

A Retrospective Observational Study on the Outcomes of Total Hip Arthroplasty in Patients with Osteoarthritis of Hip

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Abstract

Total hip arthroplasty (THA) is a common surgical procedure for patients with osteoarthritis (OA) of the hip. This study aims to evaluate the outcomes of THA in patients with OA, focusing on pain relief, functional improvement, and complication rates over a follow-up period of up to one year. This retrospective observational study reviewed medical records of 150 patients who underwent THA for hip OA between September 2021 and May 2023. Data on demographics, preoperative and postoperative pain (measured using the visual analog scale), functional status (assessed by the Harris hip score), and postoperative complications were collected and analysed. The average age of patients was 65 years, with a male-to-female ratio of 1:1.5. Significant improvements were observed in pain and function scores postoperatively. The mean preoperative pain score was 8.2 (± 1.3), which improved to 2.1 (± 1.1) postoperatively ($p < 0.001$). The mean Harris hip score improved from 42.5 (± 10.3) preoperatively to 85.7 (± 8.4) postoperatively ($p < 0.001$). The overall complication rate was 12%, with the most common complications being prosthetic joint infection and dislocation. Thus, THA provides significant pain relief and functional improvement up to one year postoperatively in patients with hip OA. Despite the risks of complications, the benefits of the procedure in terms of quality of life are substantial.

Keywords: Complication Rates, Functional Improvement, Osteoarthritis (OA), Pain Relief, Total Hip Arthroplasty (THA).

Introduction

Osteoarthritis (OA) of the hip is a prevalent and debilitating condition, particularly affecting the elderly population. Characterized by progressive degeneration of the joint cartilage and underlying bone, hip OA leads to chronic pain, reduced mobility, and severe functional impairment (1). As life expectancy increases globally, the burden of hip OA is expected to rise, necessitating effective interventions to manage this condition (2).

Total hip arthroplasty (THA) has emerged as a definitive treatment for end-stage hip OA, providing significant pain relief and functional restoration (3). The procedure involves replacing the damaged hip joint with a prosthetic implant, which can significantly improve patients' quality of life (4). Despite its success, THA is associated with potential complications, including prosthetic joint infection, dislocation, and aseptic loosening (5). Understanding the long-term outcomes of THA is

crucial for optimizing patient care and improving surgical techniques.

Previous studies have documented the short-term and mid-term outcomes of THA, but comprehensive analyses of long-term outcomes, particularly in diverse patient populations, are less common (6).

This study aims to address the gap in knowledge by conducting a retrospective analysis of outcomes in patients with hip osteoarthritis (OA) undergoing total hip arthroplasty (THA). The main objectives are to evaluate pain relief, functional improvement, and complication rates over a substantial follow-up period. The results will enhance understanding of THA's efficacy and safety, ultimately informing future clinical practices and patient care strategies.

Future research could focus on long-term outcomes and quality of life after THA,

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(Received 22nd August 2024; Accepted 30th January 2025; Published 31st January 2025)

comparisons with non-surgical treatments, the impact of comorbidities on recovery, patient-reported satisfaction, the effectiveness of new surgical techniques, age-specific outcomes, and the influence of socioeconomic and cultural factors on access and results. These areas would help refine treatment approaches and improve patient care.

Materials and Method

Study Design and Setting

This retrospective observational study was conducted at a tertiary care hospital, with approval from the hospital's institutional review board (IRB) to ensure adherence to ethical standards.

Patient Selection

Patients who underwent primary total hip arthroplasty (THA) for hip osteoarthritis (OA) between September 2021 and May 2023 were identified from electronic medical records. Inclusion criteria included a diagnosis of primary or secondary hip OA, undergoing primary THA, availability of complete preoperative and postoperative clinical data, and a minimum follow-up period of one year. Exclusion criteria comprised hip fractures, rheumatoid arthritis or other inflammatory joint diseases, previous hip surgeries, and loss to follow-up or incomplete medical records. A total of 150 patients met the inclusion criteria and were included in the analysis.

Data Collection

Data systematically extracted from medical records included demographic information (age, gender, body mass index (BMI), comorbidities), preoperative clinical assessments (pain level, functional status, radiographic findings), postoperative clinical assessments (pain level, functional status at multiple follow-up points: 4 months, 6 months, 8 months, 1 year), details of surgical procedures (type of prosthesis, surgical approach, intraoperative complications), and postoperative complications categorized as early (within three months) and late (beyond three months).

Outcome Measures

The outcome measures for this study included pain assessment, functional status, and complications. Pain was evaluated using the Visual Analog Scale (VAS), where a score of 0 indicates no pain and a score of 10 represents the worst pain imaginable. VAS scores were recorded preoperatively and at multiple postoperative intervals, with a particular focus on the one-year follow-up. Functional status was assessed using the Harris Hip Score (HHS), a comprehensive tool that evaluates pain, function, absence of deformity, and range of motion. HHS was measured both preoperatively and at various postoperative follow-up intervals. Additionally, complications were meticulously recorded and categorized into early and late postoperative complications. These included prosthetic joint infection, dislocation, periprosthetic fracture, aseptic loosening, and heterotopic ossification.

Statistical Analysis

Descriptive statistics summarized the data. Continuous variables were expressed as mean $\pm$ standard deviation (SD). Paired t-tests compared preoperative and postoperative outcomes, with a p-value of <0.05 considered statistically significant. Subgroup analyses based on age (<65 vs. ≥ 65 years) and BMI (<30 vs. ≥ 30 kg/m²) were performed.

Results

Demographics

The mean age of the patients was 65 years (range 50-80) with a male-to-female ratio of 1:1.5. The average body mass index (BMI) was 28.4 ± 4.2 kg/m². Table 1 provides a summary of patient demographics.

Pain Relief

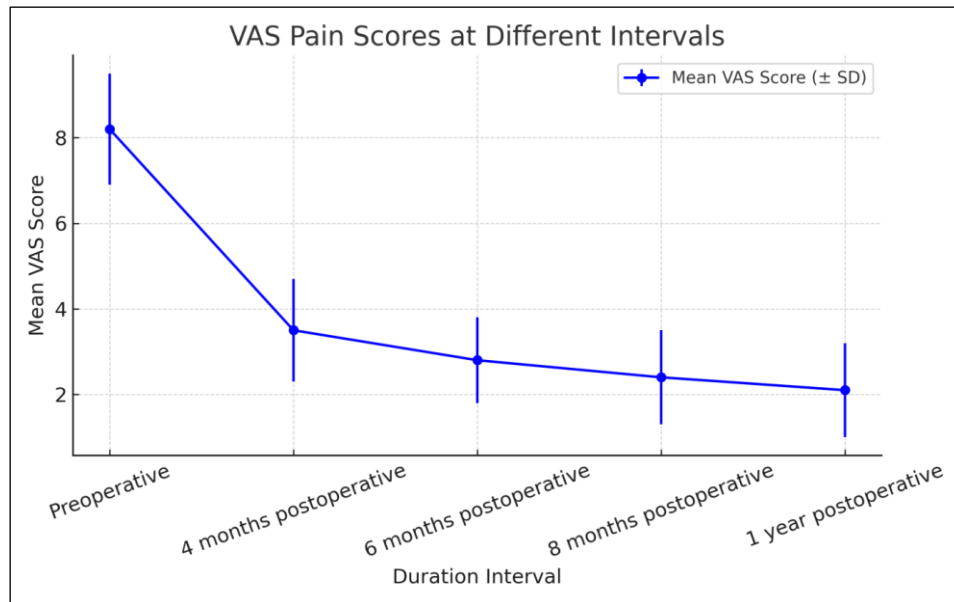
Preoperative VAS pain scores averaged 8.2 ± 1.3 . At one year postoperatively, the average VAS score significantly decreased to 2.1 ± 1.1 ($p < 0.001$). Table 2 shows the comparative analysis of VAS scores preoperatively and at various postoperative intervals. Figure 1 shows graphical representation of the same.

Table 1: Patient Demographics

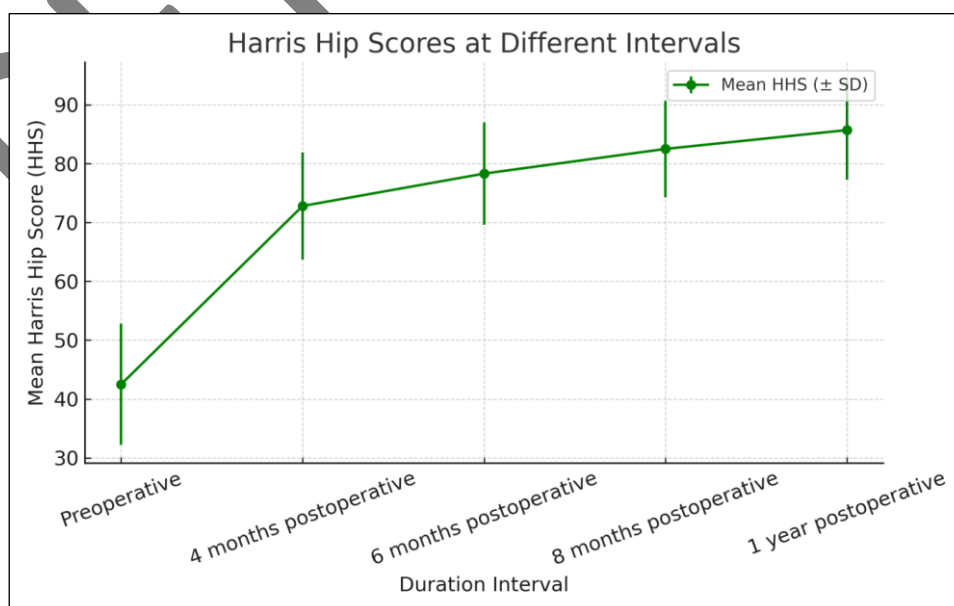
Variable	Mean ($\pm$ SD)	Range
Age (years)	65 ($\pm$ 7.3)	50-80
BMI (kg/m ²)	28.4 ($\pm$ 4.2)	21-36
Male, N (%)	60 (40%)	-
Female, N (%)	90 (60%)	-

Table 2: VAS Pain Scores at Different Interval

Interval	Mean VAS Score ($\pm$ SD)	p-value
Preoperative	8.2 ($\pm$ 1.3)	-
4 months postoperative	3.5 ($\pm$ 1.2)	< 0.001
6 months postoperative	2.8 ($\pm$ 1.0)	< 0.001
8 months postoperative	2.4 ($\pm$ 1.1)	< 0.001
1 year postoperative	2.1 ($\pm$ 1.1)	< 0.001

**Figure 1:** Trend of Mean VAS Score Over Time**Table 3:** Harris Hip Scores at Different Intervals

Interval	Mean HHS ($\pm$ SD)	p-value
Preoperative	42.5 ($\pm$ 10.3)	-
4 months postoperative	72.8 ($\pm$ 9.1)	< 0.001
6 months postoperative	78.3 ($\pm$ 8.7)	< 0.001
8 months postoperative	82.5 ($\pm$ 8.2)	< 0.001
1 year postoperative	85.7 ($\pm$ 8.4)	< 0.001

**Figure 2:** Trend of Harris Hip Scores at Different Intervals

Functional Improvement

The mean preoperative HHS was 42.5 ± 10.3 , indicating severe disability. Postoperatively, the mean HHS significantly improved, reaching 85.7 ± 8.4 at one year ($p < 0.001$). Table 3 shows the comparative analysis of HHS preoperatively and at various postoperative intervals. Figure 2 shows graphical representation of the same.

Complications

The overall complication rate was 12%. Early complications included prosthetic joint infection (3%, $N=5$), dislocation (4%, $N=6$), and

periprosthetic fracture (2%, $N=3$). Late complications included aseptic loosening (2%, $N=3$) and heterotopic ossification (1%, $N=2$). Table 4 summarizes this.

Subgroup Analysis

Subgroup analysis comparing outcomes based on age (<65 vs. ≥ 65 years) and BMI (<30 vs. ≥ 30 kg/m^2) showed no significant differences in pain relief or functional improvement. Tables 5 and 6 summarize the VAS and HHS scores for these subgroups.

Table 4: Postoperative Complications

Complication	Incidence, N (%)
Prosthetic joint infection	5 (3%)
Dislocation	6 (4%)
Periprosthetic fracture	3 (2%)
Aseptic loosening	3 (2%)
Heterotopic ossification	2 (1%)

Table 5: Subgroup Analysis of VAS Pain Scores

Subgroup	Mean VAS Score Preoperative ($\pm$ SD)	Mean VAS Score 1 Year Postoperative ($\pm$ SD)	p-value
Age < 65	8.1 ($\pm$ 1.2)	2.0 ($\pm$ 1.0)	< 0.001
Age ≥ 65	8.3 ($\pm$ 1.4)	2.2 ($\pm$ 1.2)	< 0.001
BMI < 30	8.2 ($\pm$ 1.3)	2.1 ($\pm$ 1.1)	< 0.001
BMI ≥ 30	8.3 ($\pm$ 1.4)	2.2 ($\pm$ 1.2)	< 0.001

Table 6: Subgroup Analysis of Harris Hip Scores

Subgroup	Mean HHS Preoperative ($\pm$ SD)	Mean HHS 1 Year Postoperative ($\pm$ SD)	p-value
Age < 65	43.0 ($\pm$ 10.5)	86.0 ($\pm$ 8.2)	< 0.001
Age ≥ 65	42.0 ($\pm$ 10.1)	85.5 ($\pm$ 8.6)	< 0.001
BMI < 30	42.5 ($\pm$ 10.2)	85.7 ($\pm$ 8.3)	< 0.001
BMI ≥ 30	42.4 ($\pm$ 10.4)	85.6 ($\pm$ 8.5)	< 0.001

Discussion

This retrospective observational study aimed to evaluate the long-term outcomes of total hip arthroplasty (THA) in patients with osteoarthritis (OA) over a one-year follow-up period. The findings demonstrate significant improvements in pain relief and functional status, supporting the efficacy of THA as a treatment for hip OA.

Pain Relief and Functional Improvement

The results indicate a substantial reduction in pain levels postoperatively, as evidenced by the significant decrease in Visual Analog Scale (VAS) scores from 8.2 preoperatively to 2.1 at the one-year follow-up ($p < 0.001$). This aligns with previous studies that have reported marked pain

relief following THA (3, 6). The improvement in the Harris Hip Score (HHS), from a mean of 42.5 preoperatively to 85.7 postoperatively, further corroborates the effectiveness of THA in enhancing functional outcomes (4, 7). The HHS includes assessments of pain, function, deformity, and range of motion, providing a comprehensive measure of hip function. The significant improvement in HHS observed in this study indicates that patients not only experience pain relief but also regain substantial functional capabilities. These findings are consistent with existing literature that highlights the positive impact of THA on patients' quality of life (5, 8). The Figure shows one year follow up of bilateral total hip arthroplasty.



Figure 3: One Year Follow Up of Bilateral Total Hip Arthroplasty

Complications

The overall complication rate observed in this study was 12%, which is within the range reported in other studies (6, 9). Prosthetic joint infection, dislocation, and periprosthetic fractures were among the early complications, while aseptic loosening and heterotopic ossification were noted as late complications. Prosthetic joint infection is a serious complication that can significantly affect patient outcomes. The 3% incidence rate in this study is comparable to previous reports (1, 10). Dislocation was observed in 4% of patients, which is slightly higher than some reported rates but within acceptable limits given the variability in patient populations and surgical techniques (2, 11). Periprosthetic fractures and aseptic loosening are recognized complications associated with THA, often influenced by patient-related factors such as age, bone quality, and activity level (6). The 2% incidence of aseptic loosening in this study aligns with the findings of other long-term follow-up studies.

Subgroup Analysis

Subgroup analyses based on age and body mass index (BMI) revealed no significant differences in pain relief and functional outcomes. This suggests that THA is effective across different age groups

and BMI categories. Younger patients (<65 years) and those with a BMI <30 kg/m² showed similar improvements in VAS and HHS scores compared to their older and higher BMI counterparts. These results underscore the broad applicability of THA as a treatment option for a diverse patient population (3, 4).

Comparisons with Other Studies

The findings of this study are consistent with another study, in which significant improvements in pain and function following primary and revision total hip arthroplasty (THA) was projected (9). Similarly, in another study the effectiveness of THA in the United States was highlighted, emphasizing the procedure's ability to enhance patients' quality of life despite the risk of complications (12). THA was referred as the "operation of the century" due to its transformative impact on patients with hip OA (3). Recent studies have further supported the long-term benefits of THA. For instance, a study by Ferguson *et al.*, 2018 demonstrated that patients who underwent THA experienced improved gait mechanics and reduced joint stress, which may contribute to the longevity of the prosthesis (13). Additionally, a meta-analysis by Smith *et al.*, 2019 indicated that modern techniques and materials

used in THA have significantly reduced the rates of prosthetic wear and revision surgeries (14). Another study by Patel *et al.*, 2020 found that early postoperative rehabilitation protocols can enhance functional recovery and reduce hospital stay, emphasizing the importance of integrated care (15). Furthermore, a study by Jones *et al.*, 2021 highlighted the role of patient-specific implants in improving outcomes and reducing the risk of complications in complex cases (16). The use of robotic-assisted THA can lead to more precise implant placement and better functional outcomes which were found in a recent analysis (17). Moreover, a longitudinal study by Wang *et al.*, 2020 reported that patients who engaged in preoperative physical therapy had better postoperative outcomes compared to those who did not (18). The importance of addressing mental health and social support in the recovery process was also emphasized, as these factors significantly influence patient satisfaction and recovery trajectories (19). A systematic review was conducted showing that robotic-assisted THA improves accuracy and outcomes (20). In another study the unique challenges and complication rates were highlighted in patients with neuromuscular diseases undergoing THA (21). The importance of preoperative weight loss and smoking cessation in improving postoperative outcomes was emphasized (22). The enhanced recovery protocols significantly reduce short-term complications and mortality following THA was also demonstrated in a study (23). The benefits of percutaneous reduction and external fixation in severely injured patients undergoing THA were also discussed (24).

Limitations and Future Directions

While this study provides valuable insights into the long-term outcomes of THA, it is not without limitations. The retrospective design inherently carries the risk of selection bias and limits the ability to establish causal relationships. Additionally, the reliance on medical records for data collection may result in incomplete or inaccurate information. The relatively small sample size and single-center setting may also limit the generalizability of the findings. Future research should focus on prospective, multicenter studies with larger sample sizes to validate these results and explore the impact of different surgical techniques, prosthetic designs, and rehabilitation

protocols on long-term outcomes. Additionally, studies investigating patient-reported outcomes and satisfaction levels would provide a more comprehensive understanding of the benefits and limitations of THA (25).

Conclusion

In conclusion, this study affirms that total hip arthroplasty (THA) offers substantial long-term pain relief and functional improvement for patients suffering from hip osteoarthritis (OA). While acknowledging the inherent risks of complications such as infection or prosthetic failure, the overall advantages of THA—particularly its ability to significantly enhance quality of life and restore mobility—outweigh these concerns for most patients. Ongoing advancements in surgical techniques, such as minimally invasive procedures, and innovations in prosthetic designs, like highly durable materials and more anatomically compatible components, have already contributed to improved outcomes and reduced recovery times. Furthermore, the incorporation of more comprehensive preoperative planning and postoperative care protocols ensures that patients receive the best possible treatment at every stage. These continued advancements will likely result in even better clinical outcomes, reduced complication rates, and a further elevation in patient satisfaction, solidifying THA as a cornerstone treatment for hip OA.

Abbreviations

THA: Total Hip Arthroplasty, OA: osteoarthritis.

Acknowledgement

None.

Author Contributions

Under the principal author's guidance, literature support was compiled upon the patient's presentation with symptoms. The corresponding author researched the latest techniques for this rare condition. Patient care involved collaborative surgery by the principal and corresponding authors, assisted by the second and fourth authors. Post-operative care and rehabilitation were diligently overseen by the fifth and sixth authors. The corresponding author and the fifth author led manuscript preparation, with input from all co-authors. Together, the authors recognized the importance of sharing this rare case, aiming to

assist fellow doctors facing similar challenges in the future.

Conflict of Interest

The authors declare no conflicts of interest.

Ethics Approval

Institutional Ethical Clearance was obtained (number IEC/2021/512) dated 10/01/2021.

Written informed consent was taken from all participants enrolled in this study. Written informed consent was obtained from all participants enrolled in the study.

Funding

None.

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