

Functional Outcome of Total Hip Replacement using modified Harris Hip Score

Rupesh Wod¹, Prashanna Dip Karki², Tufan Singh Kathayat³, Bijaya Gurung¹, Kathit Raj Ghimire⁴, Alisha Rasailee⁵, Srijana Pandeya⁵

Department of Orthopaedics,¹ National Trauma Center;² B & B Hospital³, Karnali Academy of Health Sciences,⁴ Pokhara Academy of Health Sciences; ⁵Gokarneshwor Nagar Hospital

Corresponding Author: Prashanna Dip Karki, Email: drprashannadkarki@gmail.com

ABSTRACT

Background: Total hip replacement (THR) is a common surgery for relieving pain and improving the quality of life in patients with moderate to severe hip arthritis. The primary reason for THR is severe hip osteoarthritis, when conservative measures fail to relieve pain. The modified Harris Hip Score (mHHS) is frequently used to assess the hip's status before surgery and after surgery. The objective of the study was to examine functional outcomes, indications, and complications of THR using mHHS at different stages.

Methods: A prospective observational study was carried out at National Trauma Center, NAMS. The study included first 35 hips of 35 patients who underwent Total Hip Replacement at our hospital and met the inclusion criteria. Follow-up assessments were conducted at 6 weeks, 3 months, and 6 months after the surgery. Each visit involved thorough clinical and radiological examinations, as well as documentation of the mHHS chart. All continuous variables were expressed as mean \pm standard deviation and two sample t test was used to compare means of two sub groups.

Results: The study enrolled participants aged 26 to 66, with 60% male and 40% female. Right sided involvement was observed in 55% of cases, while the left side was affected in 45%. The most common reason for surgery was osteoarthritis caused by avascular necrosis of the femoral head. The average preoperative mHHS was 28, which increased to 64 at six weeks, 86 at three months, and 92 at six months. The study found that 80% of participants achieved excellent results. Complications, including a 2.85% dislocation rate, were reported.

Conclusion: THR is a safe and effective procedure, providing excellent functional outcomes and minimal complications when performed carefully and precisely. Long-term studies are needed to investigate late complications and further establish the efficacy of the implants and the procedure.

Keywords: mHHS, Osteoarthritis, Outcome, THR, THA

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INTRODUCTION

Total hip arthroplasty (THA) is the most commonly performed adult reconstructive hip surgical procedure [1]. THA is a highly effective and predictable surgery, offers pain relief, enhances functionality, and elevates the quality of life for hundreds of thousands of patients annually across the globe [1,2]. Selection of the appropriate patient, the proper implants, and the technical performance of the operation are of paramount importance for success of surgery [1]. Total hip replacement (THR) is an option for nearly all patients with diseases of the hip that cause chronic pain, discomfort and significant functional impairment of daily activities. Various outcomes measuring tools has been used to determine the long term outcomes of operative procedures like THR yet no particular hip rating system has been uniformly used. Harris hip score (HHS) is most frequently used tool for recording the status of the hip before surgery and for evaluating postoperative result after THR [1,3]. The standard HHS is composed of the physician physical examination component and the patient-reported outcome component. When only the patient-reported outcomes (PRO) portion of the HHS is completed, it is referred to as a modified Harris hip score (mHHS) [4,5]. HHS is most common scoring tools used traditionally, but now mHHS is also increasingly reliable and valid tool to measure functional outcome in patients undergoing THR [3,4,5].

As like any surgical procedure, total hip replacements have associated surgical complications. Early complications include fracture in proximal femur and acetabulum, neurovascular injuries, dislocations, deep vein thrombosis and pulmonary embolism [6]. Late complications include infection, loosening and heterotrophic ossification [7]. Complications after THA can compromise patient outcomes, increase hospital readmissions, decrease patient satisfaction, and increase healthcare cost. Despite the clinical success of THA, complications after

THA can be expected despite reasonable and safe care, and rates of complications after total joint arthroplasty can vary considerably among hospitals [6]. Success rate as high as 90% with good patient satisfaction can be achieved in a well performed Total hip arthroplasty [7]. Our study aims to find functional outcome of THR and complications like nerve injury, hemorrhage, infection, thromboembolism, dislocation, periprosthetic fracture, limb length discrepancy, loosening and heterotrophic ossification related to this procedure conducted in our hospital which in general will reflect outcome of developing countries.

METHODS

This was a prospective observational which was done among the patients undergoing THR. The study population were all the patient of aged 20 years and above with hip pain who visited at National Trauma Center, Bir Hospital, Kathmandu within a duration of one and half years from August 2019 to December 2020. Ethical approval was obtained from the Institutional Review Board, National Academy of Medical Sciences (NAMS) (Reference number: NAMS 446/2077/78) before starting the study.

Sample size was calculated using Cochran formula where proportion (p) was taken 90% [8]. Altogether 35 patients were enrolled. Convenient sampling technique was done among the elective primary THR due to primary or secondary osteoarthritis to reach the participants. Revision THR and patients undergoing THR with deformities or having pathologies of other joints of the lower limb were excluded.

Patients who were planned for THR were admitted, and the surgical procedure, outcome and possible complications that can occur during the surgery were well explained. A detailed history of the patients was taken, thorough clinical examination including examination of spine and both lower extremities including opposite hip, both knees and foot, and mHHS

form was filled. Pre-operative radiographic assessment was done to confirm the diagnosis, to determine anatomic relationship of the femur and pelvis to allow for accurate restoration of joint anatomy and biomechanics.

A prophylactic antibiotic (Injection Cefuroxime 1.5 gram) was given 1 hour prior to surgery. All patients were operated under subarachnoid block. Patients were operated in lateral position using posterior Southern Moore approach with uncemented acetabular cup and uncemented femoral stem.

Post operatively vitals were monitored carefully for 24 hours, IV antibiotics, NSAIDs, DVT prophylaxis was given and check X-ray was performed. Ankle pump and chest physiotherapy was started on day one and quadriceps exercise was started on second day then were mobilized with crutches and full weight bearing was done by 6 weeks. Patient was discharged on 7th to 14th POD with advice not to adduct and internally rotate the limb and not to squat and called required patients for suture removal on 14th day. All patients were reviewed at 6 weeks, 3rd month and 6 months of surgery. At follow-up a detailed clinical and radiological examination with X-ray Pelvis with both hip anteroposterior hip and affected hip lateral view were done to see status of joints and implant and mHHS was calculated and documented.

Complications were noted like nerve injury – sciatic nerve, common peroneal nerve injury or femoral injury, infection – superficial only involving skin and subcutaneous tissue or deep infection and dislocation - posterior or anterior. Analysis of the data was done using Statistical Package for the Social Sciences (SPSS) version 21 for Windows. All continuous variables were expressed as mean \pm standard deviation while a sample t test was used for comparing means of two sub groups. P-value <0.05 was considered statistically significant.

RESULTS

Total of 312 patients presented to National Trauma Centre with advanced hip arthritis with severe pain hampering activity of daily living and not responding to conservative treatment were advised for THR during study period, out of which 76 did THR Surgery and only 35 patients meeting our inclusion criteria were evaluated for study. Among 35 patients, 19 (54%) were female and 16 (46%) were male (Figure 1).

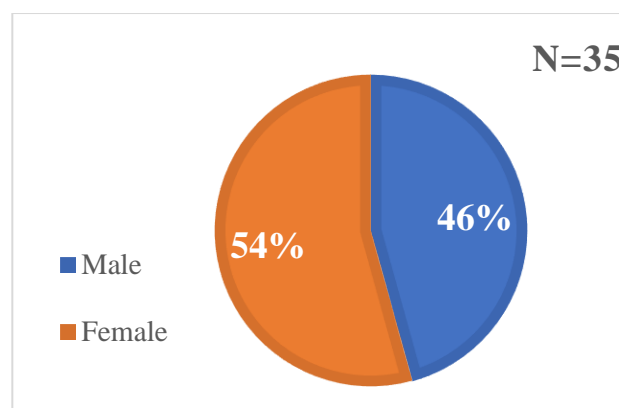


Figure 1: Pie Chart showing Gender distribution of patients

The Mean age of the patients was 43.60 years with standard deviation of 12.83 years (Range= 23 – 76 years). Most of the patients (20 out of 35) were between 40-60 years of age (Figure 2).

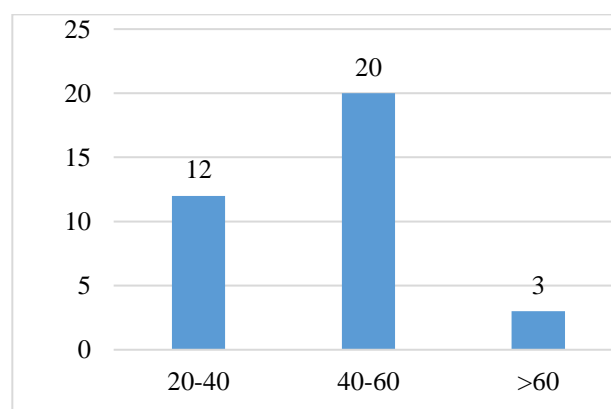


Figure2: Chart showing Age group distribution of patients

Out of 35 patients, we did THR in right side in 19 patients (54%) and left side in 16 patients (46%) (Figure 3).

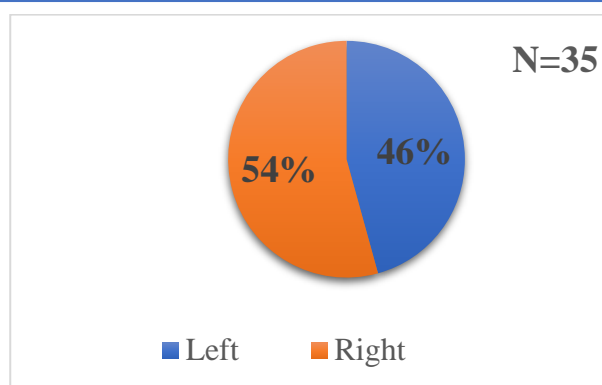


Figure 3: Pie Chart showing THR done side

The most common indication of surgery is secondary osteoarthritis in 24 patients (68.57 %), primary osteoarthritis in 8 patients (22.86 %) and non-union fracture neck of femur in 3 patients (8.57 %). In secondary osteoarthritis; osteoarthritis secondary to avascular necrosis of femoral head are 16 patients (45.71 %), arthritis secondary to ankylosing spondylitis are 2 patients (5.71%), arthritis secondary to rheumatoid arthritis are 2 patients (5.71 %), osteoarthritis secondary to Perthe's disease is 1 patient (2.86 %), osteoarthritis secondary to septic arthritis is 1 patient (2.86 %), osteoarthritis secondary to steroid use is 1 patient (2.86 %), osteoarthritis secondary to fracture neck of femur is 1 patient (2.86 %) (Figure 4).

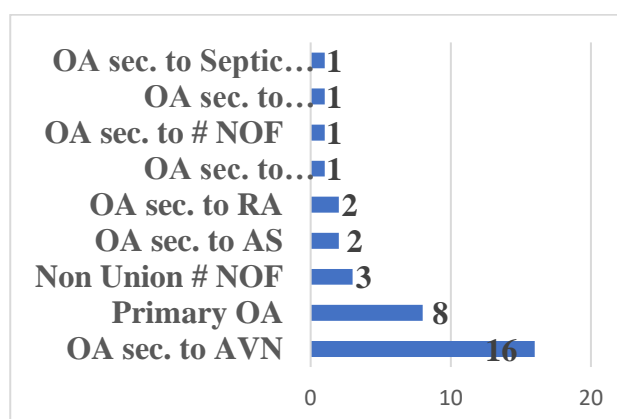


Figure 4: Bar showing indication of Surgery

Mean modified Harris Hip Score pre operatively was 29.89 which increase to 63.09 at 6 weeks of operation, gradually increases to 79.49 at 3 months of operation and finally it became 90.34 \pm 3.41 at 6 months of operation (Figure 5).

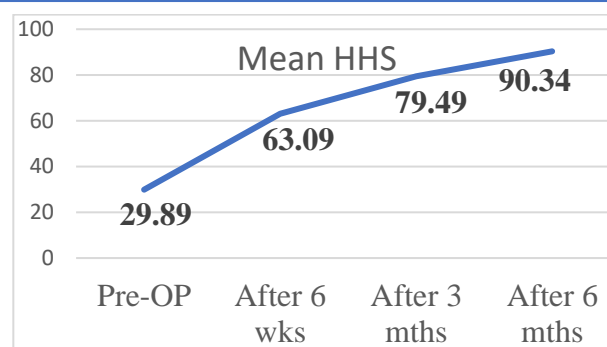


Figure 5: Bar graph showing Mean mHHS pre-operative and different post-operative period

Before operation outcome score of all patients was poor but after 6months of operation no one had poor outcome score but 2 patients had fair outcome, 5 patients had good outcome and 28 had excellent outcome (Table 1).

Table 1: Comparison of pre and post Op final outcome score

Outcome Score	Pre-operative	Final outcome
Poor (< 70)	35	0
Fair (70-79)	0	2
Good (80-89)	0	5
Excellent (90-100)	0	28
Total	35	35

Final outcome of THR based on mHHS is Excellent in 80 % (28 patients), good in 14.29 % (5 patients), fair in 5.71 % (2 patients) out of 35 patients (Figure 6).

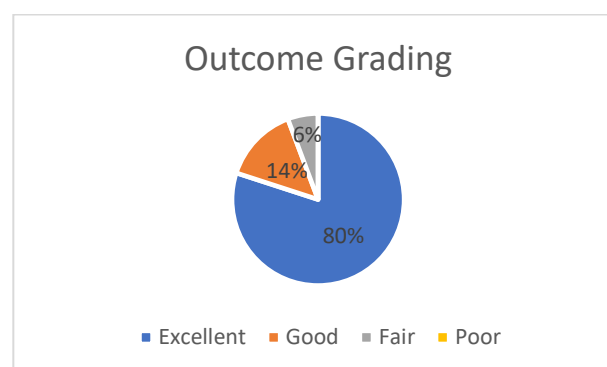


Figure 6: Pie chart showing final mHHS Outcome

Final Outcome score grading was better in female than in male. It was excellent in 17, good

in 1, fair in 1 female patient and it was excellent in 11, good in 4 and fair in 1 male patient (Table 2).

Table 2: Final outcome according to Gender

Outcome Score	Male	Female	Total
Poor (< 70)	0	0	0
Fair (70-79)	1	1	2
Good (80-89)	4	1	5
Excellent (90-100)	11	17	28
Total	16	19	35

The final outcome found better in age group of 40-60 years than others age group patients. where it was fair in 1 patient, good in 2 patients and excellent in 17 patients.

Out of 16 patients of osteoarthritis secondary to avascular necrosis of femoral head fair result was seen in 2 patients, good in 2 patients and excellent in 12 patients, Out of 8 patients of primary osteoarthritis 1 patient had good outcome and 7 patients had excellent outcome, out of 3 patients of non-union fracture neck of femur all 3 patients had excellent outcome, out of 2 patients of arthritis secondary to ankylosing spondylitis 1 patient had good and 1 had excellent outcome, out of 2 patients of arthritis secondary to rheumatoid arthritis both 2 patients had excellent outcome, 1 patient of osteoarthritis secondary to fracture neck of femur had good outcome and each 1 patient of osteoarthritis secondary to Perthe's disease, osteoarthritis secondary to septic arthritis, osteoarthritis secondary to steroid use all had excellent outcome.

Two patients had post-operative complications; 1 patient had posterior dislocation of hip and 1 had superficial skin infection.

Radiograph related tour study:

Radiograph of 52 years male with bilateral hip arthritis secondary to rheumatoid arthritis showing pre-operation (Figure 7), immediate post operation (Figure 8) and 6 months post THR operation of right hip (Figure 9).



Figure 7: Pre-OP



Figure 8: Immediate Post-OP



Figure 9: Six-months Post-OP

DISCUSSION

Total hip arthroplasty is a well-documented surgical procedure [1]. It relieves pain and functional disability experienced by patients with moderate to severe arthritis of the hip, improving their quality of life [2]. The aim of the surgery is to relieve pain, at the same time to preserve motion and stability of the joint. The challenge comes when patients of younger age group are to be operated because, then every technical detail must be used and followed so that the patient has a reasonable chance of 20 or more years of trouble-free activity and survival of living. A number of series have proved the clinical efficacy of THR and several published series have proved that it can provide satisfactory durability for most patients even at intervals of 20 years or more after surgery [9]. Age of the patients ranged from 23-76 years with mean age of 43.6 ± 12.83 years. The majority of patients, 20 out of 35 (57.14%) were between 40 to 60 years of age. This was similar with study done by Rathod et al [10] who had mean age of 43.62 years (23-61 years). Similarly other studies done by Swarna Gupta et al [11] had mean age 40.50 ± 12.15 years (20-75 years), Marahatta et al [7] had mean age of 48 years. Variation in the age group among different studies clearly indicates that age is not the indication for THA. Patients of any age with end stage arthritis are candidates for THA.

Gender variable showed the female dominance in our study with 19 (54%) female patients and 16 (46%) male patients. This finding was similar to that of Chand et al [8]. But in many studies male predominance is found like in study done by Marahatta et al [7], Swarna Gupta et al [11] and Lokesh Gupta et al [12]. In elderly females, due to marked osteopenia, achievement of stable and mobile joint can be a real challenge and there might be chance of implant failure due to lack of stable fixation. However, in our study no cases of implant failure were seen.

In our study showed right sided predominance in doing THR. Out of 35 patients,

in 19 patients (54%) right sided and in 16 patients (46%) left sided THR was done. It was equal to frequency in study done by Lokesh Gupta et al [12] and left sided predominance in study done by Rathod et al [10]. The most common indication of surgery in our patients was secondary osteoarthritis (68.57%). In them, osteoarthritis secondary to avascular necrosis of femoral head was 45.71%, arthritis secondary to ankylosing spondylitis was 5.71%, arthritis secondary to rheumatoid arthritis was 5.71%, osteoarthritis secondary to Perthes disease was 2.86%, osteoarthritis secondary to septic arthritis was 2.86 %, osteoarthritis secondary to steroid use was 2.86%, osteoarthritis secondary to fracture neck of femur was 2.86%, primary osteoarthritis was indication of surgery in 22.86 % and non-union fracture neck of femur in 8.57 %. These were similar to the study done by Marahatta et al [7], Swarna Gupta et al [11] and Lokesh Gupta et al [12].

In our study, mHHS was used for evaluation of functional outcome of THR. The mean mHHS in last follow up was 90.34 ± 3.41 which is similar to that of Marahatta et al [7] i.e. 90.5. Similarly, the mean mHHS in study of Chand et al [8] was 85.23, Lokesh Gupta et al [12] was 92 and Jil Patil and Krupal Soni [13] was 94.4. In our study, out of 35 patients, 28 (80%) patients were graded as excellent, 5 (14.29%) patients were graded as good, 2 (5.71%) were graded as fair and no one was graded as poor. This was similar to study done by Marahatta et al [7] where 85% were graded as excellent, 9% were graded as good, 6% were graded. Similarly in study done by Lokesh Gupta et al [12], 85% were graded excellent and 15% were graded good. In similar study by Jil Patil and Krupal Soni [13] 82.7% were graded excellent and 17.3% were graded good. In another study by Chand et al [8], 35% were graded excellent, 55% were graded good, 10% were graded fair. Out of 35 patients in our study, complications were seen in 2 patients. Superficial wound infection was seen in 1 case (2.86%) and was

managed conservatively. In 1 case (2.86%) posterior dislocation of hip was seen during second post-operative week due to fall on ground while mobilization and was managed with open relocation of hip from same surgical incision. In study by Chand et al [8], there was only superficial wound infection. In the study done by Marahatta et al [7], there was 2 cases of superficial infection, 2 cases of dislocation of hip, 1 case of screw irritation and GT avulsion. Similarly in study by Jil Patil and Krupal Soni [13], there was 1 case of superficial infection, 1 case of dislocation of hip and 1 case of sciatic nerve palsy.

CONCLUSION

THR is a safe and effective procedure in management of diseased and destroyed hips in patients with chronic and incapacitating pain. Functional results are excellent and complications are minimal if THR is done with utmost care and precision. It improves pain and function hence improving activity of daily living. Most of the patients have high level of satisfaction and majority return to their previous level of activity. Modified HHS is reliable and valid tool to measure functional outcome in patients undergoing THR. Long term studies are necessary to study the late complications and to prove the efficacy of the implants and procedure.

Author contributions: RW, PDK and TSK conceptualized and designed the research and reviewed the literature; RW, PDK, BG and KRG did data collection, analysis and prepare result; RW, PDK, AR and SP drafted the manuscript; and all authors reviewed the manuscript and approved the final version of the manuscript. All authors agreed to be accountable for all aspects of the research work. Note: RW, PDK, TSK, BG, KRG, AR and SP are abbreviated names of the authors.

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Ethical approval: This research was approved by Institutional Review Board of National Academy

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Consent and/or assent: Written informed consent was obtained from all the participants.

Name of Registry and Registration number: Not applicable

Data availability: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of interest: The authors declare that there is no competing interest.

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Disclose: This research was a part of master degree; MS in Orthopedic and Trauma Surgery.

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