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Original Research Article

A Prospective Study- Functional and Radiological Outcome of Total Hip Replacement via PosteriorApproach with Uncemented Modular Prosthesis

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Abstract:

Background and Objective: Total Hip Arthroplasty represents the greatest single advance in Modern Orthopaedic surgery. Total Hip Arthroplasty is the indication for nearly all patients with diseased hip that causes chronic discomfort and significant functional impairment. It is the definitive treatment for end stage hip arthritis and has been shown to improve quality of life in a highly cost effective manner. To assess the functional outcome, radiological outcome and quality of life scores in patients treated with Total Hip Arthroplasty using modular prosthesis via the posterior approach.

Methods: 30 patients who underwent THR in BMIMS Pawapuri, for a period of 2 years who fulfilled the inclusion criteria after obtaining surgical consent. Patients were followed up at 3 weeks, 6 weeks, 3 months, 6 months interval for assessing the functional outcome and quality of life scores evaluated by Harris Hip Score (HHS) and the radiological outcome by radiography – AP view.

Conclusion: Uncemented total hip replacement gives acceptable results in otherwise disabling condition of hip . Clinical assessment correlated well with radiographic appearance in the short term follow up and will require longer follow up period to prove the merits of uncemented THR. We conclude there is significant decrease in pain and disability with improvement in patient quality of life, There was significant post-operative improvement in quality of life which was evident by HHS and radiological outcomes.

Keywords: Uncemented Total Hip Replacement, Radiological Outcome, Modular Prosthesis, THR.

Introduction

Sir John Charnley is considered the father of the modern THR and was the pioneer in Total Hip Arthroplasty. His low friction arthroplasty design is similar in principle to the prostheses used today. From then on forward for the past 70 years, taking into consideration several developments and advancements, Total hip arthroplasty has proved to be anexceptionally satisfying procedure with good results. By this procedure, the quality of life of patients improves with significant functional improvement [1].

Professor Ronald John Furlong was the pioneer of the total hip arthroplasty of the uncemented type. From the initial days of total hip replacement both the tribology of the implant and the method by which it is implanted into the human body have evolved drastically.

These methods have led to a big assortment of implant design, fixation types and bearing surfaces. For example the cemented, uncemented metal on metal, metal on ceramic, metal on polyethylene etc.

Cementless total hip arthroplasty was based on the in growth of bone (Osteo- integration) achieving more dependable fixation of the prosthesis and at the same time facilitate the restoration of bone stock if a revision total hip arthroplasty is needed in future [2]. The process by which the prosthetic components become firmly united (biological fixation) to the host bone by on growth or microscopic ingrowth of new bone is called osteointegration. This is accomplished without bone cement to bond between the prosthetic implant and the bone. This growth of bone (Osteointegration) is studiedradiographically by viewing the prosthetic bone interface for incorporation in the form of radio dense lines or loosening in the form of radiolucent zones [3].

Objectives

- To assess the radiological outcome of the total hip replacement
- To assess the post-operative complications and quality of life

Material and Methods

A total of 30 patients with hip pain and limitations of functions and activities of daily living, fulfilling the inclusion criteria admitted at BMIMS Pawapuri, were considered for the study after obtaining informed written consent. All patients were initially assessed in the outpatient department and underwent evaluation of the affected hip with pre-operative HHS assesment and radiographic assesment, following which THA was undertaken.

Inclusion criteria

- Sex – Both sexes.
- Avascular Necrosis head of femur
- Fracture neck of femur
- Old fracture neck of femur non-union
- Chronic arthritis of hip

Exclusion Criteria

- Age less than 18
- Infection at the operative site
- Medically unfit for surgery.
- Not willing for surgery.
- Not willing to give written consent for inclusion in the study group.
- Pregnanacy and lactating mothers

Routine investigations like Hemoglobin (gm %) TC, DC, ESR, Blood urea, Serum creatinine, RBS, electrolytes (Sodium, Potassium, Chloride), Serology(HIV, HbSAg, HCV), ECG/ECHO and other investigation that are required for surgery. Posterior Moore's approach with uncemented THR using modular implants Routine antibiotics and analgesics/anti-inflammatory. Complications- Preoperative, immediate and late Postoperative period.

Patient was placed in lateral position with affected side facing upwards and supports placed aneteriorly and posteriorly with appropriate padding over bony landmarks to maintain the patient in the above said lateral position.

The patient is placed in lateral position with the affected limb on the upper aspect. An incision is started 5 cm posterior and lateral to the postero inferior iliac spine and proceeded towards greater trochanter and then along the line of shaft of the femur. The fascia lata is incised in line with the skin incision and centered over greater trochanter and it is divided.

Figure 1: Incision with fascia and gluteus maximus split

Figure 2: Final Implantation

Once the hip joint was reduced, the affected hip was taken through the full range of motion in all planes to check

for any signs of impingement and squeaking. Schuck test was performed at the end to assess the soft tissue tension in the affected hip following replacement by giving axial traction in the distal direction.

Figure 3: PRE- OP POST-OP

Results:

Our study comprised of 30 patients (n=30) of both sexes who presented withvaried diagnosis as listed below and met the inclusion criteria. The patients were operated by the index procedure as mentioned beinguncemented THR via Moore's approach which was the same for all the subjects.

Table 1(a): age distribution

	N	Minimum	Maximum	Mean	Std. Deviation
Age	30	36	73	54.90	11.547

Table 1 (b): age distribution

	Frequency	Percent
40 and below	4	13.3
41 – 50	8	26.7
51 – 60	7	23.3
61 – 70	9	30.0
Above 70	2	6.7
Total	30	100.0

In our study of 30 patients ,4 patients were of 30-40 years old(13.3%), 8 patients were between 41-50 years old(26.7%), 7 patients were between 51-60 years old(23.3%%), 9 patients were between 61-70 years old(30%) and 2 patients were above 70 years(6.7%) (Graph 1) (Table 1B) with the oldest patient being 73 years and youngest patient being 36 years with a mean age of 54.90 (Table 1 A). In our study HHS was used to evaluvate the functional outcome, and compared to thepreop HHS, postop improvement of HHS was highly significant ($p<0.00001$).

at every follow up uptil the final follow up at 6 months as depicted by data presented in the table (Table 2) and appropriately depicted in the graphs above.

Table 2:

	N	Mean	Std. Deviation	95% ConfidenceInterval forMean		Repeated measures ANOVA value	p value
				Lower Bound	Upper Bound		
PRE OP HHS	30	31.83	7.630	28.98	34.68	552.299	<0..00001
IMMEDIATE	30	35.87	4.191	34.30	37.43		HS
3 WK	30	48.53	5.800	46.37	50.70		
6 WK	30	61.87	6.745	59.35	64.39		
3 M	30	73.00	6.539	70.56	75.44		
6 M	30	83.10	5.780	80.94	85.26		

In the comparison of change in HHS score with various age groups as defined earlier,greater change

in HHS was noted in younger age groups (30-40 years) which was around 89.75 at the 6 month follow up, depicts the average increase of HHS post op in both the groups and as it is observed, the average HHS for the group without acetabular migration is seen to progressively improve over the span of 6 months while the rate at which the HHS in the patient with acetabular migration tends to improve decrease after 6 weeks . depicts the average HHS comparison at 6 months between both the groups and is significant in case of patients without acetabular migration. The following radiographic findings were noted when serial radiographs, including those made in the latest follow up examinations were compared . When considering the acetabular component, using DeLee and Charnley zones, there was no significant radiolucency in Zone 1. But in 3.3% of our patients there was a significant translucency in Zone 2 and Zone 3 There was no significant fresh bone formation in acetabular or femoral prosthesis and bone interface. One patient developed periprosthetic osteolysis and loosening of the acetabulum.

Table 3:

Anterior thigh pain	Frequency	Percent
N	25	83.3
Y	5	16.7
Total	30	100.0

In our study, 16.7% of the patients had complaints of anterior thigh pain in the postoperative period but the presence of anterior pain did not hinder the improvement of the HHS.

Table 4:

Acetabular inclination	Frequency	Percent
30 - 40	17	56.7
Above 40	13	43.3
Total	30	100.0

Table 5:

N	Mean	Std. Deviation	95% Confidence Interval for Mean		Minimum	Maximum
			Lower Bound	Upper Bound		
30	39.17	4.31	37.56	40.78	31.00	45.20

The mean for acetabular inclination in our study was 39.17 (Minimum- 31, Maximum- 45.20). 56.7 % of the patients had an acetabular inclination between 30- 40 and the remaining 43.3% had an inclination above 40. None of the patients in our study presented with complaints of postoperative dislocation, infection, fracture or heterotropic ossification. Absence of heterotropic ossification could be attributed to the short duration of the study and would need longterm follow up

Discussion

THR is a wonderful surgery for patients with hip joint destruction and has made lot ofprogress. Newer designs have come, each claiming its superiority over other. There has been a worldwide trend toward the uncemented THR over the past 10 years [4]. Uncemented THR was introduced to cope up with the complications of cemented THR, especially in younger patients. The purpose of our study conducted at our hospital involving 30 patients who underwent uncemented THR via the posterior approach was to analyse the postoperative radiographic features that can predict osteo-integration and the clinical co relation with the radiological outcome and the final success of uncemented total hip arthroplasties [5,6]. The leading indication for THR has been found to be arthritis of the hip joint which is not relieved by conservative therapy and analgesics. Pivec, R et al [7] in their review have stated that majority of the patients who undergo THR have arthritis of the hip joint which is in concordance with our study, in which 50% of the patients who underwent THR were diagnosed with arthritis of the hip joint. In 1969 Harris in his work on mold arthroplasty has done a set of parameters based onwhich the clinical results of the hips operated were assessed. He took into account pain, functional components, and absence of deformity and range of movements of the concerned hips. Harris Hip Score has been primarily used to evaluvate functional outcome following THR. In our study HHS was used to evaluvate both the preoperative and postoperative follow up functional outcome and showed significant improvement in the postoperative period with good clinical outcome and average HHS of 83.83 at the end of 6 months follow up in the absence of osteolysis.

The only case which had loosening and migration

of the acetabular component (3.33%) also showed an averageHHS of 72. The improvement of HHS noted in our study is in concordance with the findings of Ng, C. Y et al [8], Engh et al [9,10] found no significant acetabular changes in radiography. Engh et al also described the radiographic signs of fixation and stabilities of stem inserted without cement. The lack of reactive lines and presence of, spot welds of new bones around the surface can be called as osteointegration. In this study also we were not able to find any significant, constant pattern of new bone formation around acetabular component radio graphically. In our study, signs of osteointegration for the femoral component were not appreciable in any of the subjects which could be attributed to the short duration of the study. In our study one patient had acetabular loosening and migration at 6 months follow up and underwent revision for the acetabular cup with the femoral prosthesis beingretained. The age of the patient at primary hip arthroplasty was 42 which corresponded with the findings of Engh C.A [11,12] who revealed a higher incidence of osteolysis and reoperation in younger patients. 5 Patients in the study presented with anterior thigh pain , one out of which was the subject with acetabular migration. Three out of the five patients with anterior thigh pain received femur stem sizes > 10 cm which correlated with findings of Vresilovic et al.[13] who reported in their findings that chances of anterior thigh pain following THR increased with increasing stem size.

The absence of signs of osteointegration or any loosening in the femoral component could be attributed to the short duration of our study and will need long term clinical and radiological follow up for better correlation and to establish the benefits of Uncemented THR.

Conclusion

In this Study clinical assessment correlated well with radiographic appearance there were no evidences of osteointegration in any case possibly because of short duration of study. There was evidence of loosening with acetabular migration in only one case. We conclude that Uncemented total hip replacement gives acceptable results in otherwise disabling conditions of the hip with significant decrease in pain, disability and improved functional outcome, which correlated with the radiological outcome.

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