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RESEARCH ARTICLE

Cemented versus Uncemented Total Hip Arthroplasty: A Comparative Study

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Abstract

Introduction- Controversy persists regarding superiority of cemented versus uncemented THA.

Aims- To compare cemented versus uncemented THA.

Material & method- Cemented or uncemented THA used on basis of prevalent current recommendations and patient's statistics.

Results Total 17 patients evaluated and no significant difference found between these two groups at 1 year.

Conclusion There is no significant difference between cemented & uncemented THA but results needs further validation.

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Introduction

Total hip arthroplasty (THA) is one of the most successful orthopaedic procedures performed today. The femoral head (ball) articulates with the acetabulum (socket), allowing smooth range of motion and any condition that affects either of these structures can lead to deterioration in function. Pain continues to be the main reason patients choose joint replacement. Through understanding of the procedure and the anticipated outcome is an important part of the decision making process.

The comparative outcome, advantages and indications of cemented vs. uncemented fixation remain unsolved. The superiority of either fixation method has not been proved conclusively because of influences of confounding variables such as patient age, sex, weight and diagnosis. This problem further increased by type of implant, randomization methods, differences in study design, surgical approach, lack of a universal method to evaluate clinical results to draw a conclusive result. Most of the literature shows that better clinical and functional short term outcome were obtained from cemented femoral fixation. Other studies (Keijot et al. 2011),¹ finds no significant difference between cemented and uncemented fixation. In current time trend is to use uncemented fixation in younger population and cemented fixation in older age group. Till now no study has been able to draw conclusive result because conclusion was often limited to its own study method and result. We therefore compare cemented and uncemented total hip replacement to draw short term clinical and functional results using Harris hip, WOMAC, SF-12 scores.

Material & methods-

Present work has been conducted in department of orthopaedics, S.N. Medical College and Hospital, Agra, from April 2012 to march 2014. The cases have been selected among the patients attending emergency as well as outdoor patients aged 20-70 years including arthritis of various causes, avascular necrosis of femoral head, late presentation of congenital subluxation or dislocation of hip, failed reconstruction, tumours involving proximal femur or acetabulum while excluding patients having active infection of hip joint or any other region, neuropathic joint, progressive osteopenia, inadequate bone mass, insufficiency of abductor musculature, elevated ESR.

Preoperative patient evaluation done by taking detailed history, general examination, examination of spine, gait, both upper extremity and local examination where incision to be made, strength of the abductor musculature by the Trendelenburg Test. Skiagram of pelvis with both hip antero-posterior view in internal rotation of 15 degree with 15degree abduction used for pre operative templating to select implant type and determining neck length. Taking into consideration all the above mentioned factors and, prevalent current recommendation (Cemented THA done in light weight, low activity level, more osteoporotic bone, elderly patients and uncemented THA done in heavy weight, high level of activity, with good bone quality young patients), patients were segregated into cemented & uncemented THA group. Patients were given general/ epidural / spinal anesthesia as per choice of anaesthetist, painting and draping done thereafter. We used Gibson's modification of moore's approach because it gives good exposure with a relatively small incision and less intra-operative blood loss.

In the post operative period patients kept at physiotherapy and assisted walking regime. At each follow-up results measured in both cemented and uncemented cases with Harris hip score, WOMAC score, SF-12 score done at six week postoperatively, 6 month, 12 month 18 month and then at 1year interval.

Results-

In uncemented THA 60% of cases were in between 31-50 yrs age while in cemented group 57.2% cases were in 41 to 60 yrs age. Average age incidence was 33.3 yrs in uncemented group and 39.7 yrs in cemented group (Table 1). In uncemented cases 60% of cases were followed up to 1 year or more (maximum up to 18 month) while in cemented cases 42.8% cases were followed up to 1 year or more (maximum up to 18 month), overall 52.9% cases were followed up to 1 year or more(maximum up to 18 month) (Table 2). At 6 month follow up the mean Harris hip score for hips having cemented prosthesis was 86.38 ± 6.10 and at 1 year it was 94.5 ± 3.10 points; for the hips having uncemented prosthesis allowing ingrowth of bone it was 87.26 ± 6.06 at 6 month and 92.33 ± 5.49 at 1 year. There was no significant difference between these two groups at 1 year (p value =0.44) (Table 3). Mean WOMAC score for pre-operative patients in cemented and uncemented series was 42.02 ± 12.07 and 41.66 ± 9.26 respectively which increased to 88.06 ± 2.88 and 81.45 ± 6.08 at 6 month respectively. The WOMAC score for cemented series was 91.58 ± 2.81 and for uncemented series it was 88.66 ± 3.2 at 1 year of follow-up. Scores at 1 year were statistically not significant (p value=0.13)(Table 4). In SF-12 scores preoperative mean PCS score was 23.57 for cemented and 24.67 for uncemented group which increased to 43 and 39.16 respectively at 6 month follow-up. At 1 year mean PCS score for cemented series was 50.09 and for uncemented series it was 45.4 which also remain almost at these values at 18 month follow up with not much difference. In SF- 12 MCS score preoperative mean MCS score was 30.6 for cemented and 37.57 for uncemented group which increased to 50.85 and 57.02 respectively at 6 month follow-up. At 1 year mean MCS score for cemented series was 55.24 and for uncemented series it was 53.28. The PCS & MCS scores in both series shows constant increase and the results does not show significant difference they are comparable at 1 year follow-up (Table 5). During surgery in cemented group splitting of calcar occurred in 1 (14.28%) case, during post operative period 2 (20%) cases for deep vein thrombosis in uncemented group and 1 (14.28%) case in cemented group found (Table 6). In cemented series 14.28% patients had anterior thigh pain at 6 months and 14.28% patients at 1 year while in uncemented series there are 33.33% patients had anterior thigh pain at 6 month and 20% patients had at 1 year (Table 7).

TABLE 1- AGE INCIDENCE

Age group	Uncemented		Cemented		Total	
	No. of cases	%	No. of cases	%	No. of cases	%

20 – 30	4	40.0%	2	28.6%	6	35.3%
31 – 40	3	30.0%	1	14.2%	4	23.5%
41 – 50	3	30.0%	2	28.6%	5	29.4%
51 – 60	0	0.0%	2	28.6%	2	11.8%
Total	10	100%	7	100%	17	100%
Average age (yrs)	33.3		39.7			

Table 2- DURATION OF FOLLOW UP

Duration months	Uncemented		Cemented		Total	
	No. of case	%	No. of case	%	No. of case	%
6 weeks	0	0.0%	2	28.6%	2	11.8%
6 week - 6 month	0	0.0%	1	14.3%	1	5.9%
6 - 12 month	4	40.0%	1	14.3%	5	29.4%
12-18 month	6	60.0%	3	42.8%	9	52.9%

Table 3- HARRIS HIP SCORE (MEAN)

Groups	Pre-op	6 weeks	6 months	12 months	18 months
Cemented	33.75	55.65	86.38	94.5	89.83
Uncemented	36.44	62.98	87.26	92.3	93.76

Table 4- WOMAC SCORE (MEAN)

Groups	Pre-op	6 weeks	6 months	12 months	18 months
Cemented	42.02	67.22	88.06	91.58	89.37
Uncemented	41.66	63.47	81.45	88.66	90.18

TABLE 5- SF-12 SCORE (MEAN)

Groups	Pre-op		6 weeks		6 months		12 months		18 months	
	PCS	MCS	PCS	MCS	PCS	MCS	PCS	MCS	PCS	MCS
Cemented	23.57	30.6	31.8	44.39	43	50.85	50.9	55.24	49.5	49.2
Uncemented	24.67	37.57	33.62	31.95	39.16	57.02	45.4	53.28	47.56	53.58

Table 6- OPERATIVE & POST OPERATIVE COMPLICATIONS

Complications	Cases in uncemented group	Cases in cemented group
During surgery		
Cardiac arrhythmias	0	0
Fracture femur	0	0
Splitting of calcar	0	1 (14.28%)
Sciatic nerve injury	0	0
Post operative		
Pulmonary embolism	0	0
Shock	0	0
Superficial and deep wound sepsis	0	0
Dislocation of prosthesis	0	0
Sinking of prosthesis	0	0
Implant/cement failure	0	0
Deep vein thrombosis	2 (20%)	1 (14.28%)
Death	0	0

Table 7- PAIN IN THIGH

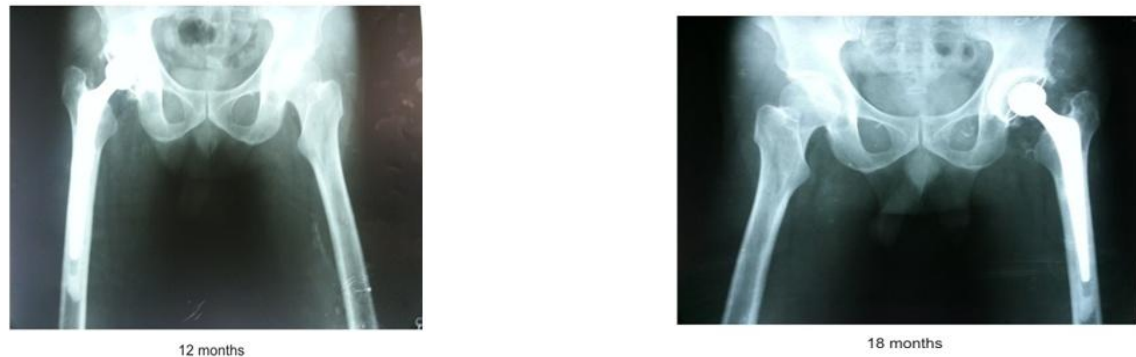
Group	No. of cases	6 months		1 year	
		No.	%	No.	%
Cemented	7	1	14.28	1	14.28
Uncemented	10	3	33.33	2	20.0

Legends for Figure(s)-

CASE 1 (uncemented)



CASE 2 (cemented)



Discussion-

DYT Fong et al. 2005² in their review article reported that cemented femoral component provide superior short term outcome in pain reduction, thigh pain, hip scores, walking with support and gait analysis. Chiu, KY and Fong DY et al 2005² performed a systematic literature review of 29 articles. Most of the articles showed that better clinical and functional short term outcome obtained from cemented femoral fixation than uncemented fixation. These results were less clear for mid term clinical outcome though, in general cemented fixation appeared to show a superior clinical outcome. This study recommended cemented fixation for duration of short term and mid term but other study done by Andreas Laupasis et al.³ (on two hundred and fifty patients who received a Mallory-Head total hip prosthesis) shows that all health-related quality-of-life measures improved postoperatively in both groups. In our study both type of fixation have excellent results with no difference at a shorter follow-up. In our study results at 1 year are statistically inconclusive but patients in cemented group have better Harris hip scores than uncemented group.

With respect to pain in thigh most studies reported increased pain for uncemented prostheses (Door 1986⁴, Emery 1991⁵, Harper 1994, Sonne – Holm 1982⁶). Three studies reported better mobility in cemented group (Door 1986, Emery 1991, Sonne – Holm 1982) but Santini 2005⁷ not found difference in walking in either group.

Callaghan et al.⁸ reported in uncemented series pain in 18% cases at 1 year and 12% in 2 year. Malachau and Herberts et al.⁹ reported 18 % cases having pain at 1 year in uncemented cases. Engh et al.¹⁰ reported pain in thigh in 14% cases at 2 year in uncemented series. In our study it was 20% in uncemented cases at 1 year. The variation in these incidences may be due to differences in operative technique or in the way how the pain was perceived and reported by the patients. They also stated that in all these studies pain tended to decrease with time, not caused disability and was generally associated with prolonged and unusual activity. The thigh pain reported by patients in this study has same characters and tended to decrease with time.

Total hip replacement after perthes disease done by Pietrzak K et al.¹¹ showed that total hip replacement allow regaining good lower limb function. The results of THR by using WOMAC score system were good regardless of the type of prosthesis and the type of fixation. Study done by Yim SJ et al.¹² to evaluate the results of ceramic-on-ceramic bearing primary total hip arthroplasty (THA) using cemented and cementless femoral stems showed that results on mean WOMAC score were superior in cemented stems. In study done by Andreas Laupacis et al.³ when outcome assessed in respect to health-related quality of life by WOMAC score at three, six, and twelve months and yearly thereafter it improved postoperatively in both groups. In our study at 1 year follow-up WOMAC score was 91.58 in cemented and 88.66 in uncemented series (p=.13) These results show no significant differences in both group at a short term follow up of 1 year.

A study "Surgical approach and patient-reported outcomes after total hip replacement" done by Alison J. Smith, Vikki Wylde, et al.¹³ between April 2004 and April 2006, evaluated 1,401 patients who had a primary THR done 3 year earlier the study. At the time of the postal survey, 911 patients returned a completed questionnaire. Hip pain and function were assessed using the disease-specific WOMAC osteoarthritis index; in addition mental health status was measured with the SF-12 mental component summary (MCS). In this study SF12 (MCS) score was 49.1 at 3 year follow up. In our study preoperative mean MCS score was 30.6 for cemented and 37.57 for uncemented group which increased to 50.85 and 57.02 respectively at 6 month follow-up. At 1 year mean MCS score for cemented series was 55.24 and for uncemented series it was 53.28 . The MCS scores of our study in both series show constant increase with time.

Conclusion-

Overall result were better in cemented total hip replacement in terms of

- Functional quality of life in short term period
- Early weight bearing
- Less incidence of thigh pain

but these are not statistically significant. This was a short term study so long term conclusions cannot be drawn at this stage. Our study cannot conclude that if cemented or uncemented prosthesis give better short term clinical and functional results than the other one.

Author(s) Contribution-

1. Author 1- Planning and implementation of work, analysis of outcome(s), preparation of main body of manuscript.
2. Author 2- Preparation of main body of manuscript. Proof reading of the manuscript before submission.
3. Author 3- Planning and implementation of work and assessment of the outcome(s).
4. Author 4- Proof reading of manuscript and final formatting before submission.

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