Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Orthosurgery

Complications and Functional Outcomes of Total Hip Arthroplasty

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DOI: 10.36347/sjams.2023.v11i09.021 | **Received:** 16.08.2023 | **Accepted:** 19.09.2023 | **Published:** 25.09.2023

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Abstract **Original Research Article**

Introduction: Total Hip Arthroplasty is mainly seen in adult patients due to different reasons. This replacement has some adverse effects and complications. In this study, the complications and functional outcomes of THA has been discussed. ***Aim of the study***: The aim of this study was to observe the complications that may arise after total hip arthroplasty. In this study, functional outcomes of THA was also another concern. ***Methods***: This prospective observational study was conducted in the Department of Orthopedics in Community Based Medical College, Bangladesh and a private clinic during the period from January 2018 to July 2023 jointly. This study had institutional review board approval and informed consent for evaluation of study patients' reports and outcomes. A general health questionnaire is used for data collection, the SF-8 Health Survey (SF-8), and a disease-specific health questionnaire, the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) to assess functional outcomes after THA. ***Result***: The result to date show a general occurrence of both in-hospital and post-release difficulties of around 7% in THA patients. Fractures (0.6%) and cardiac events (0.4%) are the most common complications that occur in the hospital for THA patients. The most well-known post-release complications in THA patients are reoperation because of bleeding, wound necrosis, wound infection, or different causes. For both situations, the incidence of bleeding complications was lower than that of other adverse events. ***Conclusion***: According to the observers, in both groups, in-hospital or after 3 months of surgery, the result was in expected improvements in functional outcomes. More youthful patients and patients who had been released straightforwardly to their homes appeared to have the best improvement in useful result after a surgery.

Keywords: THA, complications, in-hospital, bleeding, Thromboprophylaxis, functional outcomes.

INTRODUCTION

Hip replacement is the removal and replacement of portions of the pelvis and femur (thighbone) that form hip joint. It is generally performed to relieve hip pain and stiffness caused by hip arthritis. This procedure is also used to treat a broken or improperly growing hip, and for other conditions [1]. Most complications related with complete hip arthroplasty (THA) are rare and can be prevented whenever anticipated or treated promptly when perceived. Any major surgical procedure can have complications, including those caused by anesthesia, medications, comorbid conditions, or allergic reactions [2]. However, there are associated surgical complications with total hip replacements just like with any other procedure. Because of advances in technology, surgical awareness and sedative procedures the general paces of difficulties have been declining in spite of a rising burden of co-morbidities in the population [3]. Joint loosening, blood clusters, change in leg length, dislocation, fractures and infection are normal hip replacement complications. Metallosis, a form of metal poisoning that causes tissue damage and other serious conditions, may also affect people who have metal- on-metal hips [4]. A study, The Global Orthopaedic Registry (GLORY) was designed to monitor a broad range of complications and outcomes that occur following total hip arthroplasty (THA). Data on outcomes after total hip arthroplasty (THA) for this study was collected from clinical trials assessed by individual devices or from country- specific registries. Most registries included in this study focused on outcomes resulting from different types of implant and the factors that affect implant survival. Consequently, the outcome provided a valuable quality-improvement tool to identify inferior implants as early as possible. However, they also offered relatively little information about other complications and functional outcomes [5]. In this prospective observational study, the incidence and nature of complications following THA is

focused and compared these findings with those of previous studies.

Objective of the Study

- ***General objective:*** The aim of the study is to review the patients and determine the complication that may arise due to total hip Arthoplasty.
- ***Specific objective:*** The purpose of the study is to direct attention to major complications patient's facing after THA and compare with the record.

METHODOLOGY & MATERIALS

It is a prospective observational study that has been designed to examine treatment practices in patients undergoing major joint replacement surgery, especially THA. This study was conducted in Community Based Medical College, Bangladesh and a private clinic combinedly. In this 5 years period, 706 adult patients (more than 18 years) underwent total hip arthroplasty.

- ***Inclusive criteria:*** Patients who had undergone elective primary THA (within January 2018 to July 2023) were included in this study.
- ***Exclusion criteria:*** Any individuals who were unable or unwilling to undergo follow up for the next three months after surgery were excluded of this study. Patients who were not considered surgical candidates for reasons of pregnancy, patients with high sugar level, has any risk of heart condition, and patients who were unable to give informed medical consent were also excluded.

The study commenced in January 2018 to July 2023 and in this period in-hospital data were collected for all patients, and 85% of patients were followed up after 3 months and/or 12 months to collect data on post-discharge outcomes.

Out of total 706 patients, 106 patients was excluded due to their data loss. Data was collected by the participating surgeon and study coordinators by using standard case report forms. Data quality control was monitored using standardized query logic. Out-of-range or illogical responses were queried on a quarterly basis, and corrections were ensured by review and follow up. In this study, a general health questionnaire is used, the SF-8 Health Survey (SF- 8), and a disease-specific health questionnaire, the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) to assess functional outcomes after THA. The SF-8 is an alternative form of the widely used SF-36 quality-of-life (QOL) questionnaire, which uses a single question to measure each of the 8 SF-36 domains (physical function, social function, role-emotional, role-physical, bodily pain, general health, mental health, and vitality). The WOMAC is a self-administered questionnaire which can assess pain, stiffness, and physical function. Both the SF-36 and WOMAC have been shown to be valid tools to assess outcomes after THA [12].

Ethical clearance was taken from the Community Based Medical College, Bangladesh ethics committees as required. Signed informed consent was obtained from patients prior to their enrollment. Chi-square or Fisher's exact test was used to test for rate differences in different groups. As well as, Wilcoxon's ranked sum test or analysis of variance was used to test group differences between continuous variables.

RESULT

A total of 600 patients, more than 18 years old, were selected as study sample for this prospective observational research. Out of 706 patients, 106 patients were excluded due to data loss [Figure-1]. Patients were followed up in- hospital and after surgery for 3 months. In comparison of both of the data, multiple complications were common and highly found, 7.3% and 6.7% respectively. Most of the complications were in similar spectrum in both of the stages but Pneumonia. Only one patient faced Pneumonia (0.2%) during in-hospital observation where none was found after 3 months of surgery [Table-2]. According to Table-3, the complications were quite different. Bleeding necessitating reoperation and Hematoma requiring evacuation were found in both of the observation period. But rest of the complications differed. 0.31% patients were discharged late due to bleeding, where none face this difficulty later on. A few patients (0.06%) faced Gastrointestinal bleeding in-hospital, which was 0% after 3 months period. None of the in-hospital patients were readmitted due to bleeding. A few number of patients (0.04%) were readmitted due to this cause which is negligible. As shown in Table-3, the incidence of bleeding, either in hospital or at 3 months after discharge, was low in these patients 0.8% in LMWH-treated patients; 1.04% in warfarin-treated patients. Deaths that occurred either in hospital or post- discharge, population are summarized in Table-4 [Figure-2]. Overall, 4 of 600 (0.7%) THA patients died in hospital or within 3 months after discharge, of whom 1 were believed to have died as a result of PE. Table-5 describes the changes in SF-8 and WOMAC scores following THA in the study population. Both measures showed improvements after surgery. THA patients showed significantly lower scores before surgery indicating that these patients experienced more pain and disability, and scores improved after surgery to a significantly (P<.001). Before and after surgery, women's WOMAC and SF-8 mental scores were significantly lower (P<.001) than men's, but women's scores improved significantly (P = .0001) more. All-score improvements were significantly lower in elderly patients (aged ≥ 65 years) than in younger patients

following surgery, possibly indicating the impact of comorbidity in older patients. Patients who had been discharged to their homes rather than rehabilitation facilities also showed significantly greater improvements.

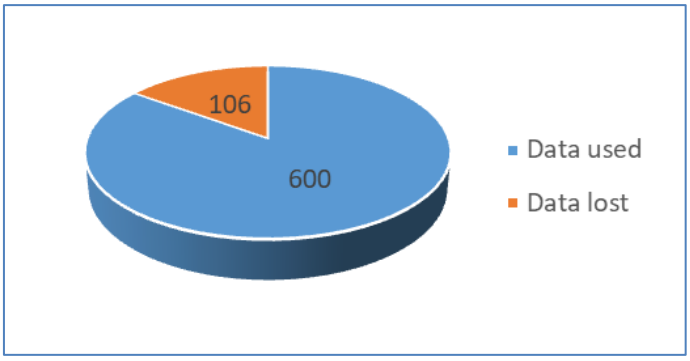

Figure 1: Participants and data included in study.

Table 1: Incidence of complications occurring in hospital and after discharge

Complication	In-hospital complications (n=600)	Additional Complications 3 Months Post-Surgery (n=489)
One or more complications	44 (7.3%)	33 (6.7%)
Fracture	4 (0.6%)	2 (0.4%)
Deep vein thrombosis	4 (0.6%)	5 (1.0%)
Dislocation	3 (0.5%)	3 (0.6%)
Nerve palsy	3 (0.5%)	2 (0.4%)
Wound infection	2 (0.4%)	3 (0.6%)
Reoperation	2 (0.4%)	5 (1.1%)
Bleeding-delayed discharge/Major bleeding	1 (0.2%)	1 (0.2%)
Cardiac events	2 (0.4%)	1 (0.2%)
Pneumonia	1 (0.2%)	ND
Pulmonary embolism	1 (0.2%)	1 (0.2%)
Death	1 (0.2%)	1 (0.2%)
Other	3 (3.5%)	15 (3.0%)

(ND= no data)

Table 2: Incidence of bleeding in hospital and 3 months after surgery

Complication	In-hospital complications (n=600)	Additional Complications 3 Months Post-Surgery (n=489)
Bleeding necessitating reoperation	1 (0.2%)	2 (0.4%)
Bleeding-delayed discharge	1 (0.2%)	0
Hematoma requiring evacuation	2 (0.3%)	2 (0.4%)
Epidural hematoma	1 (0.2%)	0
Gastrointestinal bleeding	1 (0.2%)	0
Other bleeding during surgery	1 (0.2%)	0
Major bleeding	0	1 (0.2%)
Readmission due to bleeding	0	2 (0.4%)
Any	3 (0.5%)	1 (0.2%)

Table 3: Incidence of bleeding (major or minor) in relation to use of Thromboprophylaxis

	n (In-hospital) / *n* (In-hospital or 3 months post-surgery bleeding)	In-hospital bleeding	In-hospital or 3 months post-surgery bleeding
LMWH alone	340/151	2(0.7%)	1(0.8%)
Warfarin alone	190/65	1(0.6%)	1(1.04%)
Both	126/98	2(1.7%)	4(4.0%)
Neither	143/98	3(1.9%)	2(1.8%)

Table 4: In-hospital and post-discharge mortality

	THA (n=600)
Deaths in hospital	1 (0.2%)
Deaths attributed to PE in hospital	0
Post-discharge deaths within 3 months of surgery	3(0.5%)
Deaths attributed to PE post-discharge	1

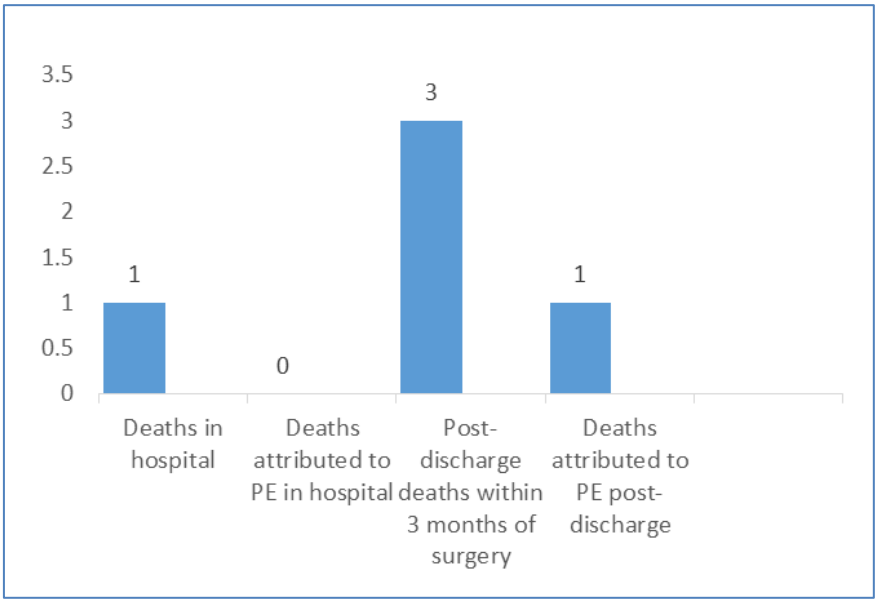

Figure 2: In-hospital and post-discharge mortality

Table 5: Functional outcomes after THA assessed by means of the WOMAC and SF-8 questionnaires, according to patient characteristics

WOMAC					**SF-8 Mental**				**SF-8 Physical**			
n		Pre	Post	Diff	n	Pre	Post	Diff	n	Pre	Post	Diff
THA	230	3.69	6.62	2.93	228	4.06	4.47	0.41	220	2.71	3.78	1.07
P value		<.0001	<.0001	<.0001		<.0001	.004	<.0001		<.0001	<.0001	<.0001
Male	178	4.15	6.62	2.45	174	4.49	4.72	.24	174	2.98	3.98	.01
Female	301	3.68	6.32	2.64	297	4.19	4.54	.35	297	2.82	3.80	.10
P value		<.0001	<.0001	.001		<.0001	<.0001	<.0001		<.0001	<.0001	.94
Age < 65 years	186	3.73	6.43	2.71	185	4.29	4.64	.34	185	2.85	3.91	1.06
Age ≥ 65 years	298	3.94	6.43	2.49	292	4.30	4.59	.29	292	2.90	3.84	.94
P value		<.0001	.92	<.0001		.53	.07	.03		.01	.005	<.0001
Home	280	3.89	6.51	2.62	276	4.30	4.62	.34	276	2.91	3.95	1.04
Rehabilitation/Other	195	3.78	6.29	2.51	192	4.29	4.56	.28	192	2.82	4.74	.92
P value		.005	<.0001	.01		.79	.003	.03		<.0001	<.0001	<.0001

DISCUSSION

Study patients were observed in two stages, in-hospital and after 3 months of surgery, to find out the complications and functional outcome of total hip arthroplasty.

In a study, of 229,031 primary THAs that were performed between 1979 and 2003, reoperation was found necessary in 26,111 (11.4%) of the study population [6]. Mostly marked reason for reoperation was aseptic loosening, which accounted for 60.6% of reoperations, followed by dislocation (10.7%), deep infection (8.3%), and fracture (6.8%) among the samples [6]. Another study found that, the utmost reason for revision (including revisions of arthroplasties that were performed before 1988) was loosening, which accounted for 44% of procedures. Within 4 years of the primary arthroplasty, approximately 50% of revisions were performed; in some particular, revisions due to infection or patellar problems were more common during the first 45 months than they were after the first 45 months [7]. A

further registry- based study, conducted in Iceland, had reported markedly higher rates of dislocations (5%) and cardiac or cerebrovascular complications (3.1%) among THA patients than those reported in the current study [8].

Comparisons of bleeding rates in studies of THA patients are complicated because the definitions of clinically important or major bleeding have varied considerably between trials [9]. The results of this study is consistent with a systematic review [10], which included data from 71 trials, involving 32,433 patients. This review compared different thromboprophylactic regimens in patients undergoing major orthopedic surgery (THA, TKA, or hip- fracture surgery). According to this report, major bleeding occurred in 632 patients (1.95%) receiving thromboprophylaxis, of whom only 0.4% required surgical or medical intervention; where they identified only 5 cases of fatal bleeding. The most common location of bleeding was the wound site, which accounted for 71% of major bleeding episodes; 7% of episodes occurred in the gastrointestinal tract, and the remainder at other sites [10]. In a significant proportion of patients who are undergoing major orthopedic surgery major or minor bleeding can occur, even in the absence of thromboprophylaxis. For example, in a meta-analysis of 52 trials of thromboprophylaxis, involving almost 11,000 THA patients, the total incidence of minor and major bleeding in placebo-treated patients was 3.0% and 0.6%, respectively [11]. In the meta- analysis by Muntz and colleagues [10], the relative risk of major bleeding with UFH, compared with LMWH, was 1.52 (95% CI, 1.04–2.23). In addition, fondaparinux, a synthetic pentasaccharide, was also associated with an increased risk of major bleeding, compared with LMWH (Relative Risk, 1.52; 95% CI, 1.11–2.09). When in the present study, in- hospital bleeding was significantly less in warfarin-treated patients than in those receiving LMWH (0.6% vs 0.7%, respectively). This may be due to the delayed onset of warfarin's anticoagulant effect, which may have delayed the therapeutic effect in many patients until after they were discharged from the hospital.

Improvements in all scores after surgery were significantly lower in older patients, aged ≥ 65 years compared to younger patients, which may reflect the impact of comorbidity in older patients. Significantly higher improvements were seen in patients who had been discharged to their homes rather than to rehabilitation facilities. The WOMAC scores of this study, that were reported postoperatively are found similar to those reported at 2 and 3 years after surgery in the Swedish National Total Hip Arthroplasty Register with a mean score of 74 at both time points [13]. Men had higher postoperative QOL scores on the SF-36 questionnaire than women, which is consistent with the current study's findings [14]. The finding in current study, patients aged ≥ 65 years showed poorer improvements in functional outcomes compared with younger patients is in contrast to Jones's study in 454 patients undergoing THA or TKA [15]. From the findings of this study, there were no significant differences between the development in WOMAC and SF- 36 scores after surgery in patients aged 55 to 79 years and in those aged ≥ 80 years. Similarly, the finding in the present study that patients who had been discharged to their homes are found to have higher QOL scores than those who had been discharged to rehabilitation facilities is at variance with those of a previous study involving 96 total arthroplasty patients [16].

Other studies used the Harris hip score has been utilized to survey results after absolute hip substitution. Soderman and Malchau [17], found that the Harris hip score is a valid and reliable specific hip measure when compared to the Western Ontario and McMaster Universities Arthritis Index and the Short Form-36 Health Survey [18].

Limitations of the Study

As it is a double centered study, the study population selected from only two selected hospitals, which may affect results of the study causing less accurate reflection than the exact picture of the country. Some patients changed their decision regarding follow up and feedback which limits our data. Therefore, in future, further study is suggested to be under taken with large sample size and in multiple center for better comparison.

CONCLUSION AND RECOMMENDATIONS

The research indicates that the incidence of major complications is low, despite the fact that a variety of complications have been reported to occur following THA. Reoperations, infections, and dislocations were the most common complications. It is remarkable that clinically significant bleeding was uncommon in the example of THA patients, basically every one of whom were given thromboprophylaxis. Present study shows that the functional outcomes after THA might rely upon the patient's attributes. Although total arthroplasty can significantly improve patients' functioning and overall well-being, younger patients and those who have been discharged directly to their homes appear to receive the most benefits. Hence, the study was conducted in a single institution, multiple centered study can find more developed outcomes.

Declaration of the Patients' Consent

The informed consent from the patients were obtained during data collection and sampling. Permission of the Hospital Ethics Committee were ensured before starting the study.

Financial Support and Sponsorship: *Self-funded research.*

CONFLICTS OF INTEREST: N/A

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