



ISSN: 2395-1958  
IJOS 2018; 4(4): 845-849  
© 2018 IJOS  
www.orthopaper.com  
Received: 21-08-2018  
Accepted: 25-09-2018

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# International Journal of Orthopaedics Sciences

## Functional outcome of primary total hip replacement in osteoarthritis of HIP

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DOI: <https://doi.org/10.22271/ortho.2018.v4.i4k.109>

### Abstract

**Introduction:** Osteoarthritis is the most common disorder associated with severe hip pain and disability in adult and elderly population. Total hip replacement (THR) has been termed as “the operation of the century” as it has revolutionised management of elderly patients crippled with arthritis, with very good long term results. Replacement of damaged cartilage surfaces with various artificial bearing materials has enabled surgeons to improve function and relieve pain in vast majority of patients [1]. At present THR is most commonly performed adult reconstructive hip procedure. The intend of the study was to evaluate the clinical as well as functional outcome of primary total hip replacement using modified harris hip score. All the patients were operated using posterior moore’s approach which is commonly employed in our institution.

**Materials and Methods:** A prospective study of 20 hips (20 patients) with primary or secondary osteoarthritis above the age of 30 years managed by both cemented and uncemented total hip replacement at basaveshwara teaching and general hospital attached to M.R Medical college kalaburagi from June 2016 to May 2018 were studied. Patient follow up was for a minimum period of 6 months.

**Results:** Patients were evaluated both functionally and radiologically. Functional evaluation with Modified Harris hip score showed excellent results in 12 hips, good in 6 hips, fair in 2 hips. We had complications in 3 patients, superficial infection in 1 patient and posterior dislocation in 2 patients. No poor results were noted. Radiological evaluation at the latest follow up of all cases showed no signs of aseptic loosening or implants failure.

**Conclusion:** Our study suggests that primary total hip replacement provides excellent functional outcome in osteoarthritis of hip. Though the study was not free of complications, the overall functional outcome showed good results and thus it confirmed the proven efficacy of total hip replacement in treatment of osteoarthritis.

**Keywords:** primary total hip replacement, modified harris hip score, osteoarthritis

### Introduction

Osteoarthritis is the most common form of chronic arthritis and results in more functional loss than any other disease, including heart disease and cancer [2]. Osteoarthritis is the most common disorder associated with severe hip pain and disability in adult population [3]. The most common condition for which THR is done is severe osteoarthritis accounting for 70% cases [4]. As the life expectancies of individuals have increased over years; the incidence of chronic disabling conditions of hip such as osteoarthritis, inflammatory arthritis and osteonecrosis is on rise. Primary total hip replacement aims for immediate and long lasting effects on pain and function in osteoarthritic hip [5]. At present total hip arthroplasty is most commonly performed adult reconstructive procedure. This procedure involves the surgical excision of head and proximal neck of femur and removal of acetabular cartilage and subchondral bone. An artificial canal is created in the proximal medullary region of the femur, and a metal femoral prosthesis, composed of stem and small diameter head, the stem is inserted into prepared femoral medullary canal. An acetabular component composed of high-molecular-weight polyethylene articulating surface and acetabular shell which is inserted proximally into acetabular space. To yield successful results, these total hip arthroplasty components must be fixed firmly to the bone, either with PMMA cement or, in the more recent uncemented designs, by bony in growth into a porous coating on the implant in “biologic” fixation. The beauty of this operation lies in the use of cement,

by means of cement the load of the body weight is distributed over a large area of bone [6].

Sir John Charnley can be considered as the father of modern total hip arthroplasty [7]. Charnley revolutionised the management of arthritis of hip with introduction of low friction arthroplasty.

Two basic fixation methods are commonly practiced for placing the implant in the bone one is press fit method without the use of any intermediary method (cementless fixation). The other fixation of the stem and acetabular cup component in THR by using acrylic bone cement (cemented prosthesis) both methods are successful in providing good functional outcome [8]. Total hip replacement provides pain reduction and improves physical function and quality of life in most of the patients with end-stage OA [9]. Early complications of total hip replacement include periprosthetic fracture, nerve injury, dislocation, deep vein thrombosis, infection and pulmonary embolism. Complications include infection, heterotrophic ossification and implant loosening.

Based on inclusion and exclusion criteria (as mentioned in methodology) 20 hips were selected; proper preoperative clinical evaluation and functional disabilities of patients with osteoarthritis hip were assessed and a primary total hip replacement was done; cemented or uncemented as per indication.

This study is undertaken to assess the functional outcome of primary total hip replacement in osteoarthritis of hip based on Modified Harris Hip Score in department of orthopaedics, M.R. Medical College, Kalaburagi.

## Materials and Methods

### Source of Data

This study was carried out on 20 hips on 20 patients of primary total hip replacement in department of orthopaedics, M.R. Medical College, Kalaburagi. All confirmed cases of various disorders of hip admitted in Basaveshwara Teaching and General Hospital attached to M.R. Medical College, Kalaburagi.

Patients were operated upon for primary total hip arthroplasty using either cemented or uncemented technique.

### Method of Collection of Data

#### Inclusion Criteria

1. Primary osteoarthritis of hip
2. Secondary osteoarthritis of hip due to
  - Avascular necrosis
  - Tuberculosis of hip
  - Post traumatic
  - Ankylosing spondylitis

#### Exclusion Criteria

1. Age below 30 years
2. Active infection of hip joint
3. Bone tumours involving proximal femur and acetabulum
4. Neuropathic hip joint
5. Patients unfit for surgery

Patients were admitted in the wards. A detailed history of the illness was extracted including age, sex, occupation, complaints and any other medical illnesses.

A thorough clinical examination was performed. Later patients were subjected to investigations. These included routine blood counts, ESR, CRP and AP & lateral X-ray views of pelvis with both hips.

Analgesics, antibiotics, tetanus toxoid and blood transfusions

were given as needed before surgery. Aspirin, anticoagulants and other anti-inflammatory drugs were stopped 7 to 10 days before surgery.

### Radiological investigations

1. X-ray chest PA view
2. X-ray pelvis with both hips AP view
3. Frog leg lateral views

### Radiological assessment

X-ray of pelvis with both hips with proximal 1/3<sup>rd</sup> of femur AP view was taken for all patients. The radiograph was evaluated for

- Size of the acetabulum
- Bone stock
- Any protrusion or periacetabular osteophyte formation
- Neck shaft angle
- Need for bone grafting
- Size of the femoral canal

Templating was done for the acetabular and femoral components. The appropriate acetabular cup size (AP view) and anteversion (Lat view) was determined. On the femoral side, using a templet, appropriate neck length, offset and stem size of the implant is chosen.

The aim of pre-op planning was to obtain the following results post-operatively.

- An acetabular socket located in a anatomical position
- Centre of rotation of femoral head located in its normal anatomical position
- Restoration of limb length
- Restoration of abductor moment arm

Patients were evaluated and data recorded on the basis of modified Harris hip score. Pre anaesthetic assessment was done on all patients. Fitness for surgery was taken from physician, cardiologist and pulmonologist for all the patients.

Patients were explained in detail about the surgery, possible complications and limitations to be followed after surgery and informed written consent was taken.

### Post operative management

Limb is kept in abduction with pillow in between the 2 lower limbs. Vitals are monitored carefully for 24 hours. Check X-ray performed. IV antibiotics are continued for 5 days. Drain removed and tip sent for culture and sensitivity after 48 hours. Physiotherapy was started from day one.

### Follow Up.

Patients were followed at 6 weeks then 3 months and at 6<sup>th</sup>, 9<sup>th</sup> and at 12 months. Patients were assessed for functional outcome using modified Harris hip score and radiologically. The score is reported as 90-100 for excellent results, 80-90 being good, 70-79 fair, 60-69 poor and below 60 a failed result.

### Operative steps

#### Procedure

**Anaesthesia:** spinal anaesthesia/ epidural anaesthesia

**Approach:** posterior approach (Moore's)

**Position:** true lateral with affected limb uppermost

A 10-15 cm curved incision, centered on the posterior aspect of greater trochanter is taken. After dissecting the

subcutaneous tissue, fascia lata is incised in the line. The gluteus maximus fibers are spilt bluntly. Internally rotate the hip and detach the tendons of short external rotators to expose the capsule. The capsule is incised with T-shaped incision. By external rotation the head is then delivered posteriorly out of the acetabulum.

### Implantation of acetabular component

Acetabulum is cleared of all soft tissue. Osteophytes removed. Reaming of floor of acetabulum is done with the help of basket reamers oriented to the acetabulum at approx. 45° of abduction and 15° of anteversion. Progressive reaming done till a healthy bleeding of subchondral bone is reached and hemispherical dome is achieved. Using the cup introducer the trial cup of 1-2mm smaller size to the final reamer is introduced and assessed for position and cortical bone contact. For cemented THR after mixing the cement a doughy paste is uniformly spread over the acetabular cup which is then loaded on cup introducer so that cup is at 45° to the lateral opening and 15° of anteversion. Introducer is removed after checking the orientation of cup and the cup is then impacted with impactor till cement hardens. For uncemented THR acetabular cup is fixed with two cancellous screws in posterosuperior quadrant. The femoral canal is prepared with straight reamer and increase the sizes of rasp till tight fit is achieved. Rough idea is gained with pre-op templating. Lateral femoral cortex is reamed in the upper part of canal to avoid a varus positioning. For cemented THR bone plug is introduced into the canal to block it. Canal is then irrigated thoroughly and cement is introduced in a retrograde fashion. Selected stem fitted with the centralizer is then introduced into the cement filled canal maintaining the necessary anteversion. Firm pressure is maintained until bone cement hardens. Excess cement is removed. For uncemented THR after progressive femoral broaching, selected porous coated femoral stem fitted with a centralizer is introduced maintaining the necessary anteversion. Reduction is done and stability of the reduction checked. Wound is then closed in layers over negative suction drain.

### Results

20 patients with 20 diseased hips were treated at our hospital with both cemented and uncemented total hip replacement between June 2016 to may 2018. All the patients were followed up for 6weeks, 3 months, 6months, 1year. Results were analysed both clinically and radiologically with series of X-rays of pelvis with both hips.

Out of 20 patients, 12 patients were in the age group of 45-55 years, 5 patients in age group 56-65 years and 3 patients between 66-75years. In our study side affected was 12 patients operated on left side and 8 patients on the right side. For Sex distribution there were 13 males and 7 females.

In our study 15 patients had secondary osteoarthritis due to avascular necrosis, 4 patients had primary osteoarthritis and one patient had tuberculosis of hip, out of which 2 patients had posterior dislocation one on post op day 3 which was later managed by closed reduction with traction, another on day 7 later managed by open reduction and one patient had superficial infection which was later managed with debridement and IV antibiotics. No other complications were noted in other patients in this study.

Patients were followed up at 6 weeks, 3months, 6 month and 1 year. At one year follow up with help of modified Harris Hip Score 12 patients (60%) were graded as excellent, 6 patients (30%) as good and 2 patients (10%) as fair. A

majority of patients had a pain free mobile hip joint by the end of one year.

**Table 1:** Age distribution

AGE (in years)	Frequency	Percentage (%)
45 to 55	12	60
56 to 65	5	25
66 to 75	3	15
Total	20	100

**Table 2:** Side affected

Side	Frequency	Percentage
Right	8	40
Left	12	60
Total	20	100

**Table 3:** Sex distribution

Gender	Frequency	Percentage (%)
Male	13	65
Female	7	35
Total	20	100

**Table 3:** Indication for surgery

Indication	Frequency	Percentage (%)
AVN	15	75
Osteoarthritis	4	20
Tuberculosis	1	5
Total	20	100

**Table 4:** Complications

Complication	No. of patients	Percentage (%)
Vascular injuries	0	0
Nerve injuries	0	0
Hemorrhage	0	0
Limb length discrepancy	1	5
Dislocation	2	10
Infection	1	5
Loosening	0	0
Stem failure	0	0
Heterotrophic calcification	0	0
Thromboembolism	0	0
Bladder injury	0	0

**Table 5:** Modified Harris hip score

Results	No. of patients	Percentage (%)
Excellent	12	60
Good	6	30
Fair	2	10
Poor	0	0
Total	20	100



**Fig 1:** pre op x-ray with secondary osteoarthritis of left hip



**Fig 2:** post op follow up x-ray of the same patient taken on 3months follow-up.



**Fig 3:** pre-op x-ray of a patient with primary osteoarthritis



**Fig 4:** post op x-ray



**Fig 5:** intra-op image showing acetabular cup.



**Fig 6:** Intra-op image showing reaming of the acetabulum

**Discussion**

Total hip arthroplasty (THR) is acknowledged as a highly successful procedure that can lead to significant pain relief, increased mobility, and improved tolerance for activity. It is highly cost effective procedure [10]. Selection of patients is an important job while planning primary total hip replacement. At our institution both cemented and uncemented total hip procedures were performed and selection of patients was based on the indications and cost affordability. Cemented total hip replacement has some limitations associated with cementing technique. These include aseptic loosening and difficult revision surgeries. Moore’s posterior approach is being practiced since long time for a good exposure of both acetabulum and femur. This is the most common approach used for hemi arthroplasty across the world. In total hip arthroplasty, this approach provides the surgeon a good vision of both acetabulum and femur.

The present study confirms that THR significantly improves the quality of life in patients with OA of the hip. The sample size in this study is 20. Sample size is less and the follow-up period is not very long as to demonstrate the long term complications of this procedure where Moore’s approach was used. All the patients didn’t require support for walking at the end of our study

In our study functional outcome was assessed by using modified Harris hip score. Mean Harris hip score improved from 30.7 to 88.5. This was similar to mean Harris hip score of Goldberg [11] *et al.* (from 37 to 92) and Katz [12] *et al.* (from 42 to 84).

80% of patients in our study had no post-operative complications. 3 patients had post-operative complications. 2 posterior dislocation and 1 superficial infection. Goldberg [11] *et al.* reported 3 dislocations, 1 deep infection and 3 deep vein thrombosis. RC siwash [13] *et al.* reported 5 dislocations, 4 superficial infections and 1 deep infection.

In present study 90% showed excellent to good results and 10% showed poor result. This was similar to results of other studies.

**Conclusion**

The study has shown that the outcome of total hip arthroplasty has excellent results in terms of pain relief, increased walking distance, and functional capabilities in patients. And they offer tremendous improvement in quality of life that otherwise would have been left stranded. However, because of short period of study and less number of subjects longer study is required to make the definitive conclusions.

At present we conclude that- the success of total hip arthroplasty depends on careful selection of patients, careful pre op planning, good surgical technique, good post-operative physiotherapy. When adequate precautions are taken during

the pre-operative, perioperative, and post-operative period the complications can be minimized.

Though the study was not free of complications, the overall functional, clinical and radiological outcome showed excellent results, and thus it is confirmed the proven efficacy of total hip replacement in treatment of osteoarthritis.

### Conflicts of interest

There are no conflicts of interest, none declared.

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