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Research Article

A Comparative Study of Functional Outcomes in Patients with Proximal Femur Fractures Treated with Total Hip Arthroplasty vs. Hemiarthroplasty

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ABSTRACT
Background: Proximal femur fractures are a common and debilitating injury, particularly among the elderly. The choice between Total Hip Arthroplasty (THA) and Hemiarthroplasty (HA) significantly impacts the patient's functional recovery, mobility, pain management, and overall quality of life. **Objectives**: This study aims to compare the functional outcomes, postoperative mobility, pain levels, and long-term patient satisfaction between THA and HA in treating proximal femur fractures. **Methods**: A retrospective cohort study was conducted with a sample size of 120 patients, equally divided between THA and HA groups. The functional outcomes were assessed using the Harris Hip Score and Oxford Hip Score, while mobility was evaluated through Activities of Daily Living (ADL) scores and walking speed. Pain levels were measured using the Visual Analog Scale, and long-term satisfaction was assessed through SF-36 and EQ-5D scores. Statistical significance was determined using t-tests and chi-square tests where appropriate. **Results**: The THA group showed significantly higher functional scores, including mean Harris Hip Score (82.3 vs. 79.1, p=0.043) and Oxford Hip Score (84.0 vs. 80.2, p=0.043). Mobility assessments also favored THA with higher ADL scores (8.7 vs. 8.0, p=0.017) and faster walking speeds (1.2 m/s vs. 1.0 m/s, p=0.017). Pain levels were lower in the THA group (VAS score: 3.0 vs. 3.7, p=0.029), and reoperation rates were significantly reduced (5.8% vs. 10%, p=0.029). Long-term satisfaction measures were also superior in the THA group (SF-36: 75.0 vs. 70.3, EQ-5D: 0.82 vs. 0.77, both p=0.018). **Conclusion**: Total Hip Arthroplasty is superior to Hemiarthroplasty in improving functional outcomes, enhancing mobility, reducing pain, and increasing long-term patient satisfaction in the treatment of proximal femur fractures. These findings suggest that THA should be considered the preferred surgical intervention in suitable patients.

Keywords: Total Hip Arthroplasty, Hemiarthroplasty, Proximal Femur Fractures

INTRODUCTION

Proximal femur fractures are a significant health issue, especially in the elderly, and are associated with high morbidity and mortality rates. The treatment of these fractures aims at restoring mobility and minimizing pain; however, the choice of surgical intervention can greatly influence patient outcomes. Total Hip Arthroplasty (THA) and Hemiarthroplasty (HA) are two common surgical options. THA involves replacing both the femoral head and the acetabulum, whereas HA involves replacing only the femoral head. The decision between these procedures depends on several factors including patient age, activity level, bone quality, and the presence of comorbid conditions.[1][2]

Numerous studies have compared the functional outcomes of THA and HA, but results have varied. Some suggest that THA provides better functional outcomes and quality of life, particularly in active and younger elderly patients. In contrast, HA is often recommended for older, less active patients due to its shorter operation time and potentially lower immediate postoperative complications. Despite these recommendations, there is ongoing debate and variability in clinical practice, underscoring the need for more definitive comparative studies.[3] Recent advancements in surgical techniques and prosthetic designs have also influenced the outcomes of these procedures. Moreover, the postoperative rehabilitation process plays a crucial role in the success of the surgery. Therefore, evaluating the long-term functional outcomes and quality of life of patients undergoing these treatments is essential to guide treatment choices.[4][5]

Aim

To compare the functional outcomes in patients with proximal femur fractures treated with Total Hip Arthroplasty versus Hemiarthroplasty.

Objectives

1. To assess the postoperative mobility and independence in activities of daily living in patients treated with THA versus HA.
2. To evaluate the pain levels and need for subsequent surgical interventions between the two groups.
3. To compare the long-term patient satisfaction and quality of life post-surgery in both treatment groups.

MATERIAL AND METHODOLOGY

Source of Data

Data were collected from patients who underwent THA or HA at our institution.

Study Design

This was a retrospective cohort study comparing the functional outcomes of THA versus HA.

Study Location

The study was conducted at the Orthopedic Department of tertiary care Hospital.

Study Duration

The study period was from January 2023 to December 2024.

Sample Size

A total of 120 patients were included in the study, with 60 patients in each treatment group.

Inclusion Criteria

Patients included were aged 65 years or older with proximal femur fractures who underwent THA or HA.

Exclusion Criteria

Patients were excluded if they had prior hip surgery, pathological fractures, or severe cognitive impairment that could interfere with follow-up.

Procedure and Methodology

Patients underwent either THA or HA based on preoperative assessments by the attending surgeon. The choice of procedure was influenced by patient health status, bone quality, and pre-existing conditions.

Sample Processing

Functional outcomes were assessed using standardized tools such as the Harris Hip Score and the Oxford Hip Score at specified postoperative intervals.

Statistical Methods

Data were analyzed using SPSS software. Descriptive statistics were used to summarize demographic and baseline characteristics. Comparative analysis was performed using the chi-square test for categorical data and the t-test for continuous data. A p-value of less than 0.05 was considered statistically significant.

Data Collection

Data collection was comprehensive, involving medical records for surgical details, postoperative complications, and follow-up assessments recorded during routine visits to the outpatient clinic.

OBSERVATION AND RESULTS

Table 1: Functional Outcomes Comparison

Outcome Measure	Group	Mean (SD)	95% CI	p-value
Harris Hip Score	THA	82.3 (12.5)	79.7-84.9	0.043
	HA	79.1 (13.2)	76.4-81.8	
Oxford Hip Score	THA	84.0 (11.8)	81.4-86.6	0.043
	HA	80.2 (14.3)	77.1-83.3	

The functional outcomes of patients undergoing Total Hip Arthroplasty (THA) and Hemiarthroplasty (HA) were assessed using the Harris Hip Score and the Oxford Hip Score. The THA group demonstrated superior results with a mean Harris Hip Score of 82.3 (SD = 12.5), significantly higher than the HA group's mean score of 79.1 (SD = 13.2), with statistical significance indicated by a p-value of 0.043. Similarly, the Oxford Hip Score was higher in the THA group, averaging 84.0 (SD = 11.8), compared to 80.2 (SD = 14.3) in the HA group, also with a p-value of 0.043. These results suggest that THA may lead to better functional recovery compared to HA.

Table 2: Mobility and Independence in ADLs

Outcome Measure	Group	Mean (SD)	95% CI	p-value
ADL Score	THA	8.7 (1.3)	8.4-9.0	0.017
	HA	8.0 (1.5)	7.7-8.3	

Walking Speed (m/s)	THA	1.2 (0.3)	1.1-1.3	0.017
	HA	1.0 (0.35)	0.95-1.05	

In evaluating postoperative mobility and independence in activities of daily living (ADLs), the THA group again showed better outcomes. The mean ADL Score for THA patients was 8.7 (SD = 1.3) versus 8.0 (SD = 1.5) for those in the HA group, with a p-value of 0.017. Walking speed further differentiated the groups, where THA patients averaged a speed of 1.2 meters per second (SD = 0.3), significantly faster than the HA group's 1.0 meters per second (SD = 0.35), reinforcing the mobility advantage with THA.

Table 3: Pain Levels and Surgical Interventions

Outcome Measure	Group	Mean (SD)	95% CI	p-value
VAS Pain Score	THA	3.0 (1.5)	2.8-3.2	0.029
	HA	3.7 (1.6)	3.4-4.0	
Reoperation Rate (%)	THA	7 (5.8%)	-	0.029
	HA	12 (10%)	-	

Pain assessment using the Visual Analog Scale (VAS) showed that THA patients experienced less pain postoperatively, with a mean score of 3.0 (SD = 1.5), compared to 3.7 (SD = 1.6) in the HA group, marked by a p-value of 0.029. Additionally, the reoperation rate was lower in the THA group at 5.8% (n=7) versus 10% (n=12) in the HA group, indicating fewer subsequent surgical interventions required for THA patients, further supporting its efficacy and durability.

Table 4: Long-term Patient Satisfaction and Quality of Life

Outcome Measure	Group	Mean (SD)	95% CI	p-value
SF-36 Score	THA	75.0 (9.2)	73.5-76.5	0.018
	HA	70.3 (10.1)	68.5-72.1	
EQ-5D Score	THA	0.82 (0.08)	0.80-0.84	0.018
	HA	0.77 (0.09)	0.75-0.79	

Long-term outcomes measured by the SF-36 and EQ-5D scores showed that THA patients reported higher satisfaction and quality of life. The SF-36 score for the THA group was 75.0 (SD = 9.2), significantly better than the HA group's 70.3 (SD = 10.1), with a p-value of 0.018. The EQ-5D Score also favored the THA group, 0.82 (SD = 0.08) compared to 0.77 (SD = 0.09) in the HA group, suggesting a consistently better postoperative quality of life for patients receiving THA.

DISCUSSION

Functional Outcomes The superior functional outcomes associated with THA are evident in the Harris Hip Score and Oxford Hip Score. Patients undergoing THA demonstrated higher scores, suggesting better joint function. These results align with findings from other studies indicating that THA tends to provide better functional recovery, especially in younger or more active elderly patients. Suarez JC et al. (2020)[6] found that THA patients generally experience improved mobility and less postoperative pain compared to those undergoing HA, which may contribute to the higher scores observed in these outcome measures.

Mobility and Independence in ADLs Mobility and independence are crucial for patient quality of life post-surgery. Our findings demonstrate that THA patients had higher ADL scores and faster walking speeds, underscoring enhanced mobility. These results are consistent with those of Ullmark G. (2014)[7], who reported that THA provides better functional outcomes in terms of walking ability and daily activities, which is critical for reducing the long-term care needs of elderly patients.

Pain Levels and Surgical Interventions The study indicates lower VAS pain scores and a reduced rate of reoperation in the THA group. This is in line with the observations of van der Sijp MP et al. (2018)[8], who noted that THA tends to have a lower incidence of postoperative pain and complications leading to reoperations. The lower reoperation rate is particularly significant as it suggests higher durability and stability of THA compared to HA.

Long-term Patient Satisfaction and Quality of Life Long-term outcomes, as measured by SF-36 and EQ-5D scores, were superior in the

THA group. This finding echoes the conclusions of Banskota N et al. (2023)[9], who observed higher patient satisfaction rates post-THA, likely due to better pain management and restoration of mobility. Such outcomes are critical as they directly impact the patient's ability to return to pre-injury lifestyle levels.

CONCLUSION

The comparative study of functional outcomes in patients with proximal femur fractures treated with Total Hip Arthroplasty (THA) versus Hemiarthroplasty (HA) provides significant insights into the effectiveness and patient-centered outcomes of these two common surgical interventions. Based on the data collected and analyzed across multiple dimensions of patient recovery and satisfaction, several key conclusions can be drawn.

Firstly, THA consistently demonstrated superior functional outcomes as evidenced by higher Harris Hip Scores and Oxford Hip Scores compared to HA. This suggests that THA may offer better joint functionality and overall recovery, aligning with its design to more completely mimic the natural biomechanics of the hip joint.

Secondly, in terms of mobility and independence in activities of daily living (ADLs), patients who underwent THA showed greater improvements. They achieved higher ADL scores and exhibited faster walking speeds, underlining the benefits of THA in enhancing the quality of life and independence post-surgery. This aspect is particularly crucial as it directly influences the patient's ability to return to their normal daily routines and reduces long-term dependence on support services.

Furthermore, THA was associated with lower pain levels postoperatively and a decreased need for subsequent surgical interventions, as indicated by the lower VAS pain scores and reoperation rates. These findings suggest that THA not only enhances immediate postoperative comfort but also contributes to more durable and long-lasting surgical outcomes, potentially leading to reduced healthcare costs and resource utilization over time.

Lastly, the long-term patient satisfaction and quality of life, assessed through SF-36 and EQ-5D scores, were notably higher in the THA group. This reflects the comprehensive benefits of THA in terms of both physical health and psychological well-being, contributing to overall patient satisfaction.

In conclusion, this study underscores the advantages of Total Hip Arthroplasty over Hemiarthroplasty for treating proximal femur fractures, particularly in patients suitable for more invasive procedures. While THA may require greater initial resources and recovery time, the long-term benefits in terms of functionality, pain management, mobility, and patient satisfaction justify its selection in appropriate patient populations. These findings advocate for a tailored approach to surgical decision-making, emphasizing the importance of considering individual patient characteristics and lifestyle needs in choosing the optimal surgical intervention.

LIMITATIONS OF STUDY

1. **Retrospective Study Design**: The retrospective nature of the study limits the ability to control for potential confounding variables that could influence outcomes. Prospective, randomized controlled trials would provide more robust data to clearly delineate the effects of THA versus HA.
2. **Selection Bias**: The criteria for selecting patients for either THA or HA could introduce bias, as surgeons may preferentially choose THA for younger or more active patients who might inherently have better outcomes due to factors unrelated to the surgery type.
3. **Sample Size**: Although a total of 120 patients were studied, this number might still be small for detecting subtle differences in some of the measured outcomes. Larger sample sizes could provide more power to detect significant differences and allow for more detailed subgroup analyses.
4. **Single-Center Study**: Data were collected from a single institution, which may limit the generalizability of the findings to other settings due to differences in surgical expertise, patient demographics, or postoperative care protocols.
5. **Subjective Outcome Measures**: Some of the outcomes, particularly patient-reported measures such as pain levels and quality of life, are inherently subjective and can be influenced by individual patient perceptions and expectations.
6. **Follow-Up Duration**: The follow-up period may not have been long enough to capture long-term complications or

outcomes, particularly for THA, which might have implications on longevity and later-life complications that were not observed in the duration of this study.

7. **Variability in Surgical Technique**: Differences in surgical technique, experience of the surgeon, and the type of prosthesis used were not controlled in the study, all of which could significantly affect the outcomes.
8. **Lack of Cost Analysis**: The study did not include an analysis of the cost-effectiveness of THA versus HA, which is crucial for healthcare decision-making, especially in settings with limited resources.
9. **Comorbid Conditions**: The study did not extensively adjust for the range and severity of comorbid conditions, which could affect recovery and outcomes. Patients with varying health backgrounds may respond differently to each type of surgery.

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