

To study the clinical outcome of total hip Arthroplasty

Swarn Gupta¹, Pradeep K. Singh², Kiran Saoji³, Sanjay Deshpande⁴, Sohael Khan^{5,*}

¹Senior Resident, ²Professor PHD, ³Professor, ⁴Professor and Head, ⁵Assistant Professor and Consultant Spine Division, Dept. of Orthopaedics, ^{1,3,4,5}Jawaharlal Nehru Medical College, Wardha, ²Dr. L H Hiranandani Hospital, Mumbai, Maharashtra

***Corresponding Author:**

Email: drsohaelkhan@hotmail.com

Abstract

Introduction: Total hip Arthroplasty is a surgical procedure, which relieves pain related to hip joint. The success of Total Hip Arthroplasty is its ability to relieve the pain associated with hip joint pathology, while maintaining the mobility and stability of the hip joint. This study was undertaken to assess the Clinical outcome of the Total hip Arthroplasty in our institution.

Material & Methods: Retrospective and prospective study was carried out on 500 patients of Total Hip Replacement. All patients underwent a standard clinical and laboratory evaluation that includes briefly information about age, sex, address, clinical history and routine investigation which were done pre operatively. X-Ray of hip joint with AP view was done. Pre-op Range of Motion, deformities and its values were recorded for the study by clinical evaluation and Modified Harris hip scoring was done preoperatively and postoperatively with follow up at 4 weeks, 6 months, 1 year and at yearly intervals.

Results: This study was conducted on patients with age ranging from 20 to 75 years with a mean age of 40.50 ±12.15 years at the time of surgery. The main indication for surgery was AVN in 360 patients (72%). The mean total pre-operative harris hip score was 49.74. The maximum score being, 73 and the minimum, being 37. Post operatively the total mean score was 85.12, with the 65 being the minimum and 96 being the maximum. The most common complication was stress shielding (24%). Acetabular component loosening was seen in 2% cases and femoral stem loosening was found in 12% cases. Calcar resorption was present in 8% cases.

Conclusion: In conclusion, Total hip Arthroplasty with or without cement gives good clinical and functional outcomes and is determined by multiple factors, like indication for total hip Arthroplasty, placement of prosthesis, and the operative technique. The results of the procedure must be evaluated in long-term studies. Our study suggests that the Total Hip Replacement can provide satisfactory clinical outcomes after short term duration of follow-up.

Keywords: Total Hip Replacement, Harris Hip Score, Clinical Outcome.

Introduction

Total hip Arthroplasty is a surgical procedure, which has relieved millions of people from incapacitating pain arising from the hip joint.⁽¹⁾ The first total hip replacement is thought to have been done in London by Phillip Wiles in 1938.⁽²⁾ The procedure was further developed in the 1950s by McKee and Farrar⁽³⁾ which was later developed by Sir John Charnley who in the late 1960s.^(4,5)

Preliminary data suggest that uncemented total hip Arthroplasty have a relatively low revision rate and excellent prosthetic durability for as long as 15 years. Compared with cemented hip Arthroplasty, 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.

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. It is a highly cost-effective procedure. Evaluation of outcome is important to determine the durability of the procedures like total hip replacement (THR). The Harris hip score is the most widely used scoring system for evaluating hip Arthroplasty.

This study is undertaken to assess the Clinical outcome of the Total hip Arthroplasty.

Material & Methods

This retrospective and prospective study was carried out on 500 patients of Total Hip Replacement operated in the Department of Orthopedics, in a tertiary care hospital between the study period of August 2012 to August 2016. Information on the patients was compiled from clinical database, case files and operation theatre records for retrospective cases and Questionnaire and case files were used for prospective cases. Patients were followed up for regular intervals at 4 weeks, 6 months and 1 year.

All the patients above 18 years of age who had undergone Total Hip Arthroplasty for isolated hip pathologies at our hospital were included. The patients who had undergone Total Hip Replacement with deformities or pathologies of other joints of the lower limb, which may have had an adverse bearing on the functional outcome of the surgery were excluded.

80 patients were available for the follow-up with their previous operative records, annual X-ray films and follow-up papers. 420 fresh cases had undergone unilateral total hip replacement. Detailed history and proper clinical examination was done. The deformity and Range of movements were measured with goniometer. All the patients were assessed using Modified Harris Hip Score pre operatively and postoperatively. Radiograph of the pelvis with both hips with proximal half of shaft

of femur AP view was taken for all patients. The radiograph was evaluated for size of the acetabulum bone stock of the acetabulum, any protrusion and periacetabular osteophyte formation, the structural integrity of the acetabulum, need for bone grafting, size of the femoral canal and radiological limb length discrepancy. Templating was done for the acetabular and femoral components. All the patients were operated using standard postero lateral approach. Prophylactic antibiotics, unless contraindicated, were used in all patients 24 hours preoperatively and upto 72 hours postoperatively and continued in the form of oral antibiotics for 7 days. DVT prophylaxis was given in the form of low molecular weight heparin for first five days after surgery. Drains were removed 24 to 48 hours after surgery. First post op day, check X-rays are taken. The patient is taught static quadriceps exercises; knee and ankle mobilization exercised and made to sit. Second post op day dressing changed and smaller dressing is applied. Gait training was started using a walker with weight bearing to tolerance. At around 10th-12th post op day sutures are removed and discharged from the hospital. Harris hip scoring was done postoperatively at the time of discharge, 4 weeks, 6 months and 1 year follow-up.

The following methods of statistical analysis have been used in this study. The Excel and SPSS software packages were used for data entry and analysis. The results were averaged (mean + standard deviation) for each parameter for continuous data and numbers and percentage for categorical data presented in Table and Figure. Proportions were compared using Chi-square test of significance and Paired t' test. In all the above test the "p" value of less than 0.01 was accepted as indicating statistical significance.

Observations & Results

The study was carried out on 500 hips of 500 patients who underwent uncemented Total Hip Replacement. This study was conducted on patients with age ranging from 20 to 75 years with a mean age of 40.50 ± 12.15 years at the time of surgery, 400 (80%) Were males and 100 (20%) were females. All the patients underwent unilateral total hip replacement. 120 total hip replacement was done on the left side and 380 on the right side. The main indication for surgery was avascular necrosis in 360 patients (72%).

Table 1: Showing underlying pathology indicative of Total Hip Arthroplasty in the study.

Diagnosis		Frequency	Percentage (%)
Avascular Necrosis (AVN)	Idiopathic AVN	110	22
	Post Traumatic AVN	20	4
	Steroid Induced	70	14
	Avn due to Chronic Alcoholism	160	32
Osteoarthritis		50	10
Ankylosing Spondylitis		20	4
Rheumatoid Arthritis		20	4
Sickle Cell Disease		50	10
Total		500	100

74% patients underwent uncemented Total Hip Arthroplasty whereas 26% patients underwent Cemented Total Hip Arthroplasty. We used Modified Harris Hip Score to evaluate the functional outcome. For the total score and each of the parameters, higher score implies lesser disability. The mean total pre-operative score was 49.74. The maximum score being, 73 and the minimum,

being 37. Post operatively the total mean score was 85.12 with the 65 being the minimum and 96 being the maximum. With regards to the different parameters in the scoring system i.e., pain, gait, functional activity, absence of deformity and ROM, there was a statistically significant improvement (P value of <0.001) in the post-operative score when compared to pre-operative score.

Table 2: Paired student t test between Pre-operative and post-operative scores according to the various parameters of the Modified Harris Score System.

Parameters of modified HHS		Frequency (n)	Range	Standard Deviation	Min	Max	Mean	P value
Pain	Preoperative	50	20	±5.226	10	30	18.20	0.00
	Postoperative	50	14	±4.120	30	44	38.08	
Function (gait)	Preoperative	50	28	±9.710	2	30	20.72	0.00
	Postoperative	50	14	±3.220	19	33	29.96	

Function (activity)	Preoperative	50	10	± 2.433	0	10	4.14	0.00
	Postoperative	50	2	± 0.942	8	10	9.36	
Absence of deformity	Preoperative	50	2	± 0.598	2	4	3.36	0.00
	Postoperative	50	0	± 0.000	4	4	4.00	
ROM score	Preoperative	50	2	± 0.605	2	4	2.96	0.00
	Postoperative	50	1	± 0.404	4	5	4.80	
Total Score	Preoperative	50	56	± 17.195	17	73	49.74	0.00
	Postoperative	50	31	± 8.594	65	96	85.66	

On Comparison of the pre-operative versus post-operative scores according to the Functional outcome scores. 90-100 had excellent results, 80-90 had good, 70-79 fair, 60-69 poor and below 60 for a failed result. Pre-operatively 94% had a poor score. The results showed a significant improvement, wherein 36% had an excellent score and 42% showed good and 20% fair results. 2% patient had a poor score.

Table 3

Outcome Score Grade	Pre-operative	Post-operative
Poor	470 (94%)	10 (2%)
Fair	30(6%)	100(20%)
Good	0(0%)	210 (42%)
Excellent	0(0%)	180 (36%)
Total	50 (100%)	500 (100%)

We compared functional outcome scores with the Outcome according to underlying cause and found that 100 % patients with osteoarthritis as the diagnosis had an excellent outcome. All the patients of Rheumatoid Arthritis and 80% patients of sickle cell disease had fair outcome. 50 % patient of Ankylosing spondylitis had poor outcome. So upon cross tabulation between

outcome score and cause of disease was statistically significant. (P value 0.00) Statistical analysis reveals that outcome of the THA can be significantly dependent on underlying cause of disease. On Radiological Evaluation, in this study we had a normal acetabular inclination (30-50 degree) in all the Patients. Femoral stem was placed in varus in 8 % of total cases and centrally in 88% cases. Valgus placed Femoral stem was present in 4% cases. In our study 81.81 % of neutrally placed femoral stem had excellent and good outcome scores and significant relation was found between placement of femoral stem and functional outcome scores.

Early complications noted were fairly less in our study Shortening was seen in 6 % cases, infection was found in 4% cases which was superficial, Periprosthetic fracture and hip dislocation was found in 1 case each.

The most common late complication was stress shielding (24%) acetabular component loosening was seen in 2% cases and femoral stem loosening was found in 12% cases. Calcar resorption was present in 8% cases. Femoral loosening was present in 75% of cases where femoral stem was placed in varus. However, no loosening was observed in 79.5% cases where there was centrally placed femoral stem.

Pre-Operative and Post-Operative Radiographs

These are some of the Pre-operative, post-operative and follow up radiographs of some of the cases in our study.

Case 1:



Fig. 1: A. X-ray Pre-operative Radiograph; B. X-ray Post-operative Radiograph; C. X ray year follow up radiograph

Case 2:

Fig. 2: A. X-ray Pre- Operative Radiograph; B. X-ray Post-operative Radiograph

Discussion

Total hip Arthroplasty is a well-documented surgical procedure. It relieves pain and functional disability experienced by patients with moderate to severe arthritis of the hip, improving their quality of life. In our study, 20% of the patients were found to be in the 50 years and above age group, with age ranging from 20 to 75 years and an average age of 40.50 ± 12.15 years. The mean age of our study was comparable with study of Unger AS et al⁽⁶⁾ where the mean age was 39.9 years with range of 14-72 years. However, in our study there were no statistical significant between age and functional outcome of the patients. Singling out the primary indication of the procedure is difficult, but reports of Eftekhari,⁽⁷⁾ Harkess⁽⁸⁾ document the arthritis group to be the most common indication. In our study Avascular necrosis was the most common indication for

replacement in which AVN due to chronic alcoholism constitute 32% cases followed by idiopathic AVN (22%) and steroid induced AVN (14%) and post traumatic AVN (4%). We used Harris hip score to assess the functional outcome in our study which is the most widely used scoring system for evaluating hip Arthroplasty. Excellent and good pain relief and function were obtained in 78% of patients which is comparable to study of RC Siwach et al⁽⁹⁾ in which excellent or good outcome was achieved in 75% patients and Chandrasekhar et al⁽¹⁰⁾ where 84 % had excellent results.

The mean total pre-operative Harris Hip score was 49.74, which improved post operatively to a mean score of 85.66. There was statistically significant improvement in postoperative Harris hip score. TABLE 4 shows comparison of mean pre-operative and post-operative Harris hip scores of various studies.

Table 4

Studies	Pre-operative Harris hip score	Post-operative Harris His Score
Our study	49.74	85.66
Wixson et al ⁽¹¹⁾	44	93
Siwach et al ⁽⁹⁾	44	83.5
Ganeshan et al ⁽¹³⁾	44	88
Chandrasekhar et al ⁽¹⁰⁾	45.04	88.44
Russoti et al ⁽¹⁴⁾	47	97

In our study mean Pre op Harris Hip score and mean post-operative Harris hip score in cemented THR was 44.85 and 83.69 which was comparable with Wixson et al⁽¹¹⁾ which is 42 and 90 and Sandesh Reddy Yaratapalli et al⁽¹²⁾ which is 36 and 88. The mean Pre op Harris Hip score and mean post-operative Harris hip score in uncemented THR was 86.35 and 51.46 which were comparable to Wixson et al.⁽¹¹⁾ However, there was no statistical significance found between the type of Arthroplasty and functional outcome scores.

Another factor that may be of important in determining the outcome of Arthroplasty the Indication of total hip Arthroplasty. In our study all the patients of osteoarthritis had excellent outcome, all the patients of rheumatoid arthritis and 80% patients of sickle cell disease had fair outcome. 50% patients of Ankylosing

spondylitis had poor outcome scores. These results are comparable with the study of Ganeshan et al⁽¹³⁾ as they concluded that function outcome of total hip Arthroplasty is more in osteoarthritis as compared to Rheumatoid Arthritis. In our study we found that there was statistical significance between the indication of surgery and final outcome.

There was no incidence of migration of acetabular component in our study however acetabular loosening in the form Osteolysis in zone 2 was present in 2% of cases after 1 year follow up and it was in the case of Ankylosing Spondylitis. In study of Sandesh Reddy Yeratapalli,⁽¹²⁾ acetabular component loosening was seen in 1 case (2.6%) and Russoti GM et al⁽¹⁴⁾ found acetabular component loosening in 1 case and femoral stem loosening in 3 cases. Acetabular component

loosening and femoral stem loosening had statistically significant correlation with the underlying pathology indicative of total hip Arthroplasty. As acetabular stem loosening was seen in 50% cases off Ankylosing Spondylitis and femoral stem loosening was present in half of the cases of Ankylosing spondylitis and 60% cases of sickle cell disease.

Stress shielding was present in 24% of total cases in this study which was comparable with study of Engh C et al⁽¹⁵⁾ who had found stress shielding in 12% cases. Stress shielding was present in all the cases of Ankylosing spondylitis, rheumatoid arthritis and sickle cell disease and its association was found to be statistically significant.

Calcar resorption was seen in 8% cases of our study after 1 year follow up whereas in Soballe K et al⁽¹⁶⁾ found calcar resorption in 21% of total cases and in Calcar resorption was seen in all the cases of Ankylosing spondylitis, 50% cases of rheumatoid arthritis and 20% cases of sickle cell disease. However, the association between the underlying cause and calcar resorption was found to be significant. Other radiological complications such as pedestal formation, cortical thickening and fibrous lucent layer were not encountered in our study.

In our study more than 1-1.5 cm shortening was present in 12% of cases which was managed with footwear correction in the form of shoe raise which is comparable to findings of Ganeshan et al⁽¹³⁾ showing 1-1.5 cm shortening in 13% cases Other complication in our study were infection (4%), dislocation (2%), periprosthetic fracture (2%) and heterotrophic ossification (2%). This was comparable with study of Anne Lubbeke et al⁽¹⁷⁾ who reported 0.7 % prosthetic joint infection, 3.2% dislocation and 3.4% periprosthetic fracture.

Post-operative infection was present in 4% of the cases which was superficial. These cases were managed successfully with long duration of adequate antibiotic cover and delayed suture removal. This was comparable with study of BabakSiavashi et al⁽¹⁸⁾ who had reported infection in 3 cases.

In our study 2% of cases had an evidence of dislocation which was managed with open reduction in the immediate post op period. This was comparable with study of Sandeshreddy Yaratpalli et al⁽¹²⁾ who reported 2.6% dislocation. 2% cases reported periprosthetic fracture one month after the surgery. It was a Vancouver Type C fracture managed with open reduction and internal fixation.

In our study, heterotrophic ossification was found in 2% cases whereas in study of Sandeshreddy Yaratpalli et al⁽¹²⁾ heterotrophic ossification was reported in 13% cases.

Conclusion

In conclusion, Total hip Arthroplasty with or without cement gives good clinical and functional outcomes and is determined by multiple factors, like

indication for total hip Arthroplasty, placement of prosthesis, and the operative technique. The results of the procedure must be evaluated in long-term studies.

Our study suggests that the Total Hip Replacement can provide satisfactory clinical and radiographic outcomes after short term duration of follow-up. However, subsequent long-term studies must be carried out in order to clarify the progression of Osteolysis that may influence the clinical result and implant longevity. Though the study was not free of complications, the overall functional and clinical outcome showed good results.

References

1. Harkess, J. W. "Arthroplasty of the hip. *Campbell's Operative Orthopaedics* Mosby, 1998.
2. Petty W, P., WB Saunders, Total Joint Replacement-VI, Lower Extremity Replacement. *The Hip*. Philadelphia, 1991:p. pp 189-465.
3. McKee GK, W.-F.J., Replacement of arthritic hips by the McKee-Farrar prosthesis. *J Bone Joint Surg [Br]*, 1966. 48:p. 245-259.
4. J, C., Total hip replacement. *JAMA*, 1974. 230:p. 1025-1028.
5. J, C., Low Friction Arthroplasty of the Hip – Theory and Practice. Berlin. *Springer-Verlag*. 1979:p. 332-345.
6. Unger AS, Inglis AE, Ranawat CS, Johanson NA. Total hip arthroplasty in rheumatoid arthritis. A long-term follow-up study. *J Arthroplasty*. 1987;2(3):191-7.
7. Eftekhari NS., Total hip replacement using principles of low-friction arthroplasty: The Hip. Surgery of the musculoskeletal system, Edited by CM Evarts, Vol.3: Churchill Livingstone, 1983.
8. Harkess JW: Arthroplasty of hip., *Campbells Operative Orthopaedics*, Edited by AH Crenshaw, 8th edition, Vol. 1: CV Mosby Company, St. Louis, Washington DC, Torto, 1982.
9. RC Siwach, Virender Singh Kadyan, SS Sangwan, and Rajiv Gupta A retrospective study of total hip arthroplasty *Indian J Orthop*. 2007 Jan-Mar;41(1):62–66.
10. Chandra Sekhar, Ankur Mittal, Ramprasad Rallapalli, Biju R, Siva Prasad Y. Evaluation and Outcome of Total Hip Replacement in Adults with Arthritis: *OSR Journal of Dental and Medical Sciences (IOSR-JDMS)* e-ISSN: 2279-0853, p-ISSN:2279-0861. Volume 14, Issue 4 Ver. VIII (Apr. 2015), PP 65-72.
11. Wixson RL, Stulberg SD, Mehlhoff M; Total hip replacement with cemented, uncemented, and hybrid prostheses. A comparison of clinical and radiographic results at two to four years. *J Bone Joint Surg Am* 1991;73:257-70.
12. Y.R.Sandesh, G.G.Ram, P. Kunal, H. Giriraj, V.V.Phagal; Functional and radiological outcomes of total hip replacement in non traumatic indications. *Int.J.Curr.Microbiol.App.Sci.* (2014);3(3):153-158.
13. G. Ram, B. Thamodaran, T. Ashok, S. Perumal and V. Varthi, "Analysis of Functional and Radiological Outcome of Total Hip Replacements in Rheumatoid and Osteoarthritis Patients*," *Open Journal of Rheumatology and Autoimmune Diseases*, Vol. 3 No. 4, 2013, pp.246-250. doi: 10.4236/ojra.2013.34038.
14. Russotti GM, C.M., Stauffer RN, Cemented total hip arthroplasty with contemporary techniques. *Clin Orthop*, 1988.235:p.141-145.
15. Engh CA, Bobyn JD, Glassman AH. Porous-coated hip replacement. The factors governing bone ingrowth, stress

- shielding and clinical results. *J Bone Joint Surg Br* 1987;69:45-55.
16. K. Søballe, F. Christensen.; Calcar resorption after total hip arthroplasty. *J Arthroplasty*. 1988;3(2):103-7.
 17. Lübbecke Anne, Katz Jeffrey, PernegerThomasv, Hoffmeyer Pierre. Primary and Revision Hip Arthroplasty: 5-year Outcomes and Influence of Age and Comorbidity. *J Rheumato*. 2007Feb;34(2):394-400.
 18. Siavashi B, Mohseni N, Zehtab MJ, Ramim T. Clinical Outcomes of Total Hip Arthroplasty in Patients with Ankylosed Hip. *Archives of Bone and Joint Surgery*. 2014;2(1):25-30.