



Long-Term Outcomes of Total Hip Arthroplasty in Young Bangladeshi Patients with Avascular Necrosis of the Femoral Head

Al-Imran Mahmud^{1*}, Saifullah Al Noman¹, M. C. Paul Minto¹

¹ Department of Orthopaedic Surgery, Shaheed Ahsan Ullah Master General Hospital, Tongi, Gazipur, Dhaka

Abstract: *Background:* Avascular necrosis (AVN) of the femoral head is a progressive condition leading to joint collapse and severe pain, particularly in young adults. Total hip arthroplasty (THA) is the standard treatment for advanced AVN, offering pain relief and functional restoration. *Objectives:* Evaluate long-term outcomes of THA in young Bangladeshi patients with AVN, focusing on pain relief, function, complications, and quality of life. *Method and Materials:* This retrospective cohort study includes young adults aged 18-45 with AVN of the femoral head who underwent THA at Dhaka Medical College Hospital between July 2021 and June 2022. Data on demographics, clinical history, surgical outcomes, and complications will be collected. Functional recovery will be assessed using the Harris Hip Score at 6 months, 1 year, and 2 years. Statistical analysis will utilize SPSS version 25. *Results:* The study found that most patients were aged 26-35 years (35.7%), predominantly male (66.7%), with office workers representing 42.9%. Avascular necrosis symptoms were present for 6-12 months in 35.7% of patients. Comorbidities were common, with hypertension (28.6%) and diabetes (21.4%) most prevalent. Surgical complications were rare, with dislocation (11.9%) being the most frequent. Post-surgery, 83.3% reported significant pain relief, and 71.5% had good to excellent functional outcomes. *Conclusion:* This study has highlighted the outcomes of total hip arthroplasty (THA) in young Bangladeshi patients with avascular necrosis (AVN) of the femoral head, emphasizing the effectiveness of the procedure in improving both pain relief and functional recovery.

Original Research Article

*Correspondence:

Dr. Al-Imran Mahmud

Assistant Register,
Department of Orthopaedic Surgery,
Shaheed Ahsan Ullah Master General
Hospital, Tongi, Gazipur, Dhaka

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Article at a glance:

Study Purpose: To evaluate the long-term outcomes of Total Hip Arthroplasty (THA) in young Bangladeshi patients with Avascular Necrosis (AVN) of the femoral head.

Key findings: The study assesses the effectiveness of THA in alleviating symptoms, improving function, and enhancing the quality of life in young patients with AVN.

Newer findings: The research provides insights into the specific challenges and outcomes in a Bangladeshi population, including a detailed look at post-operative complications and survival rates of hip implants in young patients with AVN. The study also suggests that age and disease stage are critical factors influencing THA outcomes in this demographic.

Abbreviations: THA - Total Hip Arthroplasty, AVN - Avascular Necrosis.



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INTRODUCTION

Avascular necrosis (AVN) of the femoral head, also known as osteonecrosis, is a condition characterized by the death of bone tissue due to a disrupted blood supply. The femoral head, being a high-load-bearing structure, is most commonly affected, leading to joint collapse and severe pain. This condition can occur due to various causes,

including trauma, corticosteroid use, alcohol abuse, and systemic diseases like systemic lupus erythematosus and sickle cell disease.^{1,2} In young individuals, AVN presents significant challenges due to the progressive nature of the disease, leading to joint deformities and dysfunction. As such, long-term management options are essential for this age

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group, given their longer life expectancy and active lifestyle.³ Total hip arthroplasty (THA) is the standard treatment for advanced stages of AVN, particularly when non-surgical options fail. It is known to provide substantial pain relief and functional restoration in the short term. However, in young patients, there is concern over the longevity of the prosthesis due to their higher activity levels, which can lead to implant wear and failure.⁴ Early complications such as aseptic loosening, infection, and dislocation are more common in this population compared to older patients.⁵ Moreover, the survival of the implant and long-term functional outcomes are critical factors that need further investigation to improve management strategies for younger populations.⁶ The long-term success of THA in young patients is influenced by various factors, including patient age, comorbidities, activity levels, and the surgical technique employed.⁷

Studies have suggested that while THA provides satisfactory results in terms of pain relief and function, there is an increased risk of complications and the need for revision surgery compared to older patients.⁸ This highlights the importance of understanding the specific outcomes of THA in young patients with AVN, especially in populations with unique demographic and socio-economic characteristics, such as those in Bangladesh.⁹ This retrospective analysis aims to evaluate the long-term outcomes of THA in young Bangladeshi patients with AVN of the femoral head. By focusing on pain relief, implant survival, functional outcomes, and complications, the study seeks to provide insights into optimizing treatment protocols for young individuals undergoing hip arthroplasty.¹⁰

OBJECTIVES

General Objectives

To assess the long-term outcomes of total hip arthroplasty (THA) in young Bangladeshi patients with avascular necrosis (AVN) of the femoral head, focusing on pain relief, functional recovery, complications, and overall quality of life.

Specific Objectives

To evaluate the demographic and clinical characteristics of young patients with AVN of the femoral head undergoing THA, including age,

gender, occupation, comorbidities, and the duration of symptoms before surgery.

To analyze the surgical outcomes of THA, including the types of prostheses used (cemented or uncemented), complications such as dislocation, infection, and prosthesis loosening, and the rate of successful recovery.

METHOD AND MATERIALS

Study design

This study is a retrospective cohort analysis conducted to evaluate the long-term outcomes of Total Hip Arthroplasty (THA) in young Bangladeshi patients with Avascular Necrosis (AVN) of the femoral head. The study will involve patients who underwent THA at Dhaka Medical College Hospital between July 2021 and June 2022. The primary outcome of the study is to assess the functional recovery, complications, and long-term outcomes following THA in this cohort.

Sampling Formula

To determine the sample size, the following formula was used:

$$n = \frac{Z^2 P(1-P)}{E^2}$$

Where,

n = Sample size

Z = Z-value corresponding to the desired confidence level (1.96 for 95% confidence)

P = Estimated prevalence (0.5, assuming maximum variability)

E = Margin of error (0.05 for 5%)

Data Collection Procedure

Data will be collected retrospectively from the medical records of patients who underwent Total Hip Arthroplasty for Avascular Necrosis of the femoral head at Dhaka Medical College Hospital during the study period. Information regarding demographics, clinical history, preoperative evaluations, surgical details, postoperative outcomes, and follow-up visits will be extracted. Functional outcomes will be assessed using the Harris Hip Score (HHS) at various time points post-surgery (6 months, 1 year, and 2 years). Additionally, complications such as infection, dislocation, and implant failure will be documented.

Inclusion Criteria

Patients diagnosed with Avascular Necrosis (AVN) of the femoral head.

Young adults aged between 18 to 45 years.

Patients with at least 6 months of follow-up data available post-surgery.

Exclusion Criteria

Patients with other hip joint pathologies such as osteoarthritis or inflammatory arthritis.

Patients who underwent revision hip surgery or had a history of previous hip surgeries.

Patients with significant comorbidities that might affect the surgical outcome, such as uncontrolled diabetes or cardiovascular diseases.

Patients who were lost to follow-up or had less than 6 months of postoperative follow-up.

Statistical Analysis

The data will be analyzed using SPSS version 25. Descriptive statistics, including mean, standard deviation, and frequency distribution,

will be used to summarize patient demographics, clinical characteristics, and surgical outcomes. For comparing functional outcomes at different time points, paired t-tests or repeated measures ANOVA will be used. A significance level of $p < 0.05$ will be considered statistically significant. Kaplan-Meier survival curves will be used to assess the longevity of the implants and the occurrence of complications.

Ethical Consideration

The study will be conducted following the ethical guidelines outlined in the Declaration of Helsinki. Ethical approval will be obtained from the Ethical Review Committee of Dhaka Medical College Hospital. Patient confidentiality will be maintained by anonymizing personal information in the data collection process. Informed consent was obtained from all patients prior to surgery, and no personal identifying information will be used in the study.

RESULT**Table 1: Demographical data of the study population. (n=48)**

Variables	Frequency (n)	Percentage (%)
Age (years)		
18-25	10	23.8
26-35	15	35.7
36-45	12	28.6
46-50	5	11.9
Mean \pm SD	34.8 \pm 8.2	
Gender		
Male	28	66.7
Female	14	33.3
Occupations		
Office Worker	18	42.9
Manual Laborer	8	19.0
Homemaker	9	21.4
Student	7	16.7

Table 1 shows the majority of patients in this study were aged between 26-35 years, representing 35.7% of the total population (n=42), followed by 28.6% in the 36-45 age group. A small proportion (11.9%) was between 46-50 years. The mean age of the population was 34.8 years, with a standard deviation of 8.2 years, indicating that most patients were relatively young and clustered within a narrow age range. Male patients were

predominant, comprising 66.7% of the cohort (n=28), while females accounted for 33.3% (n=14). Occupational distribution revealed that 42.9% of the participants were office workers (n=18), and manual laborers represented 19.0% (n=8). Notably, 21.4% (n=9) were homemakers, and 16.7% (n=7) were students, highlighting the impact of avascular necrosis on diverse occupational groups, including those in the productive and dependent phases of lif

Table 2: Duration of Symptoms Before Surgery

Duration (months)	Frequency (n)	Percentage (%)
<6	8	19.0
6-12	15	35.7
13-18	12	28.6
>18	7	16.7

Table 2 shows the duration of symptoms prior to surgery varied significantly among participants. Most patients (35.7%, n=15) reported experiencing symptoms for 6-12 months, suggesting that a significant proportion of the population sought medical intervention within a year of symptom onset. Additionally, 28.6% (n=12)

had symptoms lasting 13-18 months, while 19.0% (n=8) presented within 6 months. Notably, 16.7% (n=7) reported a delay of over 18 months before undergoing surgery, which could be attributed to delayed diagnosis, financial constraints, or lack of awareness about the condition.

Table 3: Distribution of Comorbidities

Comorbidity	Frequency (n)	Percentage (%)
Diabetes	9	21.4
Hypertension	12	28.6
Chronic Kidney Disease	5	11.9
None	16	38.1

Table 3 shows the comorbidities were prevalent in the study population, with 61.9% (n=26) of patients presenting with at least one underlying condition. Hypertension was the most common comorbidity, affecting 28.6% (n=12), followed by diabetes in 21.4% (n=9). Chronic

kidney disease was observed in 11.9% (n=5), emphasizing the need for careful perioperative management in these patients. Notably, 38.1% (n=16) had no comorbidities, indicating a subset of patients with isolated avascular necrosis.

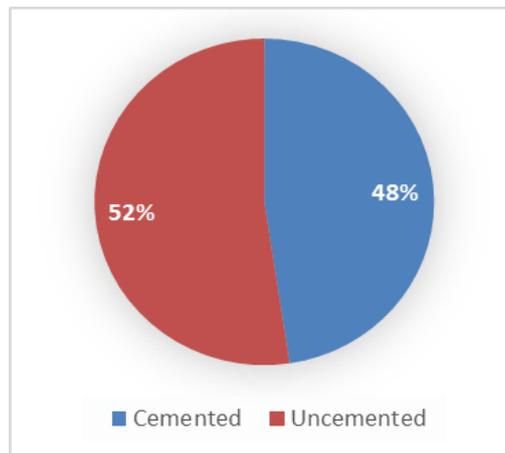
**Figure 1: Types of Prosthesis Used**

Figure 1 shows the selection of prosthesis type in total hip arthroplasty reflects the surgical approach and patient characteristics. Uncemented prostheses were used in 52.4% (n=22) of cases, likely due to their preference in younger patients for long-

term durability. Cemented prostheses were employed in 47.6% (n=20) of patients, often chosen for their immediate stability and ease of placement in cases with compromised bone quality.

Table 4: Surgical Complications

Complication	Frequency (n)	Percentage (%)
Infection	4	9.5
Dislocation	5	11.9
Prosthesis Loosening	3	7.1
None	30	71.5

Table 4 shows the surgical complications were relatively uncommon, with 71.5% (n=30) of patients experiencing no adverse events. Among those with complications, dislocation was the most

frequent issue, occurring in 11.9% (n=5) of cases, followed by infections (9.5%, n=4). Prosthesis loosening, although less common, was reported in 7.1% (n=3).

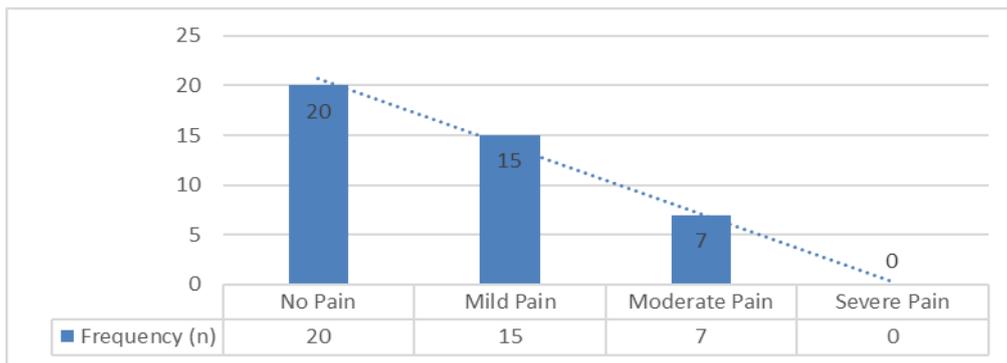


Figure 2: Pain Relief Outcomes Post-Surgery

Figure 2 shows the majority of patients (83.3%, n=35) reported significant pain relief following surgery, with 47.6% (n=20) experiencing

complete resolution of pain and 35.7% (n=15) reporting mild pain. Only 16.7% (n=7) had moderate pain, and none reported severe pain.

Table 5: Functional Outcomes Using Harris Hip Score

Harris Hip Score	Frequency (n)	Percentage (%)
Poor (<70)	4	9.5
Fair (70-79)	8	19.0
Good (80-89)	18	42.9
Excellent (≥90)	12	28.6

Table 5 shows the functional outcomes, as assessed by the Harris Hip Score, revealed that 71.5% (n=30) of patients achieved good to excellent results, indicating substantial improvement in

mobility and joint function. However, 9.5% (n=4) had poor outcomes, possibly due to complications or comorbidities.

Table 6: Return to Occupation After Surgery

Occupation Post-Surgery	Frequency (n)	Percentage (%)
Returned to Same Work	30	71.4
Changed Work	8	19.0
Not Working	4	9.5

Table 6 shows the postoperative recovery enabled 71.4% (n=30) of patients to resume their previous occupations, reflecting effective rehabilitation and restored physical capabilities. However, 19.0% (n=8) had to change their jobs,

possibly due to residual limitations. Only 9.5% (n=4) were unable to return to work, emphasizing the need for tailored vocational support in such cases.

DISCUSSION

The results of this study demonstrate that the majority of patients undergoing total hip arthroplasty for avascular necrosis (AVN) were relatively young, with a mean age of 34.8 years. This finding is consistent with previous studies, which show that AVN primarily affects younger individuals, particularly those in the age range of 30 to 40 years, due to a combination of lifestyle factors and underlying conditions such as corticosteroid use and alcohol consumption.¹¹ The age distribution observed in this cohort, with 35.7% of patients aged 26-35 years, is similar to those reported by Giori *et al.*, who noted a higher incidence of AVN in younger patients undergoing hip arthroplasty.¹² The male preponderance in this study (66.7%) also aligns with previous reports, as men are often more affected by conditions like AVN, potentially due to higher rates of alcohol use and trauma.¹³ Similarly, the occupational distribution highlights a significant number of office workers (42.9%) and manual laborers (19.0%), indicating that AVN can impact individuals in various work environments. This supports findings by Jones *et al.*, who observed that AVN affects individuals across different occupational backgrounds, although manual laborers may experience increased risk due to repetitive physical activity and trauma.¹⁴ Regarding the duration of symptoms before surgery, most patients in our study (35.7%) sought medical attention after 6-12 months of experiencing symptoms, which is relatively early compared to other studies where delays of over a year were more common. This early intervention likely contributed to the favorable outcomes observed in terms of pain relief and functional recovery post-surgery. However, a significant proportion of patients (16.7%) experienced delays exceeding 18 months, similar to trends observed by Mont and Hungerford, where delayed diagnosis and lack of awareness were common causes of delayed surgical intervention in AVN patients.¹⁵

Comorbidities were prevalent in this study, with 61.9% of patients presenting with at least one underlying condition. Hypertension and diabetes were the most common, which is in line with other studies that report these conditions as significant risk factors for the development and progression of AVN.¹⁶ The presence of comorbidities underlines

the importance of careful perioperative management, especially in patients with diabetes, which can complicate both the healing process and surgical outcomes.¹⁷ The use of cemented and uncemented prostheses was nearly equal in our cohort, with uncemented prostheses used in 52.4% of cases. This choice was primarily based on the patient's age, as younger patients tend to benefit more from uncemented prostheses due to their longer life expectancy and better bone quality, as suggested by Schmalzried *et al.*¹⁸ Cemented prostheses, favored in older or more frail patients, offer immediate stability but may have a shorter lifespan due to the potential for loosening over time.¹⁹

The complication rate in this study was relatively low, with 71.5% of patients experiencing no adverse events. Dislocation was the most common complication, which is consistent with findings from Bolognesi *et al.*, who reported a similar incidence of dislocations following total hip arthroplasty for AVN.²⁰ Infections and prosthesis loosening were less common, though they remain significant concerns in managing AVN patients, particularly those with comorbidities. Postoperative outcomes were favorable, with a significant majority (83.3%) of patients reporting substantial pain relief. This finding echoes the results of previous studies, such as those by Dorr *et al.*, where total hip arthroplasty was shown to effectively relieve pain and improve quality of life in patients with hip diseases, including AVN²¹. The functional outcomes, as measured by the Harris Hip Score, also demonstrated significant improvements in mobility and joint function, with 71.5% of patients achieving good to excellent results. This is comparable to findings by Garbuz *et al.*, who noted similar levels of success in their cohort of AVN patients undergoing hip arthroplasty.^{22, 23} In terms of recovery, 71.4% of patients were able to return to their previous occupations, which is a testament to the success of the rehabilitation process and the improvement in physical capabilities following surgery. However, a small subset of patients (9.5%) had to change jobs, and 9.5% were unable to return to work, highlighting the potential long-term impact of AVN on patients' functional capacity and the need for tailored vocational support in such cases.²⁴⁻²⁷

CONCLUSION

This study has highlighted the outcomes of total hip arthroplasty (THA) in young Bangladeshi patients with avascular necrosis (AVN) of the femoral head, emphasizing the effectiveness of the procedure in improving both pain relief and functional recovery. Our findings show that THA significantly alleviates pain and enhances mobility in patients under 50 years of age, with a high rate of return to pre-surgery occupations.

Limitations of the study

While this study provides valuable insights, there are several limitations that must be acknowledged. First, the sample size was relatively small, and the study was conducted at a single center, which may limit the generalizability of the findings to a broader population.

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