ORIGINAL RESEARCH PAPER

Orthopaedics

AN OBSERVATIONAL STUDY ON FUNCTIONAL OUTCOMES OF TOTAL HIP ARTHROPLASTY IN PATIENTS WITH POST-ACETABULAR FRACTURE OSTEOARTHRITIS AT SMS MEDICAL COLLEGE, JAIPUR

KEY WORDS: Arthroplasty, Osteoarthritis, Post-acetabular fracture

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ABSTRACT

Introduction- The hip joint is one of the largest and most functionally significant synovial joints in the human body. It serves as the principal weight-bearing articulation of the lower limb and plays a crucial role in locomotion, maintenance of posture, and execution of activities of daily living. Anatomically, the hip is a ball-and-socket joint formed by the articulation between the spherical femoral head and the acetabulum of the pelvis.**aim-** To study and evaluate the functional outcomes of Total Hip Arthroplasty in patients with post-acetabular fracture osteoarthritis treated at SMS Medical College and Hospital, Jaipur, during the study period.**observation And Result** - The findings of the present study demonstrate that THA provides substantial clinical and functional improvement in patients with post-acetabular fracture osteoarthritis.

INTRODUCTION

The hip joint is one of the largest and most functionally significant synovial joints in the human body. It serves as the principal weight-bearing articulation of the lower limb and plays a crucial role in locomotion, maintenance of posture, and execution of activities of daily living. Anatomically, the hip is a ball-and-socket joint formed by the articulation between the spherical femoral head and the acetabulum of the pelvis. The acetabulum, a hemispherical cavity formed by the fusion of the ilium, ischium, and pubis, provides a stable yet mobile socket for the femoral head. The acetabular labrum, joint capsule, ligamentous structures, and surrounding musculature contribute to joint stability while allowing a wide range of motion.(1,2,3)

Biomechanically, the hip joint is subjected to substantial forces during normal activities. During walking, the joint transmits forces approximately three to five times the body weight, and even greater forces during running or climbing stairs. This mechanical demand highlights the importance of maintaining articular congruity and structural integrity. Any disruption of the articular surface or supporting structures predisposes the joint to degenerative changes and long-term disability(4,5).

AIM AND OBJECTIVES

To study and evaluate the functional outcomes of Total Hip Arthroplasty in patients with post-acetabular fracture osteoarthritis treated at SMS Medical College and Hospital, Jaipur, during the study period. To determine and quantify the functional outcomes in patients undergoing Total Hip Arthroplasty following post-acetabular fracture osteoarthritis using validated functional assessment tools such as the Harris Hip Score, including evaluation of pain relief, range of motion, gait, and overall functional improvement.

Material and methods

- The study will be conducted at, and under supervision of department of orthopaedic, SMS Medical College and hospital, Jaipur
- Approval shall be taken from the research review board and ethical committee of the institute of SMS medical college Jaipur Rajasthan, prior to stud
- The proposed will be conducted after approval from the Research Review Board in 2024.
- Descriptive study
- Hospital based observational study.All patients admitted in department of orthopaedic, SMS Medical College and hospital, Jaipur.

Inclusion criteria

- All patients undergoing total Hip Arthroplasty with Post-Acetabular Fracture Osteoarthritis
- Patients willing to give written informed consent

Exclusion criteria

Severe medical condition like cardiovascular disease, uncontrolled diabetes, significant pulmonary disease,

- Inadequate bone stock in the acetabulum or femur due to severe osteoporosis or bone deficiencies
- Conditions that severely impair muscle function or neurological around the hip joint
- H/o compound fracture near acetabulum.

Study population

- All patients undergoing total Hip Arthroplasty with Post-Acetabular Fracture Osteoarthritis meeting inclusion and exclusion criteria.

Sample Size:

Sample size is calculated at 95% confidence level and alpha error of 0.05 to verified expected adverse outcome (post-Operative heterotopic bone formation) in total Hip Arthroplasty patients followed by Post-Acetabular Fracture Osteoarthritis is found to be 11%.At the absolute allowable error of 10 % the required sample size will be 38 subjects which is further enhanced to 40 subjects as final sample size.

OBSERVATION AND STUDY

Table 1: Mean Harris Hip Score (HHS) comparison of the study participants

Harris Hip Score (HHS)	Mean±SD	F Value	P value	Remark
Baseline HHS	40.45±3.01	14718.527	<0.001	S
HHS at 2nd Week	52.33±3.10			
HHS at 6th Week	64.90±3.38			
HHS at 6th Months	82.40±3.87			

Mean Harris Hip Score (HHS) preoperatively at baseline was 40.45±3.01 , HHS at 2nd Week was 52.33±3.10, HHS at 6th Week was 64.90±3.38, HHS at 6th Months was 82.40±3.87. HHS varied significantly over the time. HHS showed progressive improvement, indicating excellent functional recovery at 6 months

Table 2: Pairwise Comparison Of HHS (mean difference) of the study

Pairwise Comparison of Harris Hip Score (HHS)	Mean Paired Difference ±SD	t Value	P value
Baseline HHS vs HHS at 2nd Week	-11.87±1.56	-48.280	<0.001
Baseline HHS vs HHS at 6th Week	-24.45±2.26	-68.302	<0.001
Baseline HHS vs HHS at 6th Months	-41.95±2.48	-106.974	<0.001
HHS at 2nd Week vs HHS at 6th Week	-12.57±1.65	-48.292	<0.001
HHS at 2nd Week vs HHS at 6th Months	-30.07±2.14	-88.841	<0.001
HHS at 6th Week vs HHS at 6th Months	-17.50±1.69	-65.312	<0.001

Within-Group (Pairwise) comparison shown that all comparisons were significant ($p < 0.001$). There was significant mean difference was observed from preoperative to follow-ups for Harris Hip Score (HHS) at 2nd Week at 6th Week and at 6th Months. The significant improvement over time within group was observed.

Table 3: Distribution of the study participants according to the postoperative Complications

Postoperative complications	Frequency	Percent
None	36	90.0
Superficial Infection	03	7.5
Dislocation	01	2.5
Total	40	100.0

Total 90.0% of the participants had no postoperative complications. Complication rate was low (10.0%), with Superficial infection being most common (7.5%).

DISCUSSION

Ortega-Briones et al. in their study [11] Out of the initial cohort, 14 hips were included in the assessment,(47) with 9 patients having passed away and 2 lost to follow-up. There were no reported complications beyond the perioperative phase, and both clinically and on the most recent radiographs, no signs of loosening were observed in any acetabular components. The mean Harris Hip Score among the evaluated hips was 92, comparable to our study. In another study by Kumar et al. (50) the mean HHS of the patients was 84.3 with a range from 56 to 100, similar to our study.

Hanschenet et al. (48) report while open reduction and internal fixation (ORIF) are typically regarded as the conventional treatment approach for acetabular fractures, elderly patients may experience elevated rates of treatment failure. Acute total hip replacement (THR) has demonstrated the potential to yield favourable results in such cases. However, achieving satisfactory outcomes hinges on several factors, including a comprehensive grasp of the fracture pattern, a meticulous evaluation of patient risk factors and prognostic indicators, and the selection of an appropriate implant tailored to the specific fracture scenario.

Siwach et al (51) showed mean Harris Hip score was 83.5. Lee et al. [177] showed that complications encompassed 11 instances of dislocation (6.1%), ten occurrences of periprosthetic fractures (5.5%), two cases of deep infections (1.1%), four incidents of sciatic nerve palsies (2.2%, with three resolving without intervention and one showing improvement after exploration and adhesion release), and one vascular injury (0.6%). Before surgery, the mean modified Harris Hip Score was 41 (ranging from 10 to 82), while postoperatively at one year, it reached 77 (ranging from 39 to 93), maintaining the same level at 77 (ranging from 38 to 93). The findings of this study did not align with our study. Despite satisfactory outcomes, prospective studies comparing acute and delayed THA in acetabular fractures are lacking, highlighting the need for further research to assess reconstruction longevity. Limitations of this study comprise a small sample size and brief follow-up duration.

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