriate. Rehabilitation included progressive weight bearing, hip range-of-motion exercises, strengthening and gait training, with weight-bearing restrictions individualized to the patient.

Outcome assessment

The primary functional outcome measure was the HHS. The score ranges from 0 to 100, incorporating pain, function, absence of deformity and range of motion. The thesis categorized scores as poor (<70), fair (70–79), good (80–89) and excellent (90–100). WOMAC was used as a patient-reported measure of pain, stiffness and physical function. The thesis also describes VAS, timed up-and-go testing and goniometric assessment, although the principal numerical results reported for the cohort were HHS and WOMAC.

Radiographic assessment

Anteroposterior and lateral radiographs of the pelvis/operated hip were obtained to assess implant position and alignment and to identify loosening, subsidence or periprosthetic fracture.

Statistical analysis

Continuous variables were summarized as mean±standard deviation and categorical variables as frequencies and percentages. Paired t-test or Wilcoxon signed-rank testing was planned for preoperative/postoperative comparisons, with chi-square or Fisher's exact test for categorical variables. A p-value <0.05 was considered statistically significant. The thesis reports statistical analysis using SPSS, although another section of the protocol mentions STATA; the exact software version should therefore be verified before submission.

3. Results

Patient characteristics

The cohort comprised 50 patients. There were 32 males (64%) and 18 females (36%). Mean age was 62.4±9.7 years, with a reported range of 45–82 years. The right hip was involved in 27 patients (54%) and the left hip in 23 (46%).

Indications and fixation

AVN was the most frequent indication, occurring in 30 patients (60%), followed by fracture neck of femur in 12 (24%), primary osteoarthritis in 7 (14%) and inflammatory arthritis in 1 (2%). All 50 patients underwent THA. Uncemented fixation was used in 38 patients (76%) and cemented fixation in 12 (24%).

Functional outcome

Mean HHS improved progressively from 43.8 ± 6.2 preoperatively to 64.7 ± 5.9 at 6 weeks, 78.3 ± 6.7 at 3 months and 88.6 ± 7.1 at 6 months. The reported comparison between preoperative and 6-month HHS was statistically significant ($p < 0.001$).

At 6 months, 21 patients (42%) had an excellent HHS, 20 (40%) good, 7 (14%) fair and 2 (4%) poor. Thus, 41 patients (82%) had good-to-excellent HHS at 6 months.

WOMAC outcomes

The reported WOMAC pain score improved from 16.4 ± 3.2 preoperatively to 4.1 ± 2.0 at 6 months; stiffness improved from 6.2 ± 1.4 to 2.0 ± 1.1 ; physical function improved from 54.1 ± 7.6 to 15.8 ± 5.3 ; and total WOMAC improved from 76.7 ± 8.1 to 21.9 ± 6.1 . All reported comparisons were statistically significant at $p < 0.001$. Because higher WOMAC scores represent worse symptoms in the thesis scoring framework, the reduction represents improvement.

Complications

Two patients (4%) developed superficial infection, one (2%) sustained hip dislocation, one (2%) developed deep-vein thrombosis and one (2%) had transient nerve palsy. Forty-five patients (90%) had no recorded complication. The thesis states that no reoperation or revision was required during the study period.

Radiographic and rehabilitation observations

The study protocol included serial radiographic assessment and structured rehabilitation. The thesis describes early mobilization, individualized weight bearing, strengthening and gait training. Detailed numerical correlations between radiographic parameters, rehabilitation adherence and HHS were not reported in the tabulated results and are therefore not presented as inferential findings in this manuscript.

4. Discussion

The principal finding of this prospective cohort was substantial functional improvement following primary THA. Mean HHS increased from 43.8 preoperatively to 88.6 at 6 months, while WOMAC pain, stiffness and physical-function scores decreased significantly. These findings support the central role of THA in relieving pain and restoring function in patients with advanced hip pathology.

The magnitude of HHS improvement is clinically meaningful. In the present cohort, the mean increase was 44.8 points by 6 months, and 82% of patients achieved good-to-excellent HHS categories. The progressive improvement at 6 weeks and 3 months suggests that functional recovery continued throughout the early postoperative period rather than being confined to the immediate postoperative phase.

The distribution of indications is also relevant. AVN accounted for 60% of procedures, exceeding primary osteoarthritis and fracture neck of femur. This reflects the heterogeneous tertiary-care population represented by the study and emphasizes that outcome data from a single centre should be interpreted in the context of its case mix.

Both clinician-based and patient-reported outcomes improved. The HHS captures functional domains including gait and activities, whereas WOMAC emphasizes pain, stiffness and physical function from the patient's perspective. Use of more than one outcome instrument strengthens interpretation because functional recovery is multidimensional. Previous work has demonstrated the value of validated hip-specific outcome measures and patient-reported assessments after THA.

The cohort contained a predominance of uncemented implants (76%). The thesis reports no statistically significant difference in functional outcome between cemented and uncemented arthroplasty. However, because the present manuscript does not contain a complete subgroup table with means, standard deviations, confidence intervals and a between-group p-value, this observation should be regarded as descriptive rather than as definitive evidence of equivalence between fixation strategies.

Postoperative rehabilitation was standardized around early mobilization, progressive weight bearing, strengthening and gait training. The study's clinical observations suggest that structured rehabilitation formed an important part of recovery. Nevertheless, because rehabilitation adherence was not quantified and no adjusted analysis was reported, a causal relationship between rehabilitation intensity and outcome cannot be established from this cohort.

The complication profile was acceptable within the context of the reported cohort, with 90% of patients having no recorded complication. Superficial infection occurred in 4%, while dislocation, deep-vein thrombosis and transient nerve palsy each occurred in 2%. No revision or reoperation was reported. The small sample and short follow-up mean that uncommon and late complications may be underestimated.

Several methodological issues should be acknowledged. First, the study is single-centre and includes only 50 patients, limiting precision and generalizability. Second, the inclusion criteria in the thesis contain wording that emphasizes fracture/osteoporosis, whereas the actual cohort includes AVN, osteoarthritis and inflammatory arthritis; this should be clarified in the final institutional protocol and manuscript. Third, the thesis contains differing descriptions of follow-up and outcomes: the results section provides detailed HHS and WOMAC data through 6 months, whereas later sections mention 12-month HHS/OHS values. Because the underlying 12-month dataset is not presented in the tabulated results available for this manuscript, the primary reported analysis has been restricted to the 6-month data.

The study nevertheless provides useful real-world data from an Indian tertiary-care setting. Future research should use a larger multicentre cohort, prespecify primary and secondary outcomes, retain complete follow-up data, report confidence intervals and effect sizes, and use multivariable analysis to identify independent predictors of functional recovery. Longer-term follow-up is also needed to evaluate implant survivorship, aseptic loosening, wear, instability and revision.

5. Conclusion

Primary total hip arthroplasty was associated with substantial improvement in pain and functional status in this 50-patient prospective tertiary-care cohort. Mean HHS improved from 43.8 ± 6.2 preoperatively to 88.6 ± 7.1 at 6 months, and 82% of patients achieved good-to-excellent HHS results. WOMAC pain, stiffness and physical-function scores also improved significantly. These findings support the

effectiveness of primary THA for restoring function across a heterogeneous group of hip disorders. Larger multicentre studies with complete long-term follow-up and robust predictor analysis are required before the findings can be generalized more broadly.

Table 1. Baseline characteristics of the study population

Variable	n (%) / Mean±SD
Total patients	50 (100%)
Male	32 (64%)
Female	18 (36%)
Age, years	62.4±9.7
Right hip	27 (54%)
Left hip	23 (46%)

Table 2. Indications and implant fixation

Variable	n (%)
Avascular necrosis	30 (60%)
Fracture neck of femur	12 (24%)
Primary osteoarthritis	7 (14%)
Inflammatory arthritis	1 (2%)
Uncemented THA	38 (76%)
Cemented THA	12 (24%)

Table 3. Harris Hip Score over follow-up

Time point	Mean HHS±SD	Interpretation
Preoperative	43.8±6.2	Poor
6 weeks	64.7±5.9	Fair
3 months	78.3±6.7	Fair–Good
6 months	88.6±7.1	Good–Excellent
Pre-op vs 6 months	p<0.001	Significant

Table 4. WOMAC outcomes

Domain	Preoperative	6 months	p value
Pain	16.4±3.2	4.1±2.0	<0.001
Stiffness	6.2±1.4	2.0±1.1	<0.001
Physical function	54.1±7.6	15.8±5.3	<0.001
Total WOMAC	76.7±8.1	21.9±6.1	<0.001

Table 5. Complications

Complication	n (%)
Superficial infection	2 (4%)
Hip dislocation	1 (2%)
Deep-vein thrombosis	1 (2%)
Transient nerve palsy	1 (2%)

No recorded complication	45 (90%)
--------------------------	----------

References

1. Learmonth ID, Young C, Rorabeck C. The operation of the century: total hip replacement. *Lancet*. 2007;370(9597):1508-1519. doi:10.1016/S0140-6736(07)60457-7.
2. Kalairajah Y, Azurza K, Hulme C, Molloy S, Drabu KJ. Health outcome measures in the evaluation of total hip arthroplasties—a comparison between the Harris hip score and the Oxford hip score. *J Arthroplasty*. 2005;20(8):1037-1041. doi:10.1016/j.arth.2005.04.017.
3. Dawson J, Fitzpatrick R, Carr A, Murray D. Questionnaire on the perceptions of patients about total hip replacement. *J Bone Joint Surg Br*. 1996;78(2):185-190. doi:10.1302/0301-620X.78B2.0780185.
4. Ethgen O, Bruyère O, Richy F, Dardennes C, Reginster JY. Health-related quality of life in total hip and total knee arthroplasty: a qualitative and systematic review of the literature. *J Bone Joint Surg Am*. 2004;86(5):963-974. doi:10.2106/00004623-200405000-00012.
5. Rolfson O, Bohm E, Franklin P, et al. Patient-reported outcome measures in arthroplasty registries. *Acta Orthop*. 2016;87(Suppl 362).
6. Wylde V, Blom AW. Assessment of outcomes after hip arthroplasty. *Hip Int*. 2009;19(1):1-7.
7. Singh JA. Epidemiology of knee and hip arthroplasty: a systematic review. *Open Orthop J*. 2011;5:80-85.
8. Jones CA, Beaupre LA, Johnston DW, Suarez-Almazor ME. Total joint arthroplasties: current concepts of patient outcomes after surgery. *Rheum Dis Clin North Am*. 2007;33(1):71-86.
9. Nilsson AK, Petersson IF, Roos EM, Lohmander LS. Predictors of patient-relevant outcome after total hip replacement for osteoarthritis: a prospective study. *Ann Rheum Dis*. 2003;62(10):923-930.
10. Kennedy DM, Hanna SE, Stratford PW, Wessel J, Gollish JD. Assessing recovery and establishing prognosis following total hip and knee arthroplasty. *Phys Ther*. 2006;86(10):1406-1415.
11. Pivec R, Johnson AJ, Mears SC, Mont MA. Hip arthroplasty. *Lancet*. 2012;380(9855):1768-1777.

Declarations for submission

Ethics approval: Institutional Ethics Committee approval is reported in the thesis as IEC/TCC/2022-156, dated 15 December 2022.

Informed consent: Written informed consent is reported as obtained from all participants.

Funding: To be confirmed by the author before submission.

Conflict of interest: To be confirmed by the author before submission.

Data availability: The underlying patient-level master chart should be retained by the institution and supplied only in accordance with institutional and journal requirements.

Author contribution: Dr Rishabh Singh—study conception, data collection/analysis, manuscript preparation and final approval. This statement should be amended if additional authors contributed.

Important submission note: The thesis contains internal inconsistencies regarding 6-month versus 12-month follow-up and the statistical software used. These should be reconciled against the original case record/master chart before journal submission.