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Early functional outcome of uncemented v/s cemented total hip replacement in osteoarthritis: A prospective study

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Abstract

Introduction: Total hip arthroplasty (T.H.A) remains one of the most frequently performed reconstructive surgeries. Much work has been done in this discipline over the past years with regards to scientific investigation, clinical outcome assessment, and the treatment of complications.

Methods: In this series of 30 patients with osteoarthritic hips, were treated with Cemented (15) and Uncemented (15) total hip arthroplasty between October 2013 to April 2015 and follow up was done from May 2015 to October 2015 in Sri Siddharth Medical College Hospital and research centre. Results were analysed both clinically and radio logically and functional outcome was evaluated using Harris hip score.

Results: Harris hip score was used for evaluation of functional outcome which was on an average, in Cemented arthroplasty 47.87 ± 15.57 and Uncemented arthroplasty 48.33 ± 8.71 (P Value = 0.920) preoperatively. And Postoperatively in Cemented arthroplasty 90.07 ± 8.04 and Uncemented arthroplasty 91.67 ± 5.26 (P Value = 0.525).

Conclusion: Functional outcome were comparably good in both the arthroplasties. Comparison was done with only one design prosthesis – Charnley's prosthesis, duration of the study and sample size was small.

Keywords: Total hip replacement, Total hip arthroplasty, Harris Hip Score, Avascular necrosis, Fracture neck of femur

Introduction

The human hip joint is extremely complex on account of the functional demands on it by the body. On account of its complex biomechanics & important function, a stable painless hip is required for normal locomotion. Number of diseases affects the hip joint. This number has grown over the years as the life expectancies of individuals have increased ^[1].

In the beginning the thought of operating on the hip deterred even the most aggressive surgeons. With the improvement in anaesthesia, post operative care and especially the aseptic operating room ritual has brought the risk of operating on the hip very low, thus increasing the widespread acceptance of elective surgery ^[2].

Although hip surgery had its root in the 19th century, it's greatest period of growth & development has occurred in 20th century. An ever growing population of chronic joint disease demanding relief of pain & disability has led to development of operating such as osteotomy & arthroplasty.

In an arthrodesis, the purpose of the operation is to create raw cancellous bone surface on each side of the joint & hold them in rigid apposition. In an arthroplasty, the purpose of the operation is to shape the ends of the bones & to hold the surfaces apart, almost always using some material interposed between the fragments ^[3].

Total joint replacement has undergone many changes since it was first attempted in the early 20th century. It was on the basis of failures of previous surgeries & valuable clinical experience from it by the surgeons that these changes were introduced.

Initially, bone cement was used to fix the articulating surfaces of the THA to the bony ends. But high rates of loosening of the implants, especially the acetabular components led to a change in the technique of fixation of the implants ^[4].

Thus bone in growth for biological fixation was introduced. The technique of cement less Total Hip Arthroplasty could be used in younger patients in the hope that it might last longer.

However, failures in femoral stem fixation on account of little bone ingrowth, thigh pain & ideal method of fixation of the femoral stem [5].

Cemented Acetabular and cemented femoral stem fixation is advised in elderly patients.

In this series of 30 patients with osteoarthritic hips were treated with Cemented (15) and Uncemented (15) total hip arthroplasty between October 2013 to April 2015.

Follow up for each patient was done for 6 months in Sri Siddhartha Medical College

Hospital and Research centre. Results were analysed both clinically and radio logically and the functional outcome was evaluated by using Harris Hip Score.

Methodology

This study was conducted in the Department of Orthopaedics in Sri Siddhartha Medical College Hospital and Research Centre, patients presenting to the OPD and emergency between October 2013 to May 2015 were screened for osteoarthritic hip joints.

All the confirmed cases of Osteoarthritis of hip admitted in Sri Siddhartha Medical College Hospital and Research Centre.

Inclusion Criteria

All cases are selected on the basis of

- Clinical signs and symptoms
- Radiological findings
- Patients who have been diagnosed with various disorders of hip. (AVN, fracture neck of femur, O.A. of hip, etc.)
- Patients who are fit for surgery.

Exclusion Criteria

- Patients age < 20 years.
- Patients who are unfit for surgery due to associated medical problems.
- Patients with compound fractures and septic arthritis.

Detailed history, clinical examination, and radiological examination were carried out in all patients. Salient features included

Radiological Investigations

- X-Ray chest PA
- X-Ray pelvis with both hips AP
- X-Ray both hips with thigh- R & L

Patients were evaluated and data recorded on the basis of Harris hip score. Preanaesthetic assessment was done on all patients. The patients were admitted 48 hours prior to surgery for education regarding the rehabilitation program to be followed subsequent to surgery. Patients were started on chest physiotherapy and static quadriceps, hamstring and gluteal exercises. Patients were told about back- care and ways to lift themselves for use of bedpan.

Patients were explained in detail about surgery, possible complications and limitations to be followed after surgery.

Results

In this series of 30 patients with osteoarthritic hips were treated with Cemented (15) and Un Cemented (15) total hip arthroplasty between October 2013 to April 2015 and follow up was done from May 2015 to October 2015 in Sri Siddhartha Medical College Hospital and research centre. Results were analysed both clinically and radio logically and functional outcome was evaluated using Harris hip score.

Table 1: Age distribution of patients studied

Age in years	Cemented THR		Uncemented total hip replacement	
	No	%	No	%
<40	1	6.7	1	6.7
40-50	3	20.0	3	20.0
51-60	3	20.0	5	33.3
61-70	7	46.7	5	33.3
71-80	1	6.7	1	6.7
Total	15	100.0	15	100.0
Mean ± SD	56.47±13.53		56.80±8.99	

Samples are age matched with P=0.937

In our study majority of the patients ie; 7(46.7%) were in the age group of 61-70 years in Cemented THR. Majority of the patients ie; 5 (33.3%) were in the age group of 51-60 years followed by 5 (33.3%) in the age group of 61-70 years in Un-Cemented THR. The mean age in Cemented THR was 56.47±13.53 years and the mean age in Un-Cemented THR was 56.80±8.99 years.

Table 2: Gender distribution of patients studied

Gender	Cemented THR		Un-Cemented THR	
	No	%	No	%
Female	5	33.3	6	40.0
Male	10	66.7	9	60.0
Total	15	100.0	15	100.0

Samples are gender matched with P=0.705

Majority of the patients were Males (66.7%) in Cemented THR. Majority of the patients were males (60.0%) in Un-Cemented THR. Samples were gender matched with p= 0.705.

Table 3: Diagnosis distribution in two groups studied

	Diagnosis	Cemented THR		Uncemented total hip replacement	
		No	%	No	%
1.	Old Fracture Neck	4	26.7	4	26.7
2.	Avascular necrosis	4	26.7	3	13.3
3.	Failed Austin Moore Prosthesis	2	13.3	2	13.3
4.	Osteoarthritis	3	16.3	2	13.3
5.	Old Fracture Neck+ Avascular necrosis	1	6.7	1	6.7
6.	Failed Dynamic Hip Screw(DHS)	1	13.3	3	16.3
Total		15	100.0	15	100.0

Majority of the cases in our study were that of Old fracture Neck 4 (26.7%) in cemented and 4(26.7%) in uncemented arthroplasty followed by Osteoarthritis and Failed Austin Moore Prosthesis.

Table 4: Affected Side distribution in two groups studied

Affected Side	Cemented THR		Un-Cemented THR	
	No	%	No	%
Left	7	46.7	5	33.3
Right	8	53.3	10	66.7
Total	15	100.0	15	100.0

P=0.456, not significant, Chi-square test

Majority of the affected side was left 7 (46.7%) in cemented and majority of the affected side 10 (66.7%) were seen in uncemented arthroplasty.

Table 5: Comparison of Pre operative scores in two groups studied

Pre operative scores	Cemented THR	Un-Cemented THR	P value
Pain	23.33±7.24	18.00±6.76	0.046*
Function	24.60±8.51	24.00±6.32	0.828
ROM	1.13±0.92	1.33±0.72	0.512
AOD	3.47±1.41	3.20±1.66	0.638
HHS	47.87±15.57	48.33±8.71	0.920
Student t test			

In our study the pre operative harris hip scores were comparable between cemented and uncemented arthroplasty ie: 47.87±15.57 in cemented and 48.33±8.71 in uncemented arthroplasty P value = 0.920.

Table 6: Comparison of Post Operative Scores in two groups studied

Post operative Scores	Cemented THR	Uncemented total hip replacement	P value
Pain	42.27±3.77	43.20±1.66	0.387
Function	39.13±4.94	39.80±5.32	0.725
ROM	4.60±0.62	4.67±0.49	0.749
AOD	4.00±0.00	4.00±0.00	-
HHS	90.07±8.04	91.67±5.26	0.525
Student t test			

In our study the post operative harris hip scores were comparable between cemented and uncemented arthroplasty ie: 90.07±8.04 in cemented and 91.67±5.26 in uncemented arthroplasty P value = 0.525.

Table 7: Comparison of Pre and Post-operative scores in two groups studied

Pain	Variables	Cemented THR	Un-Cemented THR
<input type="checkbox"/>	Pre-op	23.33±7.24	18.00±6.76
<input type="checkbox"/>	Post-op	42.27±3.77	43.20±1.66
<input type="checkbox"/>	P value	<0.001**	<0.001**
Function			
<input type="checkbox"/>	Pre-op	24.60±8.51	24.00±6.32
<input type="checkbox"/>	Post-op	39.13±4.94	39.80±5.32
<input type="checkbox"/>	P value	<0.001**	<0.001**
ROM			
<input type="checkbox"/>	Pre-op	1.13±0.92	1.33±0.72
<input type="checkbox"/>	Post-op	4.60±0.62	4.67±0.49
<input type="checkbox"/>	P value	<0.001**	<0.001**
AOD			
<input type="checkbox"/>	Pre-op	3.47±1.41	3.20±1.66
<input type="checkbox"/>	Post-op	4.00±0.00	4.00±0.00
<input type="checkbox"/>	P value	0.164	0.082+
HHS			
<input type="checkbox"/>	Pre-op	47.87±15.57	48.33±8.71
<input type="checkbox"/>	Post-op	90.07±8.04	91.67±5.26
<input type="checkbox"/>	P value	<0.001**	<0.001**

In our study the functional modalities were compared between pre and post operative follow up in both the cemented and uncemented arthroplasty and harris hip score in pre operative cemented is 47.87±15.57 and uncemented is 48.33±8.71 (P value =<0.001 strongly significant). Post operative cemented is 90.07±8.04 and uncemented is 91.67±5.26 (P value =<0.001 strongly significant).

Table 8: Early Functional Outcome Rating in two groups studied

Early Functional Outcome Rating	Cemented THR		Uncemented total hip replacement	
	No	%	No	%
Excellent	10	66.7	11	73.3
Very Good	3	20.0	3	20.0
Good	1	6.7	1	6.7
Poor	1	6.7	0	0.0
Total	15	100.0	15	100.0

P=1.000, Not Significant, Fisher Exact test

Excellent results were obtained in 66.7% patients in the Cemented total hip arthroplasty postoperatively. Excellent results were obtained in 73.3% patients in the Un Cemented total hip arthroplasty postoperatively. Harris Hip Score in cemented total hip arthroplasty is 90.07 and P value being <0.001 which is suggestive of a strong significance in the postoperative evaluation. Harris Hip Score in Un-Cemented total hip arthroplasty is 91.67 and P value being <0.001 which is suggestive of a strong significance in the postoperative evaluation.

Discussion

Total hip Arthroplasty is one of the permanent methods of relieving pain in the hip caused by various osteoarthritic conditions. Component loosening due to osteolysis is one of the major problems associated with Total hip arthroplasty. This results in reduced rates of survival of total hip components. With improved cementing techniques, it has been seen that cemented femoral acetabular fixation has provided durable results. However, acetabular component fixation showed loss of fixation in a number of cases after 10 years. The present study was a series of 30 hips operated between 2013 to April 2015 and follow up was done from May 2015 to October 2015 in Sri Siddharth Medical College Hospital and research centre.

While our study was limited to 30 T.H.A., Berger *et al* [6]. Performed 150 T.H.A., Harris *et al* [7]. Performed 126 T.H.A. and Goldberg *et al* performed 125 T.H.A. This is due to the fact that this study was limited to a very short duration. Also, financial constraints and unawareness of this procedure to the patient limited the number of patients for this study.

The age limit for this series was upto 74 years in cemented T.H.A and 72 years in uncemented T.H.A. Many series have 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 Uncemented T.H.A reconstruction have been encouraging in young patients. Berger *et al* reported a 10-year survival of 98.8% in patients younger than 50 years.

Most common diagnosis in the present series was old fracture neck of femur (26.7%) in both arthroplasty, avascular necrosis (26.7%) in cemented and (13.3%) in uncemented followed by osteoarthritis and failed osteosynthesis.

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 the western literature (10% by Harris *et al* & 7% by Berger *et al*). In this series, the difference in diagnosis might suggest a high rate of A.V.N. and old fracture neck of femur and a low rate of osteoarthritis in Indian patients. A study for longer period of time and with longer follow up is needed to establish this fact and to determine the reason for this difference.

Chemoprophylaxis was routinely carried out in all patients. No patient developed deep infection and only one case of superficial infection was detected. All surgeries were performed in conventional operating theatre. Wilson *et al*^[8] reported a significant fall in the infection rates when prophylactic antibiotics were used from 11% to 1%. Goldberg *et al*⁹ reported a rate of 0.8% of deep infection using vertical laminar flow operating rooms and body exhaust systems. No case of deep infection in the present study highlights the importance of proper operating room discipline along with prophylactic antibiotics can significantly reduce infection rates.

Patients were evaluated after discharge at 6 weeks, 3 months, 6 months. Average follow up was 6 months in this study, as compared to much larger follow ups available in western literature (42 months by Harris *et al*, 8.6 years by Goldberg *et al* and 103 months by Berger *et al*). Mean Harris hip score improved from 34 points preoperatively to 88 points postoperatively. 88% of hip were graded as good or excellent in this study, 6% were graded fair and 6% were graded as poor. Harris *et al* reported improvement in Harris hip score from 57 preoperatively to 93 points postoperatively.

96% good to excellent results, 4% fair and no poor results were reported. Goldberg *et al* reported improvement in Harris hip score from 47 preoperatively to 88 points postoperatively. 85% good to excellent results, 13% fair and 9% poor results obtained in his series. These figures were comparable to our results.

Pain relief was also dramatic following THR. Patients had marked pain preoperatively. Postoperatively 94% of patients were relieved of pain only 6% patients had moderate pain. Similar result was obtained by Harris *et al* (98% complete pain relief) and Berger *et al* (94.5% complete pain relief).

Slight or no limp is seen in 88% of patients in this study. Moderate limp was present in 12% of patients. In a study by Harris 63% patients had no limp and 28% of patients had slight limp. Berger *et al* also reported low rate of limping. The limping improved over a period of time with progressive abductor exercises. As this study has a follow up of 6 months, percentages of patients limping are expected to decrease with time 94% patients needed no support or only occasional cane for walking long distances. 6% patients required cane full time. This finding is comparable to the results comparable to the results obtained by Harris *et al* (95% patients used cane occasionally).

Low complications were seen in our series. 1 superficial infection was seen. Harris *et al* reported 5 cases of trochanteric non-union (8%), 19 cases of deep vein thrombosis (15%), 9 dislocation (7%), 2 partial femoral and sciatic nerve paralysis and 2 patients had peroneal nerve paralysis (1.5% each). Goldberg *et al* had 3 dislocations (2.4%), 1 deep infection (0.8%) and 3 deep vein thrombosis (2.4%).

Conclusion

- Harris Hip Score in cemented total hip arthroplasty is 90.07 and P value being <0.001 which is suggestive of a strong significance in the postoperative evaluation.
- Harris Hip Score in Un-Cemented total hip arthroplasty is 91.67 and P value being <0.001 which is suggestive of a strong significance in the postoperative evaluation.

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