

Outcome of Total Hip Arthroplasty using Dual Mobility Total Hip Arthroplasty Implant

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ABSTRACT

Objective: To evaluate the outcomes of total hip arthroplasty (THA) using a dual mobility implant.

Methodology: A cohort of 49 patients, aged 35 to 80 years and including both genders, who were scheduled for THA for various indications, were enrolled in this study. Patients underwent both clinical and radiographic evaluations prior to the surgery. The dual mobility implant was utilized during THA. Follow-up assessments were conducted three months postoperatively to monitor for any incidents of dislocation. The study spanned from [start date] to [end date] and received ethical approval under the reference number [ethical approval reference number].

Results: Out of the 49 patients, 32 (65.3%) were male, resulting in a male-to-female ratio of 2:1. The mean age of the patients was 61.00 ± 10.51 years. The mean preoperative Harris Hip Score was 49.04 ± 7.33, which improved significantly to 88.45 ± 8.58 postoperatively ($p < 0.001$). There were no dislocations observed during the follow-up period.

Conclusion: The study found a statistically significant improvement in Harris Hip Scores from preoperative to postoperative assessments, with no dislocations occurring following THA using a dual mobility implant.

Keywords: Total Hip Arthroplasty, Harris Hip Score, Dislocation.

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INTRODUCTION

Total hip arthroplasty (THA) is highly regarded in orthopedic surgery due to its success rates and cost-effectiveness. It reliably provides pain relief, enhances function, and improves the quality of life for patients with advanced degenerative hip osteoarthritis (OA)¹. Hip OA, a leading cause for THA, affects millions of Americans each year, with an incidence rate of 88 symptomatic cases per 100,000 individuals. Other indications for THA include hip osteonecrosis (ON), congenital hip deformities, and inflammatory arthritis^{2,3}.

THA has been consistently shown to yield favorable clinical and functional outcomes, offering significant pain relief in both the short and long term. Compared to total knee arthroplasty (TKA), THA often provides more reliable and consistent results⁴. Although end-stage hip OA remains the most common reason for THA, other conditions such as hip

ON, hip dysplasia, and inflammatory arthritic diseases also necessitate this procedure⁵. Approximately 10% of THAs are performed for hip ON, typically affecting younger patients between the ages of 35 and 50^{6,7}.

Dislocation is a notable risk following THA, influenced by various patient-specific and surgical factors. Studies have compared revision rates between Exeter THAs and dual-mobility THAs, revealing a lower dislocation rate in the latter⁸. In Pakistan, a study reported a 9.2% revision rate for THAs involving dual implants due to cup shell fractures⁹.

This study seeks to assess the outcomes of THA using dual mobility implants, considering the procedure's commonality in Pakistan. Enhancing surgical techniques and implant options is essential to improve patient outcomes. Evaluating the effectiveness and safety of dual mobility implants within the Pakistani context could provide valuable insights into their clinical utility.

METHODOLOGY

Sample Size: The sample size was determined to be 49 based on a 9.2% proportion of revision surgery following THA with a dual mobility implant. This calculation was made using a 95% confidence interval and an 8.1% margin of error, applying the WHO formula for sample size determination.

Sampling Technique: A Non-Probability Consecutive Sampling Technique was employed.

Outcomes of Total Hip Arthroplasty Using Dual Mobility Implant:

Dislocation: Dislocation was defined as the partial or complete misalignment of the artificial hip joint components. This occurs when the ball portion of the joint exits the socket, leading to a loss of proper alignment between the components, as confirmed by radiographic assessment.

Data Collection Procedure:

This descriptive study was conducted in the Department of Orthopedic Surgery at MTI-Khyber Teaching Hospital, Peshawar, Pakistan, from April 2023 to June 30, 2023. Patients were selected based on predefined inclusion criteria, and those who qualified were asked to provide written informed consent after being thoroughly informed about the study's objectives. Prior to undergoing total hip arthroplasty with a dual mobility implant, each patient underwent clinical and radiographic evaluations. Postoperatively, patients were monitored in the ward for five days and discharged when deemed appropriate. Follow-up assessments were conducted at the 3-month mark to evaluate for dislocation, with findings confirmed by the researcher under the guidance of a consultant orthopedic surgeon.

The data collection process was managed by the researcher, under the supervision of a consultant orthopedic surgeon who possessed a minimum of three years of fellowship experience. Strict adherence to the inclusion and exclusion criteria was maintained to reduce the risk of bias and confounding factors.

Statistical Analysis: Data were entered and analyzed using SPSS version 23.0. For numerical variables such as age, and preoperative and postoperative Harris Hip Scores, mean and standard deviation (SD) were calculated. Frequencies and percentages were used to describe categorical

variables, including gender, indications for THA, the affected hip, and the incidence of dislocation. A paired t-test was applied to compare the preoperative and postoperative Harris Hip Scores. Additionally, the Harris Hip Scores were stratified by gender to identify potential effect modifiers, and post-stratification paired t-tests were performed. Statistical significance was set at $p < 0.05$.

RESULTS

A total of 49 patients were included in this study, with the majority being male (32 patients, 65.3%). The average age of the participants was 61.00 ± 10.51 years. The mean Harris Hip Score improved from 49.04 ± 7.33 preoperatively to 88.45 ± 8.58 postoperatively. Hip vascular necrosis was the most common diagnosis, observed in 29 patients (59.2%), followed by non-ossifying fibromas in 13 patients (26.5%). Only 2 patients (4.1%) underwent THA as a second-stage revision surgery. Importantly, no dislocations were reported following surgery (Table 1). A statistically significant improvement was noted in the Harris Hip Score from pre- to post-operation, with a p-value of < 0.001 (Table 2). Additionally, significant improvements in the Harris Hip Score were observed for both male and female patients, with p-values of < 0.001 for each gender.

Table-I: Demographic and Clinical Characteristics of Patients (n=49)

Quantitative Variables	Mean+SD
Age (Years)	61.00+10.51
Pre-Op Harris Hip Score	49.04+7.33
Post Op Harris Hip Score	88.45+8.58
Qualitative Variables	
Gender	n (%)
Male	32 (65.3%)
Female	17 (34.7%)
Affected Hip	
Right	22 (44.9%)
Left	27 (55.1%)
Indication for THA	n (%)
Hip Avascular Necrosis	29 (59.2%)
Non-Ossifying Fibromas	13 (26.5%)
Ankylosing Spondylitis	02 (4.21%)
Secondary OA	03 (6.1%)
2 nd Stage Revision Cases	02 (4.1%)
Outcome	n (%)
Dislocation	0 (0.0%)
No Dislocation	49 (100.0%)

Table-II: Comparison of Pre and Post Op Harris Hip Score in Patients of Total Hip Arthroplasty (n=49)

Paired Samples Statistics					P Value
Outcome	Mean	N	Std. Deviation	Std. Error Mean	0.000
Pre-Op Harris Hip Score	49.04	49	7.331	1.047	
Post Op Harris Hip Score	88.45	49	8.581	1.226	

Table-III: Association of Pre and Post Op Harris Hip Score with Gender (n=49)

Gender	Outcome	Mean	N	Std. Deviation	Std. Error Mean	P Value
Male	Pre Op Harris Hip Score	48.25	32	5.406	.956	0.000
	Post Op Harris Hip Score	89.59	32	8.389	1.483	
Female	Pre Op Harris Hip Score	50.53	17	10.051	2.438	0.000
	Post Op Harris Hip Score	86.29	17	8.773	2.128	

DISCUSSION

The objective of this study was to evaluate the outcomes of total hip arthroplasty (THA) using a dual mobility implant. The study included 49 patients, with 32 (65.3%) being male, and an average age of 61.00±10.51 years. The mean Harris Hip Scores improved significantly from 49.04±7.33 preoperatively to 88.45±8.58 postoperatively ($p < 0.001$). This improvement was consistent across both genders, with p-values of < 0.001 for each.

Dual mobility implants were developed to reduce dislocation rates following THA. A systematic review and meta-analysis¹⁰ comparing dual mobility THA with bipolar hemiarthroplasty in patients with femoral neck fractures found that dual mobility THA was associated with a lower dislocation rate. Similarly, another study¹¹ demonstrated that using dual mobility components in THA after a femoral neck fracture reduced dislocation rates compared to conventional arthroplasty. These implants have also been shown to increase effective head size and overall prosthesis stability. Multiple studies have investigated the application and outcomes of dual mobility THA^{12,13}.

A 2019 study published in *EFORT Open Reviews*¹⁴ examined the role of dual mobility implants in preventing instability during primary THA. It concluded that these implants are effective in preventing instability compared to traditional implants. The study also highlighted that dual mobility implants allow for better anatomical replication, enabling easier bilateral and outpatient procedures without post-operative range of motion restrictions. This permits patients to engage in unrestricted activities and maintain their usual occupations.

A 2023 systematic review published in *PubMed*¹⁵ focused on the use of dual mobility THA in patients younger than 55 years. It confirmed that dual

mobility is a viable option for younger patients, offering longer implant survivorship with minimal rates of instability and dislocation after primary THA. The review also reported positive clinical outcomes, including high Harris Hip Scores and low revision rates.

Another systematic review published in the *Bone Joint Journal* in 2018¹⁶ explored the outcomes of dual mobility components in THA. This review found that dual mobility implants were associated with lower dislocation rates compared to conventional implants, along with favorable clinical outcomes such as high Harris Hip Scores and low revision rates.

In summary, existing research supports dual mobility THA as a valid option that offers extended implant survivorship and low rates of instability and dislocation following primary THA. Dual mobility implants provide advantages over traditional implants, including better anatomical replication and the ability to engage in unrestricted post-operative activities. However, the study presented here has limitations, including a relatively small sample size of 49 patients and a single-center design, which may limit the generalizability of the findings. The short follow-up period also limits the assessment of long-term outcomes associated with dual mobility implants. These limitations should be taken into account when interpreting the results, despite the valuable insights the study provides into the outcomes of total hip arthroplasty using dual mobility implants.

CONCLUSION

The study demonstrated a statistically significant improvement in Harris Hip Scores from preoperative to postoperative evaluations, with no dislocations reported following total hip arthroplasty. Future research with larger sample sizes, longer follow-up periods, and comparative groups is necessary to fully

assess the outcomes of dual mobility THA. Nevertheless, this study offers valuable insights into the use of dual mobility implants in total hip arthroplasty, contributing to the growing body of literature on this topic.

Conflict of Interest: None

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