

FUNCTIONAL OUTCOME OF UNCEMENTED TOTAL HIP ARTHROPLASTY IN POST-TRAUMATIC AVASCULAR NECROSIS OF FEMORAL HEAD IN YOUNG PATIENTS

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ABSTRACT

Objective: To determine the frequency of different outcomes of uncemented total hip replacement in young patients with avascular necrosis due to traumatic cause

Materials and Methods: This study was done in Khyber Teaching Hospital Peshawar, Pakistan from March 2022 to January 2024. 96 patients of the younger age group (20-45 years) consisting of both genders with uncemented total hip arthroplasty for AVN femoral head due to traumatic cause, were studied. Age, gender, side of hip affected by AVN, and pre-operative Harris Hip Score were noted. Functional outcomes of uncemented THA were determined in terms of improvement in post-operative Harris hip score was documented at 3 months postoperatively.

Results: A total of 96 patients, 80 (83.33%) men and 16 (16.67%) women underwent uncemented total hip arthroplasty. The age ranged from 20 to 45 years, with a mean of 40 ± 7.02 years. Reasons for osteonecrosis included femoral neck fracture (50%), hip dislocation (36.46%), and acetabular fracture (13.54%). After 3 months of surgery, the Harris hip score improved and was excellent in 86.46% of patients, good in 8.33% of patients, fair in 5.2% of patients and none of the patients had poor scores.

Conclusion: The cementless hip prosthesis for the treatment of post-traumatic avascular necrosis of the femoral head in active and young individuals is a very good option. The results of cementless hip arthroplasties are good and encouraging in terms of functional outcome postoperatively.

Keyword: Harris Hip Score; Uncemented Total Hip Arthroplasty; Avascular Necrosis Hip

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INTRODUCTION

Avascular necrosis (AVN) of the femoral head is a prevalent cause of discomfort in the hip joint.^{1,2} The incidence of AVN of the femoral head is growing, with around 15,000 to 30,000 new cases annually reported United States, but no similar statistics are known in Pakistan.³ Men are more likely than women to develop the condition. Avascular necrosis is a disorder of bone due to disruption of blood supply.

When avascular necrosis affects the bones of a

joint, it frequently results in the deterioration of the joint articular surface, which is followed by subsequent osteoarthritic alterations in the hip.⁴

The pathophysiology of AVN begins with a disruption of blood to the femoral head, resulting in the collapse of the femoral head and hip joint degeneration. Microscopic changes include the death of osteocytes, adipocytes, and hematopoietic cells after a varied duration of ischemia of the head of the femur, which is responded to by healing and remodeling.⁵

The nearby viable bone tissue having a normal blood supply initiates resorption of the dead bony tissue, resulting in subchondral bone weakness and the development of osteoarthritis.⁶ Avascular necrosis can be traumatic or atraumatic in nature. Following trauma, microthrombi, and fat emboli develop, and intraosseous extravascular pressure increases which can cause vascular blockage to the femoral and hence deficient blood supply.⁷ Nontrau-

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matic causes of femoral head osteonecrosis are genetic susceptibility and a variety of other risk factors, such as corticosteroid use, alcohol misuse, hemoglobinopathy, Gaucher's disease, and coagulopathies.⁸

When the illness has progressed to Ficat and Arlet stages III and IV, total hip arthroplasty is the only viable therapy for AVN hip.⁹⁻¹¹ According to previous research, total hip arthroplasty (THA) in young patients appears to be having inferior outcomes than in senior subjects. Another source of concern is revision surgery owing to non-infective loosening of arthroplasty components caused by wear particles generated by different early generations of bearing materials which were unable to support the physical demands of younger people.¹² Furthermore, THA is frequently technically hard in post-traumatic patients because of prior procedures, muscle loss, scarring, and retained implants. As a result, orthopedic surgeons are hesitant to provide THA to extremely young patients. Nonetheless, as a result of new implant designs bearing modern technology and innovations in surgical procedures, implant survival has risen, and THA results in younger patients have improved.¹³⁻¹⁶

Despite the recent positive results on THA survival in the younger population, still, a paucity of data exists on postoperative outcomes of uncemented THA in young patients with AVN hip due to traumatic cause. This study intended to examine the quality of life in young adults by analyzing functional outcomes at short-term follow-up following uncemented THA for post-traumatic AVN hip in our population.

MATERIALS AND METHODS

From March 2022 to January 2024, this prospective study was conducted in Khyber Teaching Hospital Peshawar in Pakistan. The research comprised patients aged 20 to 45 years of both genders who had total hip arthroplasty for post-traumatic hip avascular necrosis. Patients who had hip arthroplasty for hip AVN owing to any other cause, such as steroid or alcohol use, sickle cell disease, autoimmune illness, hypercoagulopathies, hyperlipidemia, Gaucher's disease, and so on, were excluded from the research.

The sample size was 96, calculated through the Raosoft sample size calculator taking the poor outcome of uncemented total hip replacements in post-traumatic avascular necrosis hip to be 4.16% using previous data.¹⁷ The study 96 patients who had undergone uncemented hip replacements performed during this period and met

the inclusion/exclusion criteria.

In all patients, cementless THA was done unilaterally. The reasons for arthroplasty were extreme discomfort and loss of functional hip joint. In all cases, plain radiography was utilized to make the diagnosis; in patients with a broken acetabulum, computed tomography scans were required. The study's subjects were all hospitalized in the orthopedic ward.

After discussing the operating technique, its complications, and the study's goal for the patients, written consent was acquired for both surgery and enrollment in the study. Age, gender, AVN hip side, type of trauma (dislocation, neck of femur fracture, acetabular fracture), disease duration, and functional outcome in terms of Harris Hip Score (pre-operative and post-operative) were all recorded. Harris's hip score total is 100 points. Scores of 90-100 were considered excellent, scores of 80-89 were considered good, scores of 70-79 were considered fair, and scores of less than 70 were considered poor functional outcomes.

Hip arthroplasty was performed using a modified Hardinge lateral approach. Before the skin incision, 1 gm of intravenous ceftriaxone was administered. In all cases, spinal anesthesia was employed. The uncemented total hip arthroplasty was performed following standard procedure. On the second day of surgery, each patient was mobilized using a walker. On the second postoperative day, standard physiotherapy was initiated.

On the third postoperative day, patients were discharged if no active complaints. Intravenous antibiotics were taken for 7 days before switching to oral antibiotics for the remaining 7 days. Stitches were removed on the 14th postoperative day. Follow-up was done at monthly intervals till 3rd postoperative month. In 3rd postoperative month, the Harris hip score will be determined again for each participant. All the data obtained were recorded and analyzed by SPSS-23.

RESULTS

There were 80 (83.33%) males and 16 (16.67%) females among the 96 patients who received uncemented total hip arthroplasty. Age ranged from 20 to 45 years, with a mean age of 40 years (SD 7.02). The majority of the patients (60%) had right hip joint involvement, whereas only 40% had left hip joint involvement. The neck of femur fracture (50%), hip dislocation (36.46%), and acetabular fracture (13.54%) were reasons for hip AVN.

Harris Hip Score varied from 30 to 60 before surgery, with a mean of 40, and from 70 to 95 after surgery,

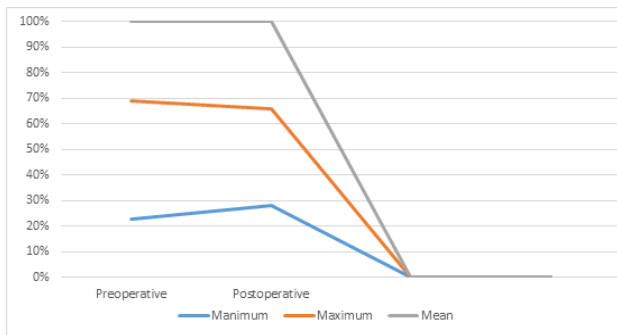


Fig 1: Harris Hip Score

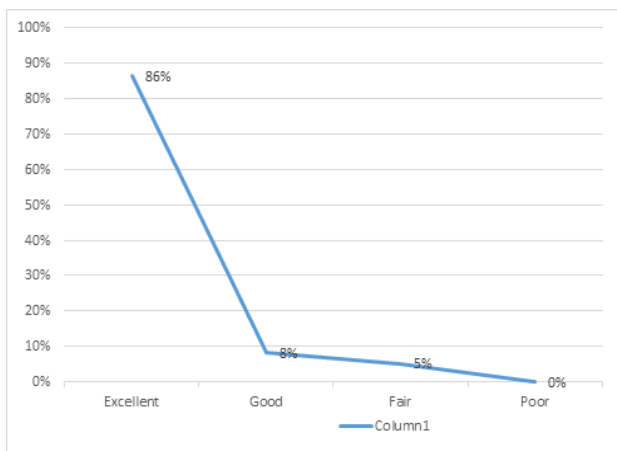


Fig 2: Postoperative Harris Hip Score Categorization

with a mean of 85 (Fig. 1). After 3 months of surgery, the Harris hip score improved and was excellent in 86.46% patients, good in 8.33% patients, fair in 5.2% patient and none of the patients had poor score. (Fig 2).

DISCUSSION

AVN of the femoral head is a disease that frequently culminates in femoral head collapse and secondary hip osteoarthritis. Many researchers have observed that preventative surgeries such as intertrochanteric osteotomy, core decompression, and superficial arthroplasty have poor long-term results.¹⁸⁻²¹

The major objective in young patients is to retain normal bone stock; however, THR is required when pain and loss of function are severe. THR in patients with high demands and a busy lifestyle poses the risk of early loosening and recurrent revisions. To address these issues, more robust bearing materials have been created.²² For young active patients, large-diameter metal-on-metal resurfacing arthroplasty has been proposed as a bone-sav-

ing technique.

With more than ten years of data, there is still insufficient information to conclude if contemporary metal-on-metal resurfacing outperforms ordinary cementless THA. The presence of significant metal ion concentrations following the implantation of large-diameter metal-on-metal articulations raises severe concerns about their usage in child-bearing women. There have also been reports of symptomatic and asymptomatic pseudotumors.^{23,24.}

Cementless fixation of prosthesis in THA retains the benefits of durability and ease of revision. Even with developments in cementing procedures, the early outcomes of cementless THA outperform those of cemented THA.

Salvati and Cornell²⁵ found a 37% failure rate following THA with cement in patients with AVN following the patients for an average time of 8 years. Stauer²⁶ in a similar study, discovered that the loosening rate of the femoral component was 50% after following the patients for a mean period of 10 years.

On the other hand, Lins et al.²⁷ followed the patients, who had undergone cementless THA for AVN hip, for a mean period of 60 months and found that 81% of femoral components and 97% of acetabular components remained stable. In the same investigation, two cases of deep infection were reported: one in the early postoperative phase and one in the late postoperative time. Even though 35% of the cases developed heterotopic ossification, none of them progressed to higher stages (stages 3 or 4). Piston et al.²⁸ found that 6% study needed revision THA after 7.5 years of follow-up of uncemented THA.

A study by Celebi et al.²⁹ shows that infection was present in one (3%) case while heterotopic ossifications were found in two (6%) cases after uncemented total hip replacement. The findings of the aforementioned trials indicate that cementless THA appears to be superior to THA with cement in AVN hip due to traumatic cause. In our study, uncemented THA was performed in all patients, with good results up to 3 months of follow-up. No intra-operative complications and no postoperative dislocations or infections were reported in this study.

In our study, Harris's Hip Score varied from 30 to 60 before surgery, with a mean of 40, and improved to 70-95 after surgery, with a mean of 85. At 3 months of follow-up, the Harris hip score was excellent in 86.46% of

patients, good in 8.33% of patients, and fair in 5.2% of patients. The results of our study are nearly comparable with a study by El-Etewy SS et al⁶ where the mean Harris hip score improved from 40 (preoperatively) to 80 (post-operatively). Six patients (25%) had an excellent score, 14 (58%) had a good score 3 (12.5%) had a fair score, and one patient had 1 (4.17%) poor score.

CONCLUSION

The cementless hip prosthesis for the treatment of post-traumatic avascular necrosis of the femoral head in active and young individuals is a very good option. The results of cementless hip arthroplasties are good and encouraging in terms of functional outcome postoperatively.

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Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
K Farmanullah	✓	✓	✓	✗	✓	✗
Zeb A	✓	✓	✗	✓	✓	✗
Tahir M,	✗	✓	✗	✓	✗	✓
Khan MW	✓	✗	✓	✓	✗	✗
Hakeem A	✓	✓	✗	✓	✗	✗
Hakim Y	✗	✓	✗	✓	✓	✗

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This Manuscript was approved by the Ethical Review Board of Khyber Medical College, Peshawar. Vide No. 112/DME/KMC.

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