

## Outcome of Total Hip Replacement Surgery Ankylosed Hip in Young Patient: Tertiary Level Hospital in Rajshahi

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### Original Research Article

### Abstract:

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**Background:** Total Hip replacement is the standard therapy for hip ankylosis, which produces reduced hip mobility. This research aimed to use the Harris Hip Score (HHS) to analyze clinical findings and results of treatments for hip ankylosis. **Methods:** A multicentered-based, non-randomized quasiexperimental prospective study was performed in Rajshahi Medical College Hospital, Dhaka Medical College Hospital, Rajshahi, from January 2018 to December 2022. A total number of patients (N=77) with ankylosis in one or both hip joints, Electromyogram, and nerve conduction studies were taken from the hip abductor muscles before surgery, and HHS was calculated. Type of surgery and prosthesis, osteotomy required for the neck and trochanteric region of the femur, periprosthetic fracture, and the need to restore the acetabulum were studied in the patients. Postoperative complications such as infection and dislocation at 3, 6, and 12 months after surgery were examined, and then the HHS was calculated. **Results:** At the end of 04 years after surgery, the functional results were analyzed by SPSS 23.0. Seventy-seven patients (42 m/35 f) with a mean age of 36.71±11.78 years underwent total hip arthroplasty. Hip joint ankylosis was most commonly brought on by osteoarthritis of old age (20 cases) and avascular necrosis (13 cases). Twelve individuals had high conduction on electromyograms, while 65 patients had low conduction on nerve conduction examinations. We used the posterior approach in 55 patients (71.4%) and the lateral approach in 22 patients (28.6%). The periprosthetic fracture occurred in two patients, and 12 patients needed acetabular reconstruction. The standard prosthesis was used in 83.1% of patients. Nine patients were excluded after six months, and two patients were excluded after 12 months due to surgery complications. At the early stage, patients' HHS averaged 48.53±6.28; after 12 months, it had improved to 88.22±3.78 (P<0.001). **Conclusions:** Patients with ankylosed hips may benefit from total hip replacement, particularly in long-term follow-up. The absence of pre-and postoperative complications is necessary for evaluating successful outcomes.

**Key Words:** Hip ankylosis, Total hip arthroplasty, Hip range of motion.

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## INTRODUCTION

Total hip replacement surgery is a common treatment option that can improve joint function and quality of life for patients with an ankylosed hip. However, this surgery may be more challenging to perform in young patients due to a higher risk of implant failure and revision surgeries. Hip ankylosis definition includes restrictions on the movement of hip flexion, extension, and rotation less than 10 degrees, and they may be achieved spontaneously or after surgery. Ankylosis of the hip joint is usually painless, and the joint is stable, but in the long term, degeneration changes and pain will occur in the lower back of the hip and knee, especially when the hip joint has poor functional status. Total hip arthroplasty (THA) is recommended to halt the degenerative process in adjacent joints (knees and spine) [1].

Hip arthrodesis was frequently used for the treatment of septic arthritis and severe osteoarthritis in young patients about 30 years ago. Provided surgery was a success, higher performance was achieved for a prolonged period, and lower back pain or other joint complaints were delayed for about 20 years [2]. Nowadays, the preferred treatment for an ankylosed hip is THA. It is very effective in cases with one joint involved and severe degenerative change in the ipsilateral knee joint [3]. Affected items to consider in the outcome of total hip arthroplasty include primary joint disease, previous bone and soft tissue surgery, atrophy of the muscles around the joint and surgical techniques [4]. To assess the clinical and radiological results of total hip replacement for the management of hip joint ankylosis, this research was conducted. Treatment efficacy was evaluated using HHS.

**Objective:**

This study aims to evaluate the outcomes of total hip replacement surgery in young patients with ankylosed hip, including implant survivorship, functional improvement, and complications.

**Inclusion Criteria:**

The study will include patients who meet the following criteria:

- Age <50 years
- Diagnosis of ankylosed hip based on clinical and radiological evaluation
- Underwent total hip replacement surgery
- Minimum follow-up of 2 years after surgery
- Complete medical records and imaging available for review

**Exclusion Criteria:**

The study will exclude patients who meet the following criteria:

- Age  $\geq$ 50 years
- Diagnosis of hip arthritis or other hip conditions other than ankylosed hip
- Previous hip surgery or revision surgery
- Incomplete medical records or imaging
- Lost to follow-up before the minimum follow-up period of 2 years

## MATERIALS AND METHODS

A total of Seventy-seven patient were included in this prospective study. Patients with a diagnosis of ankylosing or fusion of the hip were identified using a convenience sample. Electromyogram (EMG) and nerve conduction velocity (NCV) testing was performed to evaluate the gluteal muscles of the patients. Also, radiography was done to assess the femur's greater trochanter, and then the joint's range of motion and HHS were calculated. Since quality of life and hip function after surgery are issues considered to be important to the patients and their family, the HHS was used to measure outcomes after hip replacement surgery. In the HHS, questions are classified into four groups: group I - pain; group II - daily activity; group III - joint mobility; group IV - clinical examination. Patient scores were calculated for each section and then they were judged based on the following categories: excellent (90-100); good (80-89); average (70-79) and poor (less than 70) [5].

Immediate post-anesthesia recovery allowed for additional testing for a more precise description. The color and quality of abductor muscle contraction were assessed during surgery. Type of surgery and prosthesis, osteotomy required for the neck and trochanteric region of the femur, periprosthetic fracture and the need to restore acetabular were also studied.

The patients were monitored after surgery for early postoperative complications (such as fat embolism and hemoglobin decreasing). Other complications such as infection, dislocation, limited range of motion, heterotopic ossification (HO), and shortening were assessed every week up to two months after surgery. The HHS and range of motion were studied in the third, sixth, and twelfth months. The Microsoft excel with SPSS (version 23.0) was used to conduct the statistical analysis. The data are presented as proportion, mean and standard deviation. We used Chi-square, Fisher's exact test and repeated measures for quantitative and qualitative variables. A value of  $P < 0.05$  was considered as significant.

## RESULTS

Total hip arthroplasty was performed on Seventy-seven patients patients (42 men, 35 women) with a mean age of  $36.71 \pm 11.78$  78 years, and they were observed for 12 months. Most causes of hip joint ankylosis in patients were elderly osteoarthritis (20 cases) and avascular necrosis (13 cases). Electromyogram and nerve conduction studies showed high and low-velocity conduction in 12 and 65 patients, respectively. We used the posterior approach in 55 patients (71.4%) and the lateral approach in 22 patients (28.6%). The periprosthetic fracture occurred in two patients, and 12 patients needed acetabular reconstruction. Three types of the constrained prosthesis were used in this study. The standard prosthesis was used in 64 cases (83.1%), so it was the most common type of prosthesis. Long Stem and modular prostheses were used in 10 and 3 cases, respectively (Table 1; Figure 1).



**Figure1: (A) Preoperative anteroposterior (AP) (B) Postoperative X-ray, 3-month follow-up. radiograph showing ankylosed hip on the left side.**

Short-term and long-term complications were studied after surgery. No short-term complications such as fat embolism and hemoglobin decreasing were observed in our patients. Evaluation of long-term complications after surgery showed that 09 patients (11.69%) had complications. Displacement of prosthesis (2 cases; 2.7%) and infection (4 cases; 5.2%), Osteolysis, Prosthesis failure, and Pre-prosthetic fracture (3 cases; 3.9%) were prevalent long-term complications in the patients.

Three patients due to periprosthetic fractures were excluded six months after surgery. Also, two patients with osteolysis and one patient with device failure were excluded from the study. We used the HHS and ROM of hip joint measurement to evaluate surgical outcomes. These values that were acquired at 3, 6 and 12 months after surgery were compared with the preoperative values. The range of motion of the hip joint was evaluated in different directions before and after surgery. The mean of the HHS of patients before surgery was  $48.53 \pm 6.28$  and it progressed to  $88.22 \pm 3.78$  after 12 months ( $P < 0.001$ ) (Table 2).

**Table 1: Individual patient and surgical characteristics**

Variable	Data
Age (Mean ± SD)	36.71 ± 11.78
	Man
	42(54.50)
Sex (n=77) (%)	
	woman
	35(45.50)
	Left
	42(54.50)
Hip joint (n=77) (%)	
	Right
	31(40.25)
	Both
	4(5.25)
	Senile Osteoarthritis
	20(26.0)
	Avascular Necrosis
	13(16.9)
	Post-traumatic Osteoarthritis
	14(18.20)
	Dysplasia of Hip
	8(10.40)
Underlying Disease (n=77) (%)	
	Ankylosing spondylitis
	2(2.60)
	Infection
	6(7.80)
	Rheumatoid arthritis
	6(7.80)
	Post-traumatic device failure
	8(10.40)
	Positive
	12(15.60)
History of Knee Injury (n=77) (%)	
	Negative
	65(84.40)
	Positive
	0(0.0)
History of Spine Injury (n=77) (%)	
	Negative
	77(100)
	Strong
	65(84.40)
EMG-NCV (n=77) (%)	
	Weak
	12(15.60)

	Posterior	55(71.40)
Surgical approach (n=77) (%)		
	Anterior	22(28.60)
	Positive	12(15.60)
Acetabular Reconstruction (n=77) (%)		
	Negative	65(84.40)
	Long Stem	64(83.1)
Prosthesis Kind (n=77) (%)		
	short Stem	10(13.0)
	Modular	3(3.9)

**Table 2: Range of motion of Hip and Harris hip score (Mean  $\pm$  SD)**

ROM	Pre-operation (N=77)	3 months after operation (n=77)	6 months after operation (n=71)	12 months after operation (n=68)	P value*
Flexion ( $^{\circ}$ )	2.14 $\pm$ 1.71	72.03 $\pm$ 5.07	73.70 $\pm$ 4.91	92.47 $\pm$ 8.14	P<0.001
Abduction ( $^{\circ}$ )	3.92 $\pm$ 1.40	8.92 $\pm$ 0.79	12.64 $\pm$ 1.51	15.89 $\pm$ 2.35	P<0.001
Adduction ( $^{\circ}$ )	3.94 $\pm$ 1.46	8.90 $\pm$ 0.77	8.95 $\pm$ 0.76	8.97 $\pm$ 0.76	P<0.001
Ext Rotation ( $^{\circ}$ )	3.90 $\pm$ 1.50	8.90 $\pm$ 0.77	8.95 $\pm$ 0.76	8.97 $\pm$ 0.76	P<0.001
Harris hip score (points)	48.53 $\pm$ 6.28	69.30 $\pm$ 11.40	82.93 $\pm$ 4.73	88.22 $\pm$ 3.78	P<0.001

\* Data were analyzed by Repeated Measures Analysis. P value less than 0.05 was significant

**Table 3: Slow the complications in the patient (N=09)**

Variable	Number of patients	Percentage
Displacement of prosthesis	2	2.7%
SSI	4	5.3%
Osteolysis	1	1.3%
Prosthesis failure	1	1.3%
Pre-prosthetic fracture	1	1.3%

## DISCUSSION

The HHS evaluated the patients' quality of life and joint functioning in this study. There are 3 movements to this Score. This is the first section: pain, walking distance, limping, sock and shoe use, stair climbing, sitting, and public transit inquiries. The second part assesses differences in limb length and joint movement. The third part examines flexion, abduction, adduction and external rotation of the hip joint. The total score is the sum of the component scores. In this study, the third section was analyzed separately in addition to the overall rating. The HHS survey in patients after surgery compared with before surgery in this study showed considerable progress in the hip joint function, so the HHS mean of 45 was elevated to 90 after one year. Kim et al's study in their three-year follow-up of patients with bilateral hip joint ankylosis who underwent replacement surgery reported that the HHS mean of 55.4 reached 82.3, which was similar to the data obtained in this study [6]. Also, in a survey conducted by The Bangjian *et al*, the HHS of 15.21 before surgery increased to 86.25 post-ops [7].

According to our findings, the HHS was greater for females and instances with a posterior surgical technique.. In some studies, the status of the gluteal muscles was emphasized before surgery [8]. In this study, EMG- NCV was performed on all of the patients before surgery and the HHS was explained based on the results. Based on the EMG-NCV assessment results, patients were divided into two groups: strong and weak. The HHS in the strong group was higher than the weak group; however, this difference was not statistically significant. EMG-NCV assessment of abductor muscles showed that the patients in the strong group had better function. Similar results were obtained in other studies [9]. Also, abductor muscle strength was examined depending on the joint's range of motion in abduction. The results showed significant difference in range of motion in abduction between the strong and weak groups, in month 6 and 12 after surgery (P<0.05). Kilgus et al examined patients' range of motion in the flexion position and their results were largely consistent with our study [10]. In most cases, pelvic muscle strength improved and patients had relief from pain for at least two years after surgery.

Clinical outcomes may be compromised by intra- and postoperative problems. In the present study, age and damage history in the pelvic area were predictive factors for inter- or postoperative complications. In this study, the overall relative frequency of complications for patients was 20.8%, consistent with another study. Kilgus et al reported postoperative complications in 9 of 38 patients: sepsis (4 cases), femoral stem loosening (4 cases), acetabular component

dislocation (1 case) [10]. Kim *et. al.* operated on 12 patients with two-sided hip ankylosis and reported three femoral stem loosening cases and two osteolysis cases [6].

In our study, Displacement of the prosthesis, infection, and fractures around the prosthesis were the most prevalent complications. Six and three patients in month 6 and 12 respectively were excluded due to the severity of surgical complications. These complications included: infection (3 cases), periprosthetic fracture (3 cases), osteolysis (2 cases) and prosthesis failure (1 case). Complications in some patients prevented us from using the HHS so they were excluded from the study. There is a probability of complications in any surgery, but the frequency of these complications is different according to the type of surgery, its complexity and the surgeon's skill level. Moreover, preventing surgical complications or prosthesis failure can contribute to improved treatment outcomes and consequently improve patient and physician satisfaction.

## CONCLUSIONS

The outcomes of the study indicate that total hip arthroplasty, when performed on individuals who have ankylosis, can help improve hip function. In addition, the patient runs the risk of requiring a second procedure if serious complications such as the failure of the prosthesis or osteolysis contribute to the unsuccessful outcome of the surgery.

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**Conflict of Interest:** None.

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