

## **Evaluation and Outcome of Total Hip Replacement in Adults with Arthritis**

A. Chandra Sekhar<sup>1</sup> Ankur Mittal<sup>2\*</sup>, Ramprasad Rallapalli<sup>3</sup>, Biju R<sup>4</sup>,  
Siva Prasad Y<sup>5</sup>

### **I. Introduction**

Total hip replacement arthroplasty is a surgical procedure, which has relieved millions of people from incapacitating pain arising from the hip joint. At present it is the most commonly performed adult reconstructive hip procedure[1]. The success of Total Hip Replacement arthroplasty is its ability to relieve the pain associated with hip joint pathology, while maintaining the mobility and stability of the hip joint. The incidence of chronic disabling conditions of the hip such as osteoarthritis, inflammatory arthritis and osteonecrosis is on the rise. The most common condition for which total hip arthroplasty is done is severe osteoarthritis of the hip, accounting for 70% of cases. The primary indication for this procedure is severe pain and the limitation in activities of daily living that it causes. To warrant doing total hip replacement, pain must be refractory to conservative measures such as oral nonsteroidal anti-inflammatory medication, weight reduction, activity restriction, and the use of supports such as a cane. The field of total joint replacement is in an evolutionary state. The first total hip replacement is done in London by Phillip Wiles in 1938[2]. The procedure was further developed in the 1950s by pioneers such as McKee and Farrar[3]. This early work laid the groundwork for the innovative studies of Sir John Charnley who, in the late 1960s, approached the problem of artificial hip joint design by using the biomechanical principles of human hip joint function[4,5]. Improvements in implant design materials and fixation techniques continued but Charnley's basic concept continues to be valid. Conventional cemented total hip arthroplasty dramatically improves a patient's function and quality of life. With contemporary prostheses and modern cementing techniques, the rate of femoral loosening appears to be substantially reduced[6]. Regardless of the cementing technique, mechanical loosening occurs more commonly in young, heavy, active men and with certain prosthetic designs. Noncemented total hip arthroplasty was developed in response to evidence that cement debris plays an important role in promoting bone lysis and loosening. Prosthetic devices have been developed that achieve fixation without cement, either by "press-fit" or by biologic ingrowth. With the press-fit technique, stabilization is achieved by interference fit of the implant into the femur. With biologic ingrowth, fixation occurs by bone ingrowth into a porous surface. Noncemented devices are most frequently used in young patients with high physical demands, where a revision surgical procedure in the future will be more likely. Preliminary data suggest that noncemented total hip arthroplasties have a relatively low revision rate and excellent prosthetic durability for as long as 15 years. Compared with cemented hip arthroplasties, however, patients have a higher incidence of low- grade temporary thigh pain. Although short-term results appear to be less satisfactory compared with cemented hip arthroplasty, after 5 to 20 years, the results in the two procedures are similar[7]. Early complications of hip arthroplasty include fracture, nerve injury, dislocation, deep vein thrombosis and pulmonary embolism. Late complications include infection, heterotrophic ossification and loosening. Aseptic femoral and acetabular loosening which is a potential cause of pain and loss of function have emerged as the most serious complications of THR and the most common indication for revision[8]. Periprosthetic fractures of femur can be a difficult problem to manage. Several factors contributing to these adverse effects, which may eventually result in failure of the total hip arthroplasty, include the selection of the patients and the materials and design of the implant[9]. Many designs have been studied in an attempt to minimize these adverse effects and thus improve outcome. Total hip replacement (THR) relieves the pain and functional disability experienced by patients with moderate to severe arthritis of the hip, improving their quality of life[10]. It is a highly cost-effective procedure[11].The anatomically designed prosthesis can provide good results, with low prevalence of pain in the thigh and loosening of the component, in younger active patients. Evaluation of long term outcomes of an operative procedure is important to determine the durability of the procedures like total hip replacement (THR). Patient derived outcome scales have become increasingly important to surgeons and clinical researchers for measuring improvement in function after surgery. It provides a means for comparison of the results of different clinical interventions which may lead to changes in operative technique and implant design over time. The Harris hip score is the most widely used scoring system for evaluating hip arthroplasty This study is undertaken to assess the clinical and functional outcome of the cemented total hip replacement in our institution.

## **II. Methods And Materials**

Our study is a prospective study of clinical and radiological analysis of cemented total hip arthroplasties performed for various hip pathologies at Narayana Medical College and Hospital, Nellore. 25 patients were included in our study in whom 25 arthroplasties were performed. All cases were done using Hardinge's direct lateral approach. These were done between August 2011 and October 2012 and followed till October 2013. Clinical assessment was done using modified Harris Hip Score, preop and post op at 6 weeks, 3, 6, 12, 24 months and at latest follow up and points were given accordingly.

### **Inclusion Criteria:**

- Age group above 50 years
- All patients who had significant disabling hip pain and moderate to severe functional limitation of activities of daily living due to various hip pathologies with any of the etiologies.
- Patients who had one or more of the following radiological signs namely loss of sphericity of the femoral head, collapse of the weight bearing area of the femoral head, flattening of the femoral head, joint space narrowing, acetabular changes, and osteoarthritic changes.

### **Exclusion Criteria**

- Age less than 50 years
- Patients with severe systemic diseases contraindicating surgical procedure.
- Revision total hip arthroplasties

All patients came for regular follow up. All patient data and clinical history were noted with reference to pain, range of motion, gait, activities or function, pre operatively, at the time of discharge, at all follow ups. In our study we have used polyethylene-on-metal type of cemented total hip replacement in all our cases. 20 grams of cement is used for acetabular component and 40 gms for femoral component.

### **Preoperative Work Up**

For the most part the success of total hip replacement depends on not only a sound technical surgical execution but on overall management which includes appropriate selection, proper motivation of the patient, effective and adequate post operative management of the patient. A detailed history is taken and through physical examination is done. Medical consultation is always obtained. The patient is selected on the basis of patient's occupational and social requirements, the hip joint pathology, patient's age and agility for active life is assessed with respect to activity of the disease, the bone condition – Its density and texture, the functional status – Range of motion, suppleness, muscle power and the soft tissues about the hip are examined- skin for scarring or inflammation where incision is to be made, subcutaneous tissues suppleness and muscle for tone and power. Laboratory workup was done thoroughly and evolution of other joints was done by both clinically and radiologically. The patient is explained about the surgery, its limitations, the prognosis and the importance of maintaining only optimum weight. The mental makeup is dressed and promoted. The physical therapy staff works closely with the patient through out the hospital stay. We completely looked for any foci of infection and eliminated it before doing the surgery.

Epidural anesthesia is given to all the patients which help all the patients in post operative analgesia. Blood Transfusion was given according to the post operative Hb% and if clinical anaemia was present. Radiographic evaluation of both the hips was done and templating was done for both acetabular and femur components.

Technique: Under epidural anesthesia, patient in lateral decubitus position. Standard and adequate preparation are done. The limb is dropped free. An impermeable disposable steridrape is applied over the area of incision. The Hardinge's direct lateral approach was used. First we prepared the acetabulum and then the femoral canal. We used 20 gram of cement on the acetabular side and 40 gram on the femoral side.

### **Postoperative protocol:**

- Both the limbs were kept in abduction with a pillow in between the legs. Postoperative analgesia was adequately given in the form of epidural analgesia. Injectable antibiotics were used for 5 days, and then converted to oral antibiotics till suture removal.
- Heparin (LMW) was subcutaneously given for prevention of thromboembolic events for 7 days.
- Patients were encouraged to sit up in the bed from the first post op day. Quadriceps and knee bending exercises immediate postoperatively.
- Active abduction strengthening exercises were begun from the third post op day under the supervision of our physiotherapist.
- Ambulation training is started with walker on Day 1-2 followed by gait training with weight bearing as

tolerated on Day 3-7. Full weight bearing on involved extremity can be started on Day 7

### **Follow Up Evaluation**

Clinical assessment was done using modified Harris Hip Score preop and post op at 6 weeks, 3, 6, 12, 24 months and at latest follow up and points were given accordingly.

**Clinical assessment** During each visit, medical history was taken and physical examination was done. The deformity and ROM were measured with goniometer. The clinical and functional outcomes were evaluated by **Modified Harris Hip Score**. Based on a total of 100 points possible, each question is awarded a certain number of points. Questions are further grouped into categories. The score is reported as 90-100 for excellent results, 80-89 being good, 70-79 fair, 60-69 poor, and below 60 a failed result.

**Radiological Assessment:** A radiograph was taken at the end of the procedure and during follow up visits. The standard radiograph was an antero-posterior view of pelvis including both hips and sufficient length of femur. The radiological assessment included positioning and alignment of the acetabular and femoral components and complications such as periprosthetic fractures, loosening, osteolysis, dislocation, subsidence and heterotrophic ossification.

### **III. Observations And Results**

This series consisted of 25 patients with 25 diseased hips treated with cemented total hip replacement. This study is conducted on patients with age ranging from 50 to 85 years with a mean age of 59.68 years at the time of surgery. The patients were followed post operatively at 6 weeks, 3, 6, 12, and 24 months. The average followup period was 18.8 months, minimum period of followup being 12 months and maximum period followup was 24 months postoperatively. Out of 25 patients, 17 (68%) are males and 8 (32%) are females thus showing a male preponderance. 10 patients were operated on left side and 15 patients on right side. Although some cases showed bilateral involvement of arthritis in X-rays, patients came mainly with complaints on unilateral side. The main indication for surgery was secondary arthritis due to AVN in 17 patients (68%), 1 (4%) was due to ankylosing spondylitis, 1 (4%) was due to rheumatoid arthritis which is confirmed by clinical evaluation and blood investigations. Two patients came with arthritis due to implant failure (table 1). In our study two patients (8%) had varus angulation of the stem who complained of anterior thigh pain postoperatively. This was relieved in subsequent follow-ups. One patient had superficial infection who was treated with wound debridement, antibiotics and delayed suture removal. Two patients (8%) had leg length discrepancy (shortening) who were treated with shoe rise (table 2). In our study the mean preoperative modified Harris hip score (Table 3) was **45.04** with minimum of 21 and maximum of 62. The immediate mean postoperative modified Harris hip score was **88.44** with a minimum of 74 and maximum of 95. The mean followup Harris hip score increased to **91.28** with a minimum of 77 and maximum of 97. There was a significant improvement in the follow up Harris hip score (modified) with a p value of **0.044 (<0.05)**. All patients who were included in our study had poor score preoperatively. Clinical outcome score is shown in (table 4). All patients who were included in our study had poor score preoperatively. In the follow up 21 (84%) had excellent results, 2 (8%) had good result and 2 (8%) had fair results in the followup which is a significant improvement in the modified Harris hip score.

### **IV. Discussion**

Total hip arthroplasty is a well documented surgical procedure [12]. It relieves pain and functional disability experienced by patients with moderate to severe arthritis of the hip, improving their quality of life [13]. The study was carried out on 25 hips of 25 patients who underwent cemented Total Hip Replacement. In western literature, as per Harkness [12], Charney [14], Eftekhari [13] total hip arthroplasty has primarily been described for patients in older age group of sixty and above. In our study, all patients were found to be in the 50 and above age group, with age ranging from 50 to 85 years and a mean age of 59.68 years. Majority, 17 (68%) were males and 8 (32%) were females. The Harris hip score is the most widely used scoring system for evaluating hip Arthroplasty [15]. We used Harris hip score to assess the functional outcome in our study. Singling out the primary indication of the procedure is difficult, but reports of Eftekhari [13], Harkness [12] document the arthritis group to be the most common indication. Arthritis was the most common indication for THR surgery in our study as well, most of which were caused secondary to Avascular necrosis. In our study, the average pre operative Harris Hip Score of 45.04 improved to 88.44 at the time of discharge and to 91.28 at follow up. This increase in Harris hip score may be attributed to the imposed restrictions on the patient in the immediate post op period and the regimen of rigorous physiotherapy advised to the patient after the first month. The post op Harris Hip Score observed in our study is comparable to that in the study conducted by Garino and Steinberg [16] who reported increase in the Harris Hip Score from 45 pre operatively to 92 in the post op period. In one study thirty-one patients with avascular necrosis of the hip were treated by 34 total hip arthroplasties (THAs). All patients were observed prospectively with a minimum two-year follow-up evaluation (average, 46 months; range, 24-84 months). The overall Harris hip score ratings were 88 in the cemented [17]. In

our study the average followup period is 18.8 months(range 12-24 months) with a overall harris hip score at final followup is 91.28. Comparison of Harris hip score with other studies in (table 5) In our series, after a minimum follow up of 2 years, 21(84%) hips had excellent Harris hip scores, 2(8%) had good scores,2(8%) had fair scores similar to most previous studies[18]with cemented arthroplasties. The prospective study conducted in Bangladesh from May 2008 to December 2009 showed similar results. Total 21 patients were evaluated. Among them 38.1% had rheumatoid arthritis, 19.1% had ankylosing spondylitis and 42.8% had avascular necrosis. Regarding the functional outcome, 76.2% patients had excellent, 19.1% had good and 4.8% had fair outcome[19].One patient among 25 in our study developed infection (4%) which was treated with antibiotics and delayed suture removal, eventually it did not effect the outcome. Young HooKim[20]et al reported incidence of infection in their study as 2%.Scott G Kantor et al reported that 12.5% of cases came for revision for loosening at 10 years. In our study,no loosening observed in any of the 25 arthroplasties during the followup of an average period of 18.8 months(maximum93followup of 2 years). There is strong evidence to suggest that cement- stem debonding is important in aseptic loosening[21-22] Biomechanical studies have identified this interface, particularly the proximo-medial region and the tip of the prosthesis as the area of highest stress on loading[63]. Irregularities and defects of the cement cuff, eccentric placement of the implants, and direct contact between implant and bone promote fragmentation of the bone cement [24,25].Of the 142 hips in the 130 patients who were alive at a minimum of fifteen years, twenty-two (15 per cent) had been revised: fifteen (11 per cent), because of aseptic loosening; three (2 per cent), because of loosening with infection; and four (3 per cent), because of dislocation.No case in our study went to revision in a followup of minimum of 12 to 24 months[26].Konyves and Bannister[27] noted that lengthened limbs were also associated with lower clinical hip scores. Limb-length discrepancy can result from a poor preoperative patient evaluation as well as intraoperative technical errors with regard to the level of resection of the femoral neck, the prosthetic neck length, or the failure to restore offset. In our study 1 patient had leg length discrepancy of 1.5 cm and 1 patient with 1cm. One had good outcome and the other fair outcome and are managed by shoe rise.Intra operative peri-prosthetic femoral fractures are becoming increasingly common and are a major complication of total hip replacement. We didn't encounter any periprosthetic fractures in our study. In one study, an intraoperative femoral fracture was encountered during 1% (238) of 23,980 primary total hip arthroplasties compared with 7.8% (497) of 6349 revisions[28], and subsequent studies have demonstrated similar results.[29,30-33] In the study mentioned above, the rate of periprosthetic fracture during primary total hip arthroplasty was 5.4% (170 of 3121)when a cementless femoral component was used compared with 0.3% (sixty-eight of 20,859) when a cemented stem was used. Other studies demonstrated a prevalence of intraoperative fracture of 1.2% (seven of 605) when a cemented stem was used and 3% (thirty-nine of 1318).Hip joint arthroplasty is one of the most successful and cost effective surgical interventions in medicine, with approximately 27 000 procedures performed in Australia per annum[34,35]. Cemented conventional and hybrid total hip arthroplasty (THA) prostheses constitute 49.6% of primary replacements performed in Australia, with the Exeter cemented stem being the most frequently implanted primary femoral component[35].Cemented implants constitute greater than 90% of primary THA procedures in both Sweden and Norway in the elderly age group[36]. The Swedish arthroplasty register demonstrates superior prosthetic survivorship for cemented implants in all patients regardless of age or gender[36].The strength of this study is that all hips were primary arthroplasties,all were done using a uniform technique,done by same surgeon and no patient lost for followup.The limitation in our study is that the sample size is less and the followup duration is not very long so as to demonstrate the longterm complications of this procedure.

## **V. Conclusion**

Total hip arthroplasty remains unchallenged because of its spectacular results- relief of pain, preservation or increase in mobility, range of motion and easy rehabilitation.This study has shown that the outcome of the total hip athroplasty has shown excellent results in terms of pain relief, increased walking distance, and functional capabilities in patients .The direct lateral approach used in our series gave excellent results and no incidence of dislocation was found. However we do consider the individual surgeons preferences regarding the approach.The complications like aseptic loosening,cement fragmentation and particle wear requiring revision have not been found in our study, nor any analysis regarding survivorship and longevity of the arthroplasty.We conclude that – The success of total hip arthroplasty depends on Careful selection of the patient, Careful pre op planning, Good surgical technique,Good post-op physiotherapy.When adequate precautions are taken during the pre operative,perioperative and post operative period the complications can be minimized Most of our patients were elderly active treated with cemented total hip replacement and have shown excellent clinical and radiological results after an intermediate period of followup. Though the study was not free of complications, the overall functional and clinical outcome showed good results.

## Conflict Of Interest

None of the authors has any conflict of interest.

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**Case Illustrations**



Pre Operative X ray showing  
OA due to AVN



Post Operative Xray



At Final Follow up

**Patient ROM at Final Follow up**



Active Flexion



Abduction



Adduction



External Rotation



Internal Rotation

**Tables**  
**Table 1**

Indication	Frequency	Distribution
Sec Oa Due To Avn	17	68%
Sec Oa Due To Neglected Ic # Nof	4	16%
AnkylosingSpondolytis	1	4%
Dhs Implant Failure With Arthritis Hip	1	4%
Rheumatoid Arthritis	1	4%
ProtrusioAcetabulumWith Amp Insitu	1	4%
Total(N)	25	100%

**Table 2**

Complications	Frequency	Distribution (%)
Nerve Injury	0	0
Periprosthetic Fractures	0	0
Dislocations	0	0
Dvt/Pe	0	0
Superficial Infections	1	4
Anterior Thigh Pain	2	8
Varus Angulation	2	8
Heterotopic Ossification	0	0
Signs Of Loosening	0	0
Leg Length Discrepancy	2	8

**Table 3**

	No Of Patients	Minimum	Maximum	Mean	Standard Deviation
Pre Op Score	25	21	62	45.040	10.51
Post Op Score	25	74	95	88.44	5.41
Follow Up	25	77	97	91.280	4.93

**Table 4**

OUTCOME OF SCORE	PRE OP	Follow up
POOR	25 (100%)	0
FAIR	0	2 (8%)
GOOD	0	2 (8%)
EXCELLENT	0	21 (84%)

**Table 5**

	Pre op Harris score	Post op Harris score
Garino and Steinberg 62	45	92
Katz RL, Bourne 63	39	88
Current study	45.04	88.44