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Research Article

Evaluating the Clinical Outcomes of Total Hip Arthroplasty Utilizing Dual Mobility Implants: A Comprehensive Review

Sajjad Hussain Bhatti[1*], Niaz Hussain Keerio[2], Abdul Samad Qureshi[3], Muhammad Azfar Khanzada[4], Asfandyar Khan[5], Nadeem Hassan[6]

[1*]Sajjad Hussain Bhatti, Assistant Professor Orthopaedics, Pir Abdul Qadir Shah Jillani Institute of Medical Sciences GIMS Gambat Khairpur mir's Pakistan.

[2]Niaz Hussain Keerio, Assistant Professor Orthopaedics, Muhammad Medical College, Ibn-E-Sina University Mirpurkhas Pakistan.

[3]Abdul Samad Qureshi, Assistant Professor Orthopaedics, Indus Medical College Hospital Tando Mohammad Khan Pakistan.

[4]Muhammad Azfar Khanzada, Orthopaedic Specialist, Dr Sulaiman Al Habib Medical Group Riyadh KSA.

[5]Asfandyar Khan, Assistant Professor Orthopaedics, Pakistan Institute of Medical Sciences Islamabad Pakistan.

[6]Nadeem Hassan, Senior Registrar Orthopaedics, Pakistan Institute of Medical Sciences Islamabad Pakistan.

Email: [2]niaz_h@hotmail.com, [3]asqureshi855@hotmail.com, [4]azfarkhanzada123@yahoo.com, [5]asfandyar.pims@gmail.com, [6]Fad1988@yahoo.com

Corresponding Email: [1*]sajjadbhattier@gmail.com

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ABSTRACT

Objective

This study set out to evaluate the clinical results of total hip arthroplasty (THA) with a dual mobility implant (DMI).

Study design: A prospective cohort study

Place and Duration: This study was done at, Pir Abdul Qadir Shah Jillani Institute of Medical Sciences GIMS Gambat Khairpur mir's for period of one years from March 2024 to March 2025.

Methodology

Total 30 patients participated for this study. The patients were both male and female. The age bracket was from 32 years to 75 years. There were several reasons for which these patients were on the list of THA. Patients were assessed clinically and a radiograph of each patient was taken before the surgery. A DMI was used in the surgery. Patients were asked to attend their follow-up visit after three months of the surgery. This visit was arranged to check if there is any sign of dislocation.

Results

The ratio of male patients to female patients was 1.5:1. There were 18 (60%) male patients and 12 (40%) female patients. The average age of the patients was 60.21 ± 9.25 years. Harris Hip Score (HHS) of the patients was recorded before the surgery and an average of HHS was 47.70 ± 6.85. It improved after the surgery and was seen to be 85.25 ± 7.29 ($p < 0.001$). No patient was diagnosed with dislocation on the three months follow up visit.

Conclusion

The results of the study demonstrate that there was a significant improvement in the HHS of the patients treated by THA using a DMI and there was no dislocations observed after the surgery.

Keywords: Total Hip Arthroplasty, Dual Mobility Implant, Harris Hip Score, Dislocation.

INTRODUCTION

Surgery known as total hip arthroscopy (THA) is performed on patients who have hip joint problems for a variety of underlying causes, including osteoarthritis, hip fractures, and avascular necrosis. Because dislocation is thought to be the most frequent post-operative issue, the results of THA are determined by the joint's stability following the procedure and the overall risk being decreased. In the modern day, DMI is a lifesaver for patients suffering from various ailments, particularly dislocation of the joint, which is frequently observed in patients with

complex hip anatomy or decreased integrity of the soft tissues of the joint [1, 2].

When placed inside a titanium shell, the DMI functions similarly to a movable joint, providing a broad range of motion and lowering the risk of dislocation during surgery [3]. DMI's larger jump distance and more articulating model make its design more dependable. In high-risk, geriatric, and neuromuscular illness patients, this has contributed to the prosthetic device's greater stability [4]. Numerous studies have demonstrated the benefits of DMIs, including their contributions to improved joint function, a shorter recovery time, and a lower dislocation rate [5, 6].

Despite these positive findings of DMI usage, research is still ongoing for the determination of long term efficiency and safety of these DMIs compared to the conventional implants used for the THA. There are differing discussions on the ideal patient demographic, surgical technique, and potential side effects of these implants [7, 8]. Moreover, outcomes like wearing and tearing of the installed device, loosening of the implant and wearing of the polythene are still being researched about [9, 10].

DMIs not only reduce the chances of dislocation, they also improve the functional outcomes of the joint after the surgery. These benefits make it useful for elderly individuals and patients with cognitive disabilities [11, 12]. Furthermore, various studies have shown the positive outcomes of DMIs in terms of patients' satisfaction and easier recovery compared to conventional THA designs [13, 14]. However, not much data is available regarding its reviews and outcomes from younger and physically active individuals [15].

The present study aims at the evaluation of the clinical outcomes of the THA and DMIs in terms if functional improvement, rate of dislocation after the surgery, and complications. For that purpose, HHS has been used as a measure of function of hip and it was also used to check the pre and postoperative outcomes.

METHODOLOGY

This prospective cohort study evaluates and compares the outcomes of THA with DMIs. A written informed consent was taken from all the patients before enrolling them in the study. Total number of patients, including male and female, was 30. The ages of the patients ranged from 32 years to 75 years. The patients had different hip joint problems such as fracture of hip joint, osteoarthritis and avascular necrosis. According to the exclusion criteria of the study, patients having any infection at the time of study, patients having a significant neurological or musculoskeletal disorders, or surgical contraindications were excluded from the study. a comprehensive preoperative assessment of all the patients was done before the surgery. This assessment included history of the patient, physical examination and analysis of radiographs. The HHS of each patient was considered to be the baseline of each hip function assessment. Radiographs of the patients were collected to make a plan regarding the surgery, assessment of extent of hip joint deterioration and for the confirmation of any contraindication to THA, if any. Baseline laboratory investigations were carried out for all the patients for checking their fitness to bear a surgical procedure.

All surgical procedures were done by the orthopedic surgeons. Each case used a dual mobility acetabular component, which consists of a movable titanium shell with a mobile polythene insert. The femoral component was fixed using a popular cementless technique. The size and position of the implant were established by preoperative templating and intraoperative assessment of the patient's acetabular and femoral anatomy. Most patients were approached from the back to the hip joint. Postoperative care included physical therapy to increase hip strength and mobility, early mobilisation with weight-bearing when tolerated, and, when feasible, non-opioid analgesic pain management.

Patients were thoroughly monitored for any problems, including deep vein thrombosis, infection, and dislocation. Following surgery, follow-up appointments were scheduled for six weeks, three months, six months, and twelve months to monitor recovery and functional outcomes.

The primary outcome measure for the trial was the HHS, which assessed functional improvement at preoperative and postoperative time points. On the day of admission, preoperative HHS scores were noted, and at the three-month follow-up visit,

postoperative HHS scores were acquired. The frequency of dislocation, implant-related issues like wear or loosening, and patient-reported outcomes like satisfaction and pain levels were examples of secondary outcomes. To minimise bias, follow-up evaluations were conducted by impartial assessors who were blind to the patients' preoperative condition. Three months after surgery, a radiographic evaluation was performed to look for indications of implant failure, such as acetabular migration, wear, or loosening. Descriptive statistics were used to analyse the data and summarise the clinical scores, complications, and demographic data. Preoperative and postoperative HHS scores were compared using the paired t-test; a p-value of less than 0.05 is regarded as statistically significant. Implant survival was evaluated using Kaplan-Meier survival analysis, and frequency distributions were used to determine the incidence of dislocation and other complications.

The study adhered to the principles of the Declaration of Helsinki. All patients provided informed consent before participating in the study.

RESULTS

A total of 30 patients were included in this study, with 18 males (60%) and 12 females (40%), giving a male-to-female ratio of 1.5:1. The mean age of the participants was 60.21 ± 9.25 years. The most common indication for Total Hip Arthroplasty (THA) was osteoarthritis, observed in 16 patients (53.3%), followed by avascular necrosis in 9 patients (30%) and hip fractures in 5 patients (16.7%). Importantly, no dislocations were reported during the follow-up period (Table 1). The mean preoperative Harris Hip Score (HHS) was 47.70 ± 6.85, which improved significantly to 85.25 ± 7.29 postoperatively, with a p-value of < 0.001 (Table 2). This improvement in HHS was observed across both male and female patients, with statistically significant increases in both groups (p < 0.001 for each gender) (Table 3).

Table 1: Demographic and Clinical Characteristics of Patients (n=30)

Quantitative Variables	**Mean ± SD**
Age (Years)	60.21 ± 9.25
Qualitative Variables	**n (%)**
Gender	
Male	18 (60%)
Female	12 (40%)
Indication for THA	
Osteoarthritis	16 (53.3%)
Avascular Necrosis	9 (30%)
Hip Fracture	5 (16.7%)
Outcome	
Dislocation	0 (0%)
No Dislocation	30 (100%)
Preoperative HHS	47.70 ± 6.85
Postoperative HHS	85.25 ± 7.29

Table 2: Comparison of Preoperative and Postoperative Harris Hip Scores (n=30)

Table 3: Association of Preoperative and Postoperative Harris Hip Scores with Gender (n=30)

Outcome	**Mean ± SD**	**N**	**Std. Deviation**	**Std. Error Mean**	**P Value**
Preoperative HHS	47.70 ± 6.85	30	6.85	1.25	< 0.001
Postoperative HHS	85.25 ± 7.29	30	7.29	1.33	< 0.001

Gender	**Outcome**	**Mean ± SD**	**N**	**Std. Deviation**	**Std. Error Mean**	**P Value**
Male	Preoperative HHS	46.58 ± 7.21	18	7.21	1.70	< 0.001
	Postoperative HHS	86.77 ± 6.92	18	6.92	1.63	< 0.001
Female	Preoperative HHS	49.58 ± 6.05	12	6.05	1.75	< 0.001
	Postoperative HHS	83.41 ± 7.52	12	7.52	2.17	< 0.001

With a mean rise of 37.55 points from preoperative to postoperative examinations, the results showed a statistically significant improvement in the HHS following THA ($p < 0.001$). Both male and female patients experienced this improvement. Furthermore, no dislocations were noticed throughout the study time, indicating that the DMI is effective in averting these issues. The distribution of THA causes, which included osteoarthritis in more than half of the patients, showed that degenerative hip diseases were common in the studied group.

DISCUSSION

With no reported dislocations during the follow-up period, the current study assessed the effects of THA using DMIs and found a significant improvement in HHS postoperatively. These results are in line with other research that demonstrated the potential of DMIs to improve hip stability and functional outcomes. The mean HHS was 47.70 ± 6.85 before surgery, but it improved to 85.25 ± 7.29 after surgery ($p < 0.001$). These findings are consistent with those of Barlow et al., who found that THA and DMIs improved HHS in a comparable way [16]. Similar gains in functional evaluations were reported by Zambianchi et al., who reported preoperative HHS of 49.6 ± 6.5 and postoperative HHS of 87.2 ± 7.0 [17].

Molloy et al. and Piva et al. discovered no dislocations in patients getting THA with DMIs, which is in line with our study's lack of dislocations [18, 19]. The 2-3% dislocation rate linked to traditional THA implants [20] highlights how much better DMIs are in minimising this issue.
Avascular necrosis accounted for 30% of THA indications in our data, per Gomez et al. [21]. This illustrates how crucial DMIs are for giving patients with necrotic hip joint dysfunction stability [22].
The gender differences analysis in our study showed that the improvement was similar for male and female patients. Postoperative HHS was somewhat higher in male patients, which is consistent with earlier findings by Barlow et al. [16]. These gender differences could result from differences in preoperative activity and function. Our study's lack of serious issues is in line with earlier research by Molloy et al. and Piva et al. [17, 18]. However, the study's single-center design and brief three-month follow-up period are drawbacks. To more precisely evaluate the long-term effects of DMIs in THA, longer-term research with bigger sample groups is required.

CONCLUSION

This study comes to the conclusion that DMIs in THA lead to significant improvements in functional outcomes because there were no dislocations recorded during the follow-up period. These findings are consistent with previous studies and highlight the advantages of DMIs in enhancing hip stability and reducing problems like dislocations. Future studies must use larger sample numbers and longer follow-up to evaluate the long-term impact and durability of this promising approach.

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None
Permission
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Conflict of Interest
None

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