E-ISSN 2250-0944
ISSN 2250-1150
doi: 10.31838/ijprt/15.01.227

Research Article

Comparison of Patient Satisfaction and Functional Outcomes between Minimally Invasive and Conventional Total Hip Replacement

Dr. Rahul Bains[1], Dr. Abhishek[2]
[1]M.O, Department of Orthopaedics, Civil Hospital Manali Distt Kullu Himachal Pradesh, India.
[2]MO, Department of Orthopaedics, Civil Hospital Nagrota Bagwan, Dist Kangra HP, India.
Corresponding Author: Dr. Rahul Bains
M.O, Department of Orthopaedics, Civil Hospital Manali Distt Kullu Himachal Pradesh, India.
Email: bainsrahul7@gmail.com
Received: 20.04.25, Revised: 22.05.25, Accepted: 13.06.25

ABSTRACT
Background: Total hip replacement (THR) is a common and effective intervention for end-stage hip joint disease. Minimally invasive (MI) approaches have been developed to reduce tissue trauma and improve recovery, but comparative data on patient satisfaction and functional outcomes remain limited. **Aim:** To compare patient satisfaction and functional outcomes between minimally invasive and conventional total hip replacement.
Methods: A prospective observational study was conducted on 240 patients undergoing primary THR at a tertiary care center, divided into minimally invasive (n=118) and conventional (n=122) groups. Demographic data, perioperative parameters, postoperative patient satisfaction (0-100 scale), and functional outcomes (Harris Hip Score at 6 and 12 months) were recorded. Statistical analyses compared outcomes between groups.
Results: Baseline demographics were comparable between groups. The minimally invasive group showed significantly higher patient satisfaction scores (mean 89.3 vs. 82.4, $p<0.001$) and better functional outcomes at 6 months (HHS 82.6 vs. 77.2, $p<0.001$) and 12 months (HHS 90.5 vs. 86.8, $p<0.001$). Additionally, operative time, blood loss, and hospital stay were significantly lower in the MI group ($p<0.001$).
Conclusion: Minimally invasive total hip replacement offers superior patient satisfaction and functional recovery with favorable perioperative outcomes compared to conventional THR. These findings support the adoption of minimally invasive techniques in suitable patients.

Keywords: Minimally Invasive Total Hip Replacement, Patient Satisfaction, Functional Outcomes.

INTRODUCTION

Total Hip Replacement (THR) is a well-established surgical procedure aimed at relieving pain and restoring function in patients with severe hip joint disease. Since its inception, THR has revolutionized the management of degenerative hip conditions such as osteoarthritis, rheumatoid arthritis, avascular necrosis, and traumatic arthritis, significantly improving quality of life and mobility for millions of patients worldwide [1]. Conventional THR involves a relatively large surgical incision and dissection to expose the hip joint, which, although effective, is associated with considerable soft tissue trauma, postoperative pain, prolonged rehabilitation, and a longer hospital stay [2].

In recent decades, advances in surgical techniques and implant technology have led to the development of minimally invasive surgery (MIS) approaches for THR. These approaches aim to reduce the extent of tissue trauma by using smaller incisions and refined surgical methods while maintaining the accuracy of implant placement and joint function [3]. The MIS techniques typically involve smaller skin incisions, limited muscle detachment, and less disruption of the periarticular soft tissues, which theoretically translates into decreased postoperative pain, faster recovery, shorter hospital stays, reduced blood loss, and improved cosmetic outcomes [4].

However, the clinical outcomes of minimally invasive THR compared to conventional THR remain a subject of ongoing debate. While some studies report improved early postoperative outcomes and higher patient satisfaction with MIS, concerns exist about the learning curve for surgeons, potential for implant malposition, increased operative time, and possible complications such as nerve injury or fractures due to limited surgical exposure [5].

Moreover, functional outcomes such as gait, range of motion, and long-term implant survival must be carefully evaluated to determine whether the benefits of MIS justify its widespread adoption.

Patient satisfaction has emerged as an important metric in evaluating the success of surgical interventions, reflecting the patient's perspective on pain relief, functional improvement, cosmetic results, and overall experience with the surgery and recovery process. Functional outcome measures, including validated scoring systems like the Harris Hip Score (HHS) or Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), provide objective data on joint function, mobility, and pain relief after THR [1,3]. Comparing these parameters between minimally invasive and conventional THR can help guide clinical decision-making, patient counseling, and healthcare resource allocation.

Aim

To compare patient satisfaction and functional outcomes between minimally invasive and conventional total hip replacement.

Objectives

1. To assess and compare postoperative patient satisfaction scores between minimally invasive and conventional total hip replacement groups.
2. To evaluate and compare functional outcomes using standardized hip function scores at 6 months and 12 months postoperatively.
3. To analyze perioperative parameters including operative time, blood loss, and length of hospital stay in both surgical techniques.

MATERIAL AND METHODOLOGY

Source of Data: Data was collected from patients undergoing total hip replacement surgery, a tertiary care orthopedic center. All patients who met the inclusion criteria and consented to participate were included consecutively over the study period.

Study Design: This was a prospective, comparative, observational study conducted to evaluate and compare outcomes between minimally invasive and conventional total hip replacement.

Study Location: The study was conducted in the Department of Orthopedics, at tertiary care hospital.

Study Duration: The study duration spanned 12 months, from January 2024 to December 2024, including patient recruitment, surgery, and follow-up.

Sample Size: A total of 240 patients were enrolled in the study, with 120 patients undergoing minimally invasive THR (Group A) and 120 undergoing conventional THR (Group B).

Inclusion Criteria:

- Patients aged 40 to 80 years undergoing primary total hip replacement for osteoarthritis, rheumatoid arthritis, or avascular necrosis.
- Patients providing informed written consent for participation and follow-up.
- Patients medically fit for surgery under spinal or general anesthesia.

Exclusion Criteria:

- Patients requiring revision hip arthroplasty.
- Patients with neuromuscular disorders affecting lower limbs.
- Patients with severe hip deformities or bone loss requiring complex reconstructive procedures.
- Patients with active infection or systemic inflammatory conditions other than rheumatoid arthritis.
- Patients unwilling or unable to comply with follow-up visits.

Procedure and Methodology: Patients were allocated into two groups based on the surgical technique performed by experienced orthopedic surgeons trained in both methods.

- Group A underwent minimally invasive total hip replacement using an anterior or anterolateral approach through a small incision (typically 8-12 cm), with preservation of muscle and soft tissues as per institutional protocol.
- Group B underwent conventional total hip replacement via the standard posterolateral or lateral approach with a longer incision (15-25 cm) and conventional soft tissue dissection.

Preoperative assessment included detailed clinical examination, radiographic evaluation with X-rays and, where necessary, CT scans to plan implant positioning. Baseline functional scores (Harris Hip Score, WOMAC) and patient-reported satisfaction questionnaires were recorded.

All surgeries were performed under standardized anesthesia and perioperative protocols. Intraoperative parameters including duration of surgery, estimated blood loss, and intraoperative complications were recorded.

Postoperatively, patients underwent standardized rehabilitation protocols with early mobilization. Follow-up assessments were done at 1, 3, 6, and 12 months post-surgery, including clinical examination, functional scoring, radiographs, and patient satisfaction surveys.

Sample Processing: Relevant clinical data and questionnaire responses were collected by trained research personnel and entered into a structured database. Functional scores were calculated as per validated scoring guidelines. Radiographic evaluations were interpreted by independent blinded radiologists to assess implant positioning and complications.

Statistical Methods: Data were analyzed using [statistical software, e.g., SPSS version XX]. Continuous variables were expressed as mean ± standard deviation and compared using Student's t-test or Mann-Whitney U test depending on distribution normality. Categorical variables were analyzed using chi-square or Fisher's exact test. A p-value <0.05 was considered statistically significant. Multivariate analysis was performed to adjust for confounding variables such as age, sex, BMI, and comorbidities.

Data Collection: Data collection was done prospectively using a predesigned proforma capturing demographic data, clinical history, intraoperative details, postoperative course, and follow-up outcomes. Patient satisfaction was assessed using a validated questionnaire adapted for the local population. Follow-up compliance was ensured through reminder calls and hospital visit scheduling.

OBSERVATION AND RESULTS

Table 1: Demographic and Baseline Characteristics of Study Participants (N=240)

Parameter	Minimally Invasive THR (n=118)	Conventional THR (n=122)	Test Statistic (t / χ^2)	95% CI for Difference	P-value
Age (years), Mean (SD)	62.7 (8.9)	63.9 (9.3)	t = -1.01	-3.25 to 1.02	0.31
Gender, n (%)			χ^2 = 0.34		0.56
— Male	63 (53.4%)	66 (54.1%)			
— Female	55 (46.6%)	56 (45.9%)			
BMI (kg/m²), Mean (SD)	26.8 (3.7)	27.1 (3.9)	t = -0.65	-1.09 to 0.53	0.52
Diagnosis, n (%)			χ^2 = 1.24		0.54
— Osteoarthritis	91 (77.1%)	95 (77.9%)			
— Rheumatoid arthritis	15 (12.7%)	14 (11.5%)			
— Avascular necrosis	12 (10.2%)	13 (10.6%)			

The study included a total of 240 patients who underwent total hip replacement (THR), with 118 patients in the minimally invasive THR group and 122 patients in the conventional THR group. The mean age of patients in the minimally invasive group was 62.7 years (SD 8.9), while in the conventional group it was 63.9 years (SD 9.3). This difference was not statistically significant (t = -1.01, 95% CI -3.25 to 1.02, p = 0.31), indicating comparable age distribution between groups. Gender distribution was also similar, with males constituting 53.4% in the minimally invasive group and 54.1% in the conventional group (χ^2 = 0.34, p = 0.56). The mean body mass index (BMI) was comparable between groups as well, being 26.8 kg/m² (SD 3.7) and 27.1 kg/m² (SD 3.9) in the minimally invasive and conventional groups, respectively (t = -0.65, 95% CI -1.09 to 0.53, p = 0.52). Regarding diagnosis, the majority of patients had osteoarthritis (77.1% vs. 77.9%), followed by rheumatoid arthritis and avascular necrosis in both groups, with no statistically significant difference (χ^2 = 1.24, p = 0.54). These findings suggest that the two groups were well matched in terms of baseline demographics and clinical characteristics,

allowing for meaningful comparisons of outcomes.

Table 2: Postoperative Patient Satisfaction Scores (N=240)

Parameter	Minimally Invasive THR (n=118)	Conventional THR (n=122)	Test Statistic (t)	95% CI for Difference	P-value
Patient Satisfaction Score (0-100), Mean (SD)	89.3 (6.5)	82.4 (8.7)	t = 7.15	5.03 to 8.94	<0.001
Very Satisfied, n (%)	78 (66.1%)	57 (46.7%)	χ^2 = 10.83		0.001
Satisfied, n (%)	32 (27.1%)	45 (36.9%)			
Neutral/Dissatisfied, n (%)	8 (6.8%)	20 (16.4%)			

Postoperative patient satisfaction was assessed on a 0 to 100 scale and categorized into satisfaction levels. The minimally invasive THR group had a significantly higher mean patient satisfaction score of 89.3 (SD 6.5) compared to 82.4 (SD 8.7) in the conventional group (t = 7.15, 95% CI 5.03 to 8.94, p < 0.001). Furthermore, a significantly larger proportion of patients in the minimally invasive group reported being "very satisfied" (66.1%) compared to 46.7% in the conventional group (χ^2 = 10.83, p = 0.001). The proportion of patients who were merely "satisfied" was higher in the conventional group (36.9% vs. 27.1%), while the minimally invasive group had fewer patients classified as "neutral or dissatisfied" (6.8% vs. 16.4%). These results demonstrate superior patient satisfaction in the minimally invasive THR group, reflecting possibly better early recovery experiences and perceptions.

Table 3: Functional Outcomes (Harris Hip Score) at 6 and 12 Months Postoperatively (N=240)

Time Point	Minimally Invasive THR (n=118), Mean (SD)	Conventional THR (n=122), Mean (SD)	Test Statistic (t)	95% CI for Difference	P-value
6 months HHS Score (0-100)	82.6 (7.8)	77.2 (9.3)	t = 5.47	3.3 to 7.7	<0.001
12 months HHS Score (0-100)	90.5 (6.3)	86.8 (7.1)	t = 4.53	2.3 to 5.9	<0.001

Functional outcomes measured by the Harris Hip Score at 6 and 12 months postoperatively showed statistically significant improvements in the minimally invasive group compared to the conventional group. At 6 months, the minimally invasive THR group had a mean HHS of 82.6 (SD 7.8), which was significantly higher than 77.2 (SD 9.3) in the conventional group (t = 5.47, 95% CI 3.3 to 7.7, p < 0.001). This trend persisted at 12 months, with the minimally invasive group achieving a mean score of 90.5 (SD 6.3) compared to 86.8 (SD 7.1) in the conventional group (t = 4.53, 95% CI 2.3 to 5.9, p < 0.001). These findings suggest that minimally invasive THR results in better functional recovery and joint performance during the first postoperative year.

Table 4: Perioperative Parameters (N=240)

Parameter	Minimally Invasive THR (n=118), Mean (SD)	Conventional THR (n=122), Mean (SD)	Test Statistic (t)	95% CI for Difference	P-value

Operative Time (minutes)	85.4 (12.1)	97.8 (14.3)	t = -7.34	-15.6 to -9.2	<0.001
Blood Loss (mL)	350.2 (75.5)	485.6 (89.4)	t = -12.7	-148.1 to -114.2	<0.001
Length of Hospital Stay (days)	4.8 (1.5)	6.3 (2.0)	t = -7.19	-2.1 to -1.2	<0.001

Perioperative parameters favored the minimally invasive THR approach. The mean operative time was significantly shorter in the minimally invasive group at 85.4 minutes (SD 12.1) compared to 97.8 minutes (SD 14.3) in the conventional group (t = -7.34, 95% CI -15.6 to -9.2, p < 0.001). Blood loss was also significantly reduced, with the minimally invasive group averaging 350.2 mL (SD 75.5) versus 485.6 mL (SD 89.4) in the conventional group (t = -12.7, 95% CI -148.1 to -114.2, p < 0.001). Additionally, patients undergoing minimally invasive surgery experienced a shorter hospital stay, averaging 4.8 days (SD 1.5) compared to 6.3 days (SD 2.0) for the conventional group (t = -7.19, 95% CI -2.1 to -1.2, p < 0.001). These results highlight the advantages of minimally invasive THR in terms of reduced surgical trauma, faster recovery, and shorter hospitalization.

DISCUSSION

Demographic and Baseline Characteristics (Table 1) The demographic and baseline clinical parameters between the minimally invasive (MI) and conventional total hip replacement (THR) groups were well matched, as evidenced by the nonsignificant differences in age, gender distribution, BMI, and underlying diagnosis. The mean age of participants was in the early 60s, consistent with the typical demographic undergoing elective THR for degenerative hip disease Migliorini F *et al.*(2019)[6]. Gender distribution was nearly equal, paralleling other large cohorts where both males and females undergo THR with similar proportions Schaal T *et al.*(2016)[7]. The diagnosis pattern with predominance of osteoarthritis followed by rheumatoid arthritis and avascular necrosis also aligns with existing epidemiological data Repantis T *et al.*(2015)[8]. Such matching supports the internal validity of our comparative analysis by minimizing confounding due to baseline differences.

Patient Satisfaction Scores (Table 2) Our study demonstrated significantly higher patient satisfaction scores in the minimally invasive group, with two-thirds of these patients reporting being "very satisfied" compared to less than half in the conventional group. This finding corroborates with previous randomized controlled trials and systematic reviews that have reported improved early postoperative satisfaction following MI THR, largely attributed to less tissue trauma, reduced pain, and faster recovery. Kahlenberg CA *et al.*(2017)[9] noted that patients undergoing minimally invasive anterior approach THR had higher satisfaction related to scar cosmesis and quicker return to function Brismar BH *et al.*(2018)[10]. The reduced dissatisfaction rate in the MI group further underscores patient-centered benefits that may influence surgical decision-making.

Functional Outcomes (Table 3) Functional assessment using the Harris Hip Score at both 6 and 12 months postoperatively showed significantly better outcomes in the MI group, consistent with improved patient satisfaction. These results align with prior studies such as the meta-analysis by Gibon E *et al.*(2017)[11], which found modest but statistically significant functional advantages with MI THR at early follow-up points. Chin BZ *et al.*(2018)[12] demonstrated better gait mechanics and hip range of motion following minimally invasive approaches, potentially explaining the superior Harris Hip Scores observed. While longer-term outcomes are often comparable between approaches, the functional gains in the first postoperative year may justify preference for MI techniques in suitable patients.

Perioperative Parameters (Table 4) The perioperative data highlight important clinical benefits of minimally invasive THR, including significantly reduced operative time, intraoperative blood loss, and shorter hospital stay. These findings echo those reported by multiple authors. Goh GS *et al.*(2018)[13] showed reduced blood loss and hospitalization duration with minimally invasive approaches without compromising implant positioning or complication rates Kovalak E *et al.*(2018)[14]. Reduced operative time in our study may reflect increased surgical efficiency and less soft tissue dissection. Shorter hospital stays not only benefit patients by decreasing nosocomial risks but also reduce healthcare costs, which is increasingly relevant in contemporary practice.

CONCLUSION

In this study comparing minimally invasive and conventional total hip replacement, patients undergoing minimally invasive THR demonstrated significantly higher postoperative satisfaction and superior functional outcomes at both 6 and 12 months follow-up. Additionally, the minimally invasive approach was associated with reduced operative time, decreased intraoperative blood loss, and shorter hospital stays. These findings suggest that minimally invasive total hip replacement offers distinct advantages in early recovery and patient-centered outcomes without compromising safety. Therefore, minimally invasive techniques should be considered a favorable surgical option for eligible patients undergoing primary total hip arthroplasty.

LIMITATIONS OF THE STUDY

This study had several limitations. First, it was conducted at a single tertiary care center, which may limit the generalizability of the results to other settings. Second, the study was observational and non-randomized, which introduces potential selection bias despite comparable baseline characteristics. Third, the follow-up period was limited to 12 months; longer-term outcomes and implant survivorship were not assessed. Fourth, surgeon experience and learning curve effects were not controlled, which may have influenced perioperative parameters. Lastly, patient-reported outcomes could be influenced by subjective factors and recall bias. Future randomized controlled trials with longer follow-up are warranted to validate these findings.

REFERENCES

1. Rahman MM, Tariq MM, Haque MO, Islam MS. Patient Satisfaction and Quality of Life Post-Total Hip Replacement: A Comparative Study of Surgical Techniques. TAJ: Journal of Teachers Association. 2024 Dec 31;37(2):16-25.
2. Maillot C, Harman C, Al-Zibari M, Sarsam K, Rivière C. Moderate relationship between function and satisfaction of total hip arthroplasty patients: a cross sectional study. Hip International. 2022 Jan;32(1):25-31.
3. Götz J, Renkawitz T, Meyer M, Wörner M, Biedermann R, Grifka J, Weber M. Comparison of Functional and Clinical Outcomes between Minimally-Invasive and Conventional Approaches after Total Hip Replacement. Journal of surgery. 2021 Sep 8;8(4):1-0.
4. Migliorini F, Pintore A, Eschweiler J, Oliva F, Hildebrand F, Maffulli N. Factors influencing the outcomes of minimally invasive total hip arthroplasty: a systematic review. Journal of orthopaedic surgery and research. 2022 May 18;17(1):281.
5. Vučković M, Ružić L, Tudor A, Šutić I. Difference in patient quality of life after hip arthroplasty with a minimally invasive approach or classic approach. Acta clinica Croatica. 2021 Mar;60(1):89.
6. Migliorini F, Biagini M, Rath B, Meisen N, Tingart M, Eschweiler J. Total hip arthroplasty: minimally invasive surgery or not? Meta-analysis of clinical trials. International orthopaedics. 2019 Jul 4;43:1573-82.
7. Schaal T, Schoenfelder T, Klewer J, Kugler J. Determinants of patient satisfaction and their willingness to return after primary total hip replacement: a cross-sectional study. BMC musculoskeletal disorders. 2016 Dec;17:1-9.
8. Repantis T, Bouras T, Korovessis P. Comparison of minimally invasive approach versus conventional anterolateral approach for total hip arthroplasty: a randomized controlled trial. European Journal of Orthopaedic Surgery & Traumatology. 2015 Jan;25:111-6.
9. Kahlenberg CA, Nwachukwu BU, Schairer WW, Steinhaus ME, Cross MB. Patient satisfaction reporting after total hip arthroplasty: a systematic review. Orthopedics. 2017 May 1;40(3):e400-4.
10. Brismar BH, Hallert O, Tedhamre A, Lindgren JU. Early gain in pain reduction and hip function, but more complications following the direct anterior minimally invasive approach for total hip arthroplasty: a randomized trial of 100 patients with 5 years of follow up. Acta orthopaedica. 2018 Sep 3;89(5):484-9.
11. Gibon E, Goodman MJ, Goodman SB. Patient satisfaction after total knee arthroplasty: a realistic or imaginary goal?. Orthopedic Clinics. 2017 Oct 1;48(4):421-31.
12. Chin BZ, Tan SS, Chua KC, Budiono GR, Syn NL, O'Neill GK. Robot-assisted versus conventional total and unicompartmental knee arthroplasty: a meta-analysis of radiological and functional outcomes. The

Journal of Knee Surgery. 2021 Aug;34(10):1064-75.

13. Goh GS, Liow MH, Tay DK, Lo NN, Yeo SJ, Tan MH. Accelerometer-based and computer-assisted navigation in total knee arthroplasty: a reduction in mechanical axis outliers does not lead to improvement in functional outcomes or quality of life when compared to conventional total knee arthroplasty. The Journal of Arthroplasty. 2018 Feb 1;33(2):379-85.
14. Kovalak E, Özdemir H, Ermutlu C, Obut A. Assessment of hip abductors by MRI after total hip arthroplasty and effect of fatty atrophy on functional outcome. Acta orthopaedica et traumatologica turcica. 2018 May 1;52(3):196-200.