

Study of Outcome of Total Hip Replacement in Adults with Arthritis in a Teaching Hospital**Shaik Masthan Basha¹, Majji Chandra Sekharam Naidu², Mallam Kiran Kumar³, Vurundhur Divya⁴**¹Associate Professor, Department of Orthopaedics, ACSR Govt Medical College, Nelore, Andhra Pradesh²Professor, Department of Orthopaedics, ACSR Govt Medical College, Nelore, Andhra Pradesh³Associate Professor, Department of Orthopaedics, ACSR Govt Medical College, Nelore, Andhra Pradesh⁴Assistant Professor, Department of Orthopaedics, ACSR Govt Medical College, Nelore, Andhra Pradesh

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Abstract:**Aim:** Current study aim is to assess the clinical and functional outcomes of cemented Total Hip Replacement in adults using Modified Harris Hip Score in terms of pain, functional disabilities, deformity, range of movements, limb length discrepancy.**Method:** An observational study carried out on 30 hips of 30 patients who underwent cemented Total Hip Replacement and were available for follow-up. This study conducted on patients with age ranging from 50 - 70 years with mean age of 58.3 years. A thorough clinical and radiological examination was performed. All patients were operated through Hardinge's direct lateral approach, putting the patient in the lateral position. Quadriceps and knee bending exercises were started immediately post-op. Ambulation training is started with the 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.**Results:** 66.7% are males and 33.3% are females underwent Cemented total hip replacement. 13 patients were operated on the left side. Indication for surgery was secondary arthritis due to AVN in 66.7% cases, 3.3% due to ankylosing spondylitis, 6.7% was due to Rheumatoid arthritis which is confirmed by clinical evaluation and blood investigations. The mean follow-up period was 18.8 months. The patients were followed postoperatively at six weeks, 3, 6, 12, and 24 months. 6.7% patients had varus angulation of the stem who complained of anterior thigh pain postoperatively. One patient had a superficial infection that was treated with antibiotics and delayed suture removal. 6.7% patients had leg length discrepancy and shortening who were treated with a shoe raise. All patients were followed up regularly; no patients were lost for follow up. They were evaluated according to the Modified Harris Hip score. The mean total preoperative score was 45.04. The maximum score is 62, and the minimum is 21. Postoperatively the total mean score was 88.44, with 74 being the minimum and 95 being the maximum. The mean follow-up Modified Harris Hip score increased to 91.60, with a minimum of 77 and a maximum of 97. There were a statistically significant improvement $p=0.044$ ('p' value of <0.001) in the follow-up score when compared to the preoperative score.**Conclusion:** Results showed a significant improvement, wherein 84% had an excellent score, and 8% showed good and 8% fair results. No patient had a poor score. The management of diseased and destroyed hips with cemented total hip replacement is effective and gives stable, mobile, and painless hip joints to the patient. Functional results are excellent, and complications are minimal if done with utmost care and precision. This study has shown that the outcome of the total hip arthroplasty has shown excellent results in terms of pain relief, increased walking distance, and functional capabilities in patients. Most of the patients were elderly active treated with a cemented total hip replacement and have shown excellent clinical and radiological results after an intermediate period of follow-up. The overall functional and clinical outcome showed good results.**Keywords:** Total hip replacement arthroplasty, Cemented total hip, Rheumatoid arthritis, Modified Harris Hip score.

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Introduction

Total hip arthroplasty (T.H.A) relieves the pain and functional disability experienced by patients with moderate to severe arthritis of the hip, and

improves their quality of life. Total hip arthroplasty accounts 70% in severe osteoarthritis condition. The earliest sign for this surgical

technique is unbearable pain and unable to perform daily activities. Indications to do this procedure, pain must be refractory to conservative measures such as oral NSAIDs, weight reduction, restriction of daily activity and the use of walking aid. [1,2]

Uncemented total hip Arthroplasty has prosthetic durability of 15 years. Whereas cemented hip Arthroplasty may have high incidence of low-grade temporary thigh pain. After 5 to 20 years the results of the two procedures are similar. [2,3,4]

Total hip replacement relieves the pain and limited daily activities experienced by patients with moderate to severe arthritis involving a hip joint, thereby improving the living quality. It is a cost-effective procedure. [4]

Current study aim is to assess the clinical and functional outcomes of cemented Total Hip Replacement in adults using Modified Harris Hip Score in terms of pain, functional disabilities, deformity, range of movements, limb length discrepancy.

Material & Methods

The present study was undertaken at department of orthopedics, ACSR Govt. Medical College, Nellore.

Study population: 30 patients were included in this as per including & excluding criteria. Study subjects were selected by random sampling method.

Sample size: 30 patients

Study duration: From November 2022 upto November 2023.

Patients aged >50 years, patients with hip pain & critical to daily activities, loss of sphericity in femoral head, the collapsed functionality of head of femur, flattened head of the femur, narrowed joint space and osteoarthritic changes were included.

Patients with severe systemic diseases, middle & young aged peoples, and patient's history of total hip arthroplasties and failures were excluded.

Follow-up was done at 2 weeks, 6 weeks, 12 weeks, and 6 months post-operatively. At every visit, check radiographs were taken to assess the radiological union.

Polyethylene-on-metal type of cemented total hip replacement was done in all cases. 20gr of cement is used for acetabular component and 40 gms for the femoral component.

Preoperatively, detailed history, physical and clinical examinations were done.

Laboratory investigations done including complete blood count, urinalysis, ESR, Blood group, Rh factor, blood sugar, serum uric acid, serum proteins, Liver function tests, blood urea, serum

creatinine, serum electrolytes, serum calcium, phosphorus acid, and alkaline phosphatase, blood and urine culture, chest X-rays, ECG.

The diseased joint is thoroughly examined radiologically.

The physiotherapy staff works closely with the patient throughout the hospital stay.

An anteroposterior view of both hips with upper one-third femur allows assessment of lesser trochanteric region with both hip joints.

X-rays of the lumbar spine was taken. Epidural anesthesia done in all patients.

Templating done for both acetabular and femur components.

Templating Method includes the use of plastic overlay templates supplied by the prosthesis manufacturer both for femoral and acetabular components to aid in the selection of the type of implant that will provide the best fit, implant size, and neck length required to restore equal limb lengths and medial offset. A horizontal line drawn joining both ischial tuberosities intersect the lesser trochanters in normal individuals. In limb length discrepancy, the difference between the lesser trochanter and the point of intersection of the line at the affected femur is measured and it is considered to be the amount of discrepancy to be corrected.

Acetabular templates were placed on the film and select a size that closely matches the contour of the patient's acetabulum. The medial surface of the cup is at the teardrop, and the inferior limit is at the level of the obturator foramen. Mark the new center of rotation of the hip.

Femur: Select a size that most precisely matches the contour of the proximal canal with 2-3 mm of cement mantle. Select a neck length so that the difference in the height of the femoral and acetabular center is equal to the limb length discrepancy.

Surgical technique of cemented THR:

The Hardinge's direct lateral approach was used for all the cases. Standard and adequate preparation was done. The limb is dropped free. An impermeable disposable sterile drape is applied on area of the incision. The hip joint is exposed through a direct lateral approach. A straight incision centered over the greater trochanter is given. Fascia lata is incised along with skin incision. Fibers of gluteus medius are split longitudinally starting at the middle of the greater trochanter, and an incision is extended inferior through the fibers of vastus lateralis. The anterior third of gluteus medius, whole gluteus minimus, and anterior half of hip capsule are elevated as one

flap, along with an anterior third of vastus lateralis. The dissection is further done by external rotation and flexion of the leg. The flap is elevated from the bone until the hip joint is exposed. The labrum is incised at the proximal part of the flap to help in the dislocation of the femur. Femoral head was dislocated by traction on the bone hook while externally rotating the leg. Femoral neck osteotomy is performed at a line made from the medial neck one cm above the lesser trochanter to the saddle of the lateral neck. Femoral head is removed, exposing the acetabulum. Preoperative planning and the use of a template also help to orient the neck osteotomy. Preoperative limb length discrepancy or postoperative limb length equalization decides the level of the osteotomy.

Acetabular Preparation: Proper exposure of the acetabulum was achieved, the labrum is excised. Any overhanging osteophytes were removed. Reaming begins with an acetabular reamer 4 - 5 mm smaller than the anticipated required size as determined by pre-operative planning. Acetabulum prepared in 1 mm increments until the reamer snugly fits in the acetabulum or until a bleeding subchondral bone bed is exposed. In the case where the anatomy has not been distorted, the anatomic edges of the acetabulum are used to guide the position of the reamer. This gives both the anteversion and the correct anteroposterior angulation.

acetabular component insertion: Size of the acetabular component was denoted by either the outer diameter of the polyethylene or the outer diameter of the polyethylene plus the additional size provided by the PMMA spacers. Size of the acetabular component should be at least 4 mm smaller in diameter than the largest reamer used to guarantee a minimal cement mantle thickness of 2-3 mm.

Cement is uniformly distributed over the surface of the acetabulum in the early dough phase, and pressurized. Care is taken not to contaminate the cement with blood. The acetabular component is inserted using the appropriate positioning device. The apex of the cup is placed in the center of the cement mass to distribute the cement evenly. Positioner is held motionless as the cement begins to polymerize.

When cement becomes moderately doughy the positioning device was carefully removed.

Femoral Preparation: Femoral preparation begins with the removal of lateral cortical bone from the femoral neck cut using a box osteotome. Sequentially broaching is completed, starting from the smallest broach until the correct size is reached.

Femoral neck to receive the collar is precisely prepared. With the help of the trial component, the

trial reduction is performed, to determine limb length, range of motion, and stability of the arthroplasty. Soft tissue tension is an important determinant of stability and leg length. When final component sizes have been selected, and limb length and stability have been assessed, the hip is dislocated, and the trial components are removed to expose proximal femur and remaining loose cancellous bone was removed from the femur.

Femoral component Insertion: Femoral canal is occluded distal to the anticipated tip of the stem to allow pressurization of the cement and to prevent extrusion of the cement distally into the femoral diaphysis using a bone block or cement. Cement is applied at medium viscosity. The component is inserted when the cement has entered a medium dough phase, typically at 6 min after the start of mixing the cement and the final head is impacted, and the hip is reduced.

Wound closure: The anterior "flap" is sutured to its anatomic position. An absorbable suture is utilized to repair the abductors onto the trochanter. The hip was internally rotated to facilitate repair. The gluteus maximus fascia and fascia lata is closed using interrupted absorbable suture. The subcutaneous tissue is closed with interrupted absorbable suture. The skin is closed with mattress, non-absorbable sutures.

Postoperative: Injectable antibiotics given for 5 days and then converted to oral antibiotics.

LMW Heparin was subcutaneously given for one week.

Quadriceps and knee bending exercises done immediately postop. Active abduction strengthening exercises were started from 3rd post-op day by physiotherapist. Ambulation training is started with the walker on Day 1-2, followed by gait training with weight-bearing as tolerated on Day 3-7. Full weight bearing on involved extremity started on Day 7.

Follow up evaluation: Modified Harris Hip Score done at preop and post-op at 6 weeks, 3, 6, 12 months. Pain is evaluated. Clinical assessment done at during every visit, medical history was taken. The deformity and ROM were measured.

Total Harris Hip Score: Based on a total of 100 points possible, each question is awarded a certain number of points. The score is reported as 90-100 for excellent results, 80-89 is good, 70-79 fair, 60-69 poor, and below 60 a failed result.

Radiological Assessment: 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. Periacetabular osteolytic

lesions are assessed according to the zones and the femoral osteolytic lesions were assessed according to the zones described by Gruen.

Zones of the femur- to document bony remodeling, subsidence, osteolysis, and loosening in case of cemented stems.

Acetabular zones for assessment of loosening Calcar resorption were differentiated from calcar osteolysis.

Results

The mean age was 58.3 ±6.5 years and 66.7% patients were males.

The patients were followed postoperatively at six weeks, 3,6,12, and 24 months. The average follow up period was 18.8 months; the minimum period of follow up is 12 months, and the maximum period follow up was 24 months postoperatively.

17 patients were operated on the left side and 13 patients on the right side.

The main indication for surgery was secondary arthritis due to AVN in 68% cases, one patient was due to ankylosing spondylitis and one patient was due to Rheumatoid arthritis which is confirmed by clinical valuation and blood investigations. Two patients came with arthritis due to implant failure.

Complications

8% of patients had varus angulation of the stem who complained of anterior thigh pain postoperatively. One patient had a superficial infection who was treated with wound debridement, antibiotics and delayed suture removal. 8% patients had leg length discrepancy (shortening) who were treated with shoe rise.

The mean preoperative modified Harris hip score was 45.5 (range: 21-52). The immediate mean postoperative modified Harris hip score was 88.3 (range: 74-95). The mean follow-up Harris hip score increased to 91.4 (range: 77-97). There was a significant improvement in the follow-up Harris hip score (modified) with a p-value of 0.039.

Scores

All patients had poor scores preoperatively. In the follow up, 84% had excellent results, 8% had a good result, and 8% had fair results in the followup, which is a significant improvement in the modified Harris hip score.

Clinical outcome

The average preoperative Harris hip score was 45.04. The Harris hip score at the most recent follow up was 91.28. The result was excellent in 84% patients, Good in 8% patients, and fair in 8% patients. Intraoperatively, for two patients, we came across increased vascularity, due to previous

surgery in the same hip. Hemostasis was achieved. Bone grafting was done in one patient with protrusio acetabulum.

Pain: As almost always occurs after total hip replacement, there was a marked immediate relief in pain postoperatively. After improving for three months, however, the pain scores did not change appreciably. 2/25 (8%) patients had slight pain, which didn't compromise activities of daily living.

Before surgery, 17/ 25 (68%) of the patients had marked pain. This suggests that most of the patients presented to us in the late stages of the disease after being treated by all forms for relief of pain. A final evaluation, almost universal relief of pain, was seen.

Postoperatively anterior thigh pain was present for 8% cases, which was relieved in subsequent follow-ups.

Function: At the last follow up, 92% patients could walk unlimited distance. 92% Patients walked without support.

21 patients were employed at some stage before their total hip arthroplasty. Twenty of them returned to work. All the patients were to use public transport

Satisfaction: All the patients were satisfied with the outcome of the total hip arthroplasty.

Femoral stem: The femoral stem was aligned in neutral in 23 hips. 2 stems were in slight varus. The metaphyseal fit was good in all cases with uniform distribution of cement. Radiographic evidence did not reveal any signs of loosening or subsidence, at last, follow up. Resorptive bone remodeling like mottling and cortical thinning was not seen as serial radiographs showed any evidence of migration.

Acetabular cup: All acetabular components were stable when seen at the final follow up with no signs of loosening. No cup had a radiolucent line of more than 2 mm.

Discussion

Cemented total hip replacement has some limitations like the long term complications associated with the cementing technique, mainly aseptic loosening and difficult revision surgeries.

Current study was done in 30 hips of 30 patients, who underwent cemented total hip replacement.

As this study is limited to 30 T.H.A., Berger et al. [5] performed 150 T.H.A., Harris, et al. performed 126 T.H.A., and Goldberg et al. [6] done 125 T.H.A. This is because this study was limited to a very short duration. Financial constraints and unawareness of this procedure to the patient limited the number of patients for this

study.

In western literature, as per harkness et al [7], eftekhar et al [8], charney et al [9], total hip arthroplasty has primarily been described for patients in the older age group of sixty and above. In our study, all patients were found to be in the >50 yrs age group.

Many studies shown that the rate of loosening and revision of total hip arthroplasty is high in younger patients. The cemented acetabular component has been the source of most of these failures. The short-term results of the cementless acetabular reconstruction have been encouraging in young patients.

Berger et al. reported 10-year survival of 98.8% in patients < 50 years.

Singling out the primary indication of the procedure is difficult, but reports of Eftekhari, harkness, documents the arthritis group to be the most common indication. Arthritis was the most common indication for total hip replacement surgery in our study as well, most of which were caused secondary to avascular necrosis.

The most common diagnosis in the present series was avascular necrosis (40%), followed by a fractured neck of femur (16.7%).

Studies in the west report osteoarthritis as the most common diagnosis (63% by harris et al. & 77% by Berger et al). Avascular necrosis is the second most common diagnosis in western literature (10% by harris et al & 7% by Berger et al.). In our study, the difference in diagnosis might suggest a high rate of Avascular necrosis And a low rate of osteoarthritis in the Indian population.

Harris Hip Score

The functional outcome in our study, the average preoperative Harris hip score of 45.8, improved to 88.8 at the time of discharge and to 91.6 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 shah et al [10] who reported an increase in the Harris hip score from 45 pre-operatively to 92 in the post-op period.

The post-op harris hip score was 88, and the average follows up period is 18.8 months (range 12-24 months) with an overall Harris hip score at the final follow up is 91.28. In our study, after follow-up of 2 yrs, 83.3% hips had excellent harris hip scores, 6.7% cases had good scores, 10% had fair scores similar to most previous studies (64) with cemented arthroplasties. The prospective

study conducted in Bangladesh from May 2008 to December 2009 showed similar results. A total of 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% of patients had excellent, 19.1% had good, and 4.8% had fair outcome. [11]

Infection

Chemoprophylaxis was carried out in all patients. No patient developed a deep infection and only one case of superficial infection was detected in our study (3.3%), which was treated with antibiotics and delayed suture removal; eventually it did not affect the outcome. Young Kim et al [12] reported the incidence of infection in their study as 2%.

Loosening

Pallave et al reported that 5.5% of cases came for revision for loosening at ten years. In our study, no loosening observed in any of the 30 arthroplasties during the followup of an average period of 18.8 months (94 follow-up of 2 years). There is strong evidence to suggest that cement- stem debonding is important in aseptic loosening. [13,14]

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. 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. [15,16] Of the 142 hips in the 130 patients who were alive at a minimum of fifteen years, twenty-two (15%) had been revised: fifteen (11%), because of aseptic loosening; three (2%), because of loosening with infection; and four (3%), because of dislocation. [17] No case in our study went to revision in a follow- up of a minimum of 12 to 24 months.

Dislocation

Amstutz et al. [18] in their study have reported a 3% incidence of dislocation of the hip in the first week. The rate of dislocation (8.9%) noted in the study conducted by Turner. In our study, no dislocation.

Limb-length discrepancy

Konyves study [19] observed that lengthened limbs were also associated with lower clinical hip scores. The limb-length discrepancy can result from a poor preoperative patient evaluation as well as intraoperative technical errors concerning the level of resection of the femoral neck, the prosthetic neck length, or the failure to restore offset. In our study, one patient had a leg length discrepancy of 1.5 cm and one patient with 1cm. one had a good outcome and the other fair outcome and is

managed by shoe rise.

Intraoperative peri-prosthetic femoral fractures

Intraoperative peri-prosthetic femoral fractures are becoming increasingly common and are a major complication of total hip replacement. In our study not encounter any peri- prosthetic fractures.

In a study, an intra-operative femur fracture was encountered during 1% (238) of 23,980 primary total hip arthroplasties compared with 7.8% (497) of 6349 revisions, and subsequent studies have demonstrated similar results. The rate of peri-prosthetic 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.

Anterior thigh pain

Anterior thigh pain occurred in 6.6% of the patients in our study, which disappeared after a few months. Our study detected no association between pain in the thigh and position of the stem.

Callaghan et al reported that 8% of 46 patients had pain in the thigh at two years after arthroplasty with the use of the PCA stem.

Cemented implants constitute > 90% of primary THA procedures in both Sweden and Norway in the elderly age. [20] the Swedish arthroplasty register demonstrates superior prosthetic survivorship for cemented implants in all patients regardless of age or gender. [21]

Conclusion

This study has shown that the outcome of the total hip arthroplasty 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 were not observed.

The success of total hip arthroplasty depends on careful selection of the patient, good surgical technique & Good post-op physiotherapy, when adequate precautions are taken during the preoperative, perioperative and postoperative period to minimize the complications. Most of the patients were elderly active treated with a cemented total hip replacement and have shown excellent clinical and radiological results after an intermediate period of followup. The overall functional and clinical outcome showed good results.

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