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Original Research Article

SHORT TERM ANALYSIS OF FUNCTIONAL OUTCOME OF UNCEMENTED TOTAL HIP ARTHOPLASTY

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ABSTRACT

Background: Total hip replacement (THR) is highly effective procedure for patients with hip joint deterioration by various conditions, as it relieves pain, improve mobility, attain stability with restoration of limb length and normal mechanics of hip joint, thus improving the standard of life for patient. Total hip replacements are cemented, uncemented & hybrid. The present study was conducted to analyze the short term functional outcomes of uncemented total hip arthroplasty.

Materials and Methods: In this study a total of 35 patients, who underwent uncemented total hip arthroplasty (THA) were enrolled to evaluate short term functional outcomes. The final functional outcomes were assessed as per Modified Harris Hip Score (HHS).

Results: Mean pre-operative and post-operative HHS was 57±13 and 94±7.14 respectively, p value = 0.0001. In this study, pre-operatively maximum patients 32 (91.43%) had Harris Hip Score of <70, while at the at final follow-up 30 (85.71%) patients had HHS of 90-100. Complication rate was 11.43%.

Conclusion: This study provides robust evidence supporting that uncemented total hip arthroplasty provides satisfactory clinical and radiological outcomes after a short duration of follow up.

Keywords: Total hip arthroplasty, Uncemented fixation, Functional outcome, Harris hip score

INTRODUCTION

Anatomical alignment of hip allows mobility in three planes.[1] Any derangement in this alignment is mostly either due to trauma or degenerative conditions like osteoarthritis (OA). OA is major cause of disability in both developed & developing countries. Prevalence of OA increases with age & its consequences significantly affecting the society.[2] Hence it was adopted as major focus by global initiative in the decade of bone & joint disease.[3] Till date the most effective treatment of severely damaged joints is replacement.

Total hip arthroplasty refers to the surgical replacement of both the components of the hip joint, acetabulum and the proximal femur, using synthetic implants to give the patient a new well-functioning, painless, mobile and stable hip. Total hip arthroplasty (THA) is a widely performed surgical procedure aimed at alleviating pain and restoring mobility in patients suffering from advanced hip joint disorders, including osteoarthritis, rheumatoid arthritis, and femoral head necrosis.[4,5] Total hip replacement is considered as one of the most successful orthopaedic interventions of its generation.[6]

Total hip replacements are cemented, uncemented & hybrid. Uncemented THR is commonly indicated in young patients with good bone stock. In recent decades, the development of uncemented prosthetic implants has gained significant attention as an alternative to cemented prostheses, primarily due to their potential for long-term biological fixation, reduced risk of loosening, and ease of revision surgery. Noncemented total hip arthroplasty is a cost-effective procedure,[7] and was developed in response to evidence that poly and cement debris plays an important role in promoting bone lysis and loosening in cemented arthroplasty. This shift has been driven by advancements in implant design, surface coating technologies, and surgical techniques, all of which

contribute to better outcomes and improved patient satisfaction.

However the usage of Uncemented THR in elderly patients is of debate in the recent past. Despite the growing popularity of uncemented THA, questions remain regarding its short-term functional outcomes, complication rates, and recovery timeline, particularly when compared to traditional cemented techniques. The primary mechanism behind uncemented implants relies on bone ingrowth or ongrowth for stability, making early postoperative outcomes critical to assess the effectiveness of the procedure. Cementless femoral stem prosthesis can achieve immediate stability by closely embedding the medullary cavity of the proximal femur, and long-term stability of the prosthesis can be obtained by the host bone growing into the microporous layer on the surface of the prosthesis in the later stage.[8] Evaluation of short-term functional results provides valuable insight into pain relief, range of motion, gait improvement, and overall quality of life during the initial recovery phase. Additionally, such analyses help guide clinical decisions regarding patient selection, rehabilitation protocols, and long-term management strategies.

The purpose of this study was to conduct a short-term analysis of the functional outcomes of patients undergoing uncemented total hip arthroplasty. By focusing on early postoperative results, we aim to determine the efficacy and safety of this technique, identify potential complications, and evaluate its impact on patient-reported outcomes and objective clinical measures. This information will contribute to the growing body of evidence needed to optimize surgical approaches and improve patient care in hip replacement surgery.

MATERIALS AND METHODS

This was a prospective study conducted in Department of Orthopaedics, Alfalah School Of Medical Science And Research Centre from 2020 to 2022.

Inclusion Criteria

- Both male and female patients with >50 years of age.
- Gross reduction of ROM-Harris hip score <50
- Patients willing for surgery

Exclusion Criteria

- Patients with failed total hip arthroplasty.
- Patients with neuropathic joints, neurological defects around hip (paralyzed abductors).
- Presence of active foci of infection in the body.
- Patients unfit for surgery
- Patients not willing for surgery.

In this study a total of 35 patients, who underwent uncemented total hip arthroplasty (THA) were enrolled. All patients were admitted, evaluated and operated using non cemented total hip arthroplasty. Written, informed consent was obtained preoperatively after explaining the procedure, risks, benefits and the rehabilitation.

Procedure: The type of anaesthesia was dependent upon the preference of the anaesthetist. Most of the cases, though were operated under combined spinal epidural anaesthesia. The patient was positioned in the lateral decubitus position and the bony prominences adequately padded. Posterolateral approach was used for removal of implant if any and to perform hip replacement. The short external rotators were tagged and separated from its insertion by keeping it under tension by flexing the knee and rotating it externally. The capsule was excised and the Hip was dislocated posteriorly by flexion, adduction, and gentle internal rotation of the hip. On dislocating, femoral neck osteotomy was made, the femoral head was extracted. If it was not possible to dislocate like in ankylosis of hip, femoral neck osteotomy was done first and head is removed as peacemeal. The osteophytes were removed. Acetabulum was prepared after excising the soft tissues attached to it and serial reaming was done up to the bleeding subchondral bone. Acetabular cup sizes used were one size higher than the reamer used. Screws were used to fix the acetabular cup in the postero-superior quadrant with the centre of the offset placed superiorly or postero-superiorly. The acetabular cup placed was covered with gauze to protect it from any debris. The femur was exposed and delivered out by internal rotation of the limb. The femoral canal was hand reamed to the anticipated stem size and maintaining the ante version. On introducing the femoral stem, the stability was tested to rotational and extraction forces and care was taken not to fracture the proximal femur. The femoral head was reduced; the stability confirmed through a functional range of motion. Wound was closed over a suction drain.

Patients were followed at 2, 6, 12 weeks, and finally at 6 months. At the follow-up of 6 months, the final functional outcomes were assessed as per Modified Harris Hip Score (HHS).[9]

Statistical analysis: Data was compiled and entered into a Microsoft Excel spreadsheet, then exported to SPSS Version 20.0 for analysis (SPSS Inc., Chicago, Illinois, USA). Continuous variables were presented as Mean ± SD, while categorical variables were summarized using frequencies and percentages. Pearson's Chi-square test was used for inferential analysis, with two-sided P values reported; a P value of <0.05 was considered statistically significant.

RESULTS

Mean age of the patients was 63.7 ± 6.73 (range 51-76) years. Maximum 17 (48.57%) patients were of 60-69 years of age. There were 19 (54.29 %) male patients and 16 (45.71 %) were females. In this study, right side was affected in 21 (60 %) patients and left side was affected in 14 (40 %) patients. In this study, the most common indication for THA was AVN in 22 (62.86 %) patients, followed by osteoarthritis in 8 (22.86 %) patients [Table 1].

Table 1: Demographic details of the enrolled population.

Demographic characters	No. of patients	Percentage
Gender		
Male	19	54.29
Female	16	45.71
Age group		
50-59 Years	14	40.00
60-69 Years	17	48.57
≥70 Years	4	11.43
Side		
Right	21	60.00
Left	14	40.00
Indications for THA		
Osteoarthritis	8	22.86
Rheumatoid arthritis	2	5.71
AVN	22	62.86
Others	3	8.57

Mean acetabular cup inclination was 44±7 (range 30-58) Degrees. In this study, acetabular cup inclination was 40-49 degrees in maximum patients 15 (42.86%), followed by 30-39 degrees in 13 (37.14%) patients and 50-60 degrees in 7 (20%) patients [Figure 1].

Mean pre-operative and post-operative HHS was 57±13 (range 34-87) and 94±7.14 (range 66-100) respectively, p value = 0.0001. In this study, pre-operatively maximum patients 32 (91.43%) had Harris Hip Score of <70, while at the at final follow-up 30 (85.71%) patients had HHS of 90-100 [Table 2].

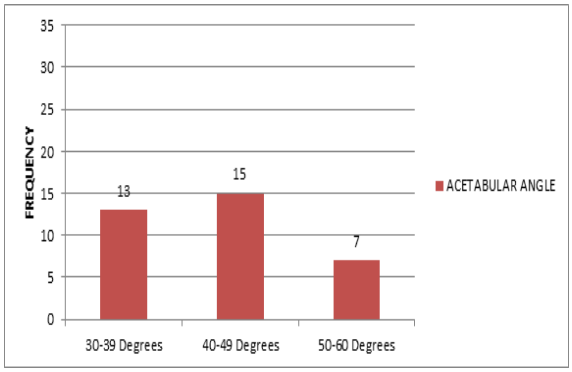

Figure 1: Acetabular Angle

Table 2: Comparison in pre and post-operative Harris Hip Score

Range	Grade	Pre-operative		Post-operative	
		Frequency	Percentage	Frequency	Percentage
90-100	Excellent	0	0	30	85.71
80-89	Good	0	0	4	11.43
70-79	Fair	3	8.57	0	0
<70	Poor	32	91.43	1	2.86
Mean		57±13 (34-87)		94±7.14 (66-100)	
P value		0.0001			

In this study, complication rate was 11.43%. The most common complication was limb length discrepancy in 2 (5.71 %) patients, followed by superficial infection in 1 (2.86%) patients and intra-operative calcar fracture in 1 (5%) patients.

DISCUSSION

Total hip arthroplasty represents about 1.5 million surgeries performed worldwide each year. It is one of the most successful procedure, some concerns remain though. The hip joint and the surrounding can be affected by a disease or a fracture that requires the replacement of this particular ball-and-socket joint, which is done using a total hip replacement (THR). This procedure is one of the most common and successful as it is demonstrated by the increasing number of such surgeries world-wild each year. The THR has advanced considerably. Newer designs have emerged, each staking claim to superiority. The central query is, however, still unanswered, cemented, or uncemented.[10] The choice of cemented fixation for hip arthroplasty in elderly patients is easier to achieve initial stability and reduce the probability of intraoperative fracture, but it is also accompanied by some serious complications related to bone cement.[11] The cementless prosthesis is initially applied to young patients, because the biotype prosthesis takes advantage of bone growing into the pore of the prosthesis, and the hydroxyapatite coating on the prosthesis surface can be more closely combined with the femoral cortex of the patient, so it has a lower prosthesis revision rate.[12] Some researchers have begun to explore whether cementless prostheses can provide the same advantage in elderly patients. This dilemma becomes even more important for elderly people and developing countries like India, where cost-effectiveness is still a top priority. Even in countries that were formerly ardent supporters of cemented fixation, there has been an international shift toward the uncemented THA during the last ten years.[13]

The study included a sample of 35 patients with 35 hips who underwent uncemented total hip arthroplasty (THA). The mean age was 63.7 years, ranging from 51 to 76 years, reflecting a typical

demographic for THA in older adults. Our results are comparable to the study done by Lobodo 2013,[14] where mean age was 64.2 (55-70) years. The gender distribution was nearly balanced, with 54.29% male and 45.71% female patients, ensuring a fair representation of both sexes. The majority of patients (48.57%) were aged between 60-69 years, indicating a higher prevalence of hip pathologies requiring THA in this age group. A right-sided involvement was more common (60%), aligning with patterns observed in degenerative hip conditions and avascular necrosis (AVN). AVN was the most frequent indication for THA (62.86%), followed by osteoarthritis (22.86%) and other conditions. This high prevalence of AVN may be attributed to local epidemiological factors or referral patterns at the study center. The inclusion of various indications highlights the broad applicability of uncemented THA in different hip pathologies.

Radiological and Functional Outcomes: Radiological outcomes were assessed based on acetabular cup inclination, with a mean of 44° (range 30-58°), comparable to the studies done by Kim et al,[15] 2011 and Saxler et al,[16] 2004 where mean acetabular cup inclinations were 43 (35-51) degrees and 45.8 degrees respectively. Optimal positioning (40-49°) was achieved in 42.86% of patients, reflecting a well-controlled surgical technique that is crucial for implant stability and functional success. Suboptimal inclinations outside the ideal range occurred in some patients, which could influence long-term outcomes but were acceptable within the short-term scope.

Researchers commonly use the Harris Hip Score (HHS) to determine a patient's level of function either before or after a hip arthroplasty. Functional outcomes, measured by the Harris Hip Score (HHS), demonstrated significant improvement. The mean preoperative HHS of 57 (range 34-87) improved to 94 (range 66-100) postoperatively, with a highly significant p value of 0.0001. Before surgery, 91.43% of patients had poor scores (<70), whereas at final follow-up, 85.71% had excellent scores (90-100). A significant improvement of 37 was observed in mean HHS. A review of seven papers by Schwarzkopf et al,[17] demonstrated that the mean pre-conversion HHS was 36.9 (range, 13 to 74), and the mean post-conversion HHS was 80.7 (range, 30 to 100). Overall, the functional outcomes of these patients were significantly better after conversion THA, with a mean improvement in HHS of 43.7 (range, 37 to 47.6) ($P < 0.05$). Our results are comparable to the studies done by Akgul T et al,[18] 2019 and Park SH et al. 2024.[19] This substantial enhancement confirms the effectiveness of uncemented THA in pain relief, mobility restoration, and overall quality of life improvements.

Complications: The overall complication rate was 11.43%, reflecting an acceptable risk profile for uncemented THA. Limb length discrepancy (5.71%) was the most frequent issue, emphasizing the importance of precise intraoperative measurement. Superficial infection and intraoperative calcar fractures, each affecting one patient, were managed without significant long-term sequelae. These findings are consistent with other studies, where complication rates for uncemented THA range between 5-15%.[20-22]

Strengths: This study design minimizes recall bias and allows accurate data collection. The use of HHS, a validated functional score, ensures reliable and comparable assessments. Well-defined criteria enhance the study's internal validity by reducing confounding factors.

Limitations: In this study there were some limitations as; the limited number of patients restricts the generalizability of the findings. Larger studies are necessary to confirm these results. Six months is insufficient for evaluating long-term complications such as aseptic loosening or implant failure, which are critical for uncemented THA and conducting the study at a single institution may introduce location-specific biases.

CONCLUSION

This study provides robust evidence supporting that uncemented total hip arthroplasty provides satisfactory clinical and radiological outcomes after a short duration of follow up. Significant improvements in functional outcomes with a low complication rate justify its use, especially in patients with good bone stock. Future research should focus on larger, multicenter trials with long-term follow-up to further validate these findings and refine patient selection criteria.

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