

IMPACT OF OTHER MEDICAL CONDITIONS ON PAIN AND FUNCTIONALITY FOLLOWING TOTAL HIP ARTHROPLASTY: A PROSPECTIVE COHORT STUDY.

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Abstract

Background

Total hip arthroplasty is the procedure carried out for patients suffering from arthritis. Arthritis is a painful bone inflammation that severely affects the functional ability of the hip bone. Total hip arthroplasty helps in reduction of the painful inflammation and it also helps in restoring the functional ability of the hip bone

Method

This was a prospective study including individuals who underwent total hip arthroplasty at Rajendra Institute of Medical Sciences, Ranchi. The 30 patients participating in the study underwent the total hip arthroplasty. Patients were asked to follow up after 3 months, 6 months, 12 months, and 24 months of the surgery. Preoperatively, after the surgery and during the follow-up the hip bone was assessed using WOMAC score survey form 36.

Results

Comorbidities increased with age, affecting postoperative outcomes. Higher CCI values led to poorer functional improvements and more complications, sometimes necessitating conservative measures. Older patients and those with higher CCIs had higher complication rates and readmissions. CCI rose with age, from 0.29 for patients <40 to 5.42 for those >70. Significant improvements in WOMAC and SF-36 scores were seen at the third-month follow-up, but higher CCI patients declined after six months. Patients with CCI >3 had three surgical complications, while CCI 2 patients had two complications related to infection. No complications occurred in patients with CCI 0 and 1, but one patient with a higher CCI died.

Conclusion

From this study, it was found that the occurrence of comorbidity after the THA significantly decreased patient satisfaction. Also, the higher preoperative CCI resulted in the occurrence of comorbidity, delayed improvement, decreased recovery, increased rate of readmission, and decreased satisfaction of the patient.

Recommendation

This association can guide clinicians in taking appropriate steps to intervene in the occurrence of comorbidities and treatment of the comorbidities to improve patient satisfaction.

Keywords: Total hip arthroplasty, joint replacement, comorbidities

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Introduction

Total hip arthroplasty is the procedure carried out for patients suffering from arthritis. Arthritis is a painful bone inflammation that severely affects the functional ability of the hip bone. Total hip arthroplasty helps in reduction of the painful inflammation and it also helps in restoring the functional ability of the hip bone [1]. The number of arthroplasty carried out every year has been increasing

exponentially. As this arthroplasty is generally carried for the geriatric population, the rise in the geriatric population explains the substantial increase in the number of total hip arthroplasty.

According to a study conducted where comorbidities were evaluated after total hip arthroplasty, it was found in this study that 50% of the patients had one or the other comorbidities. A study states that the number of

comorbidities increases with the age of the patient [2]. The comorbidities associated with the THA affect the postoperative clinical outcomes. The comorbidities affect the quality of life of the patient and compromise the functional ability of the hip bone. Addressing the comorbidities can significantly improve the clinical outcome of total knee arthroplasty.

Changes in the comorbidity associated with the postoperative procedure decrease the efficiency of the procedure. Rigorous follow-up and timely intervention can prevent the progression of the comorbidity. A suboptimal replacement of the hip joint can result in several comorbidities that have to be monitored and require management to prevent the worsening of the condition [3]. This study aims to determine the association of comorbidities with clinical outcomes such as quality of life and the functional abilities of the bone. This study involved follow-up at regular intervals to assess the comorbidities and their progression.

Method

Study design

This was a prospective cohort study.

Study setting

The study was conducted at Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India, spanning from January 2022 to December 2023.

Participants

In all 30 patients agreed to participate in this study.

Inclusion and exclusion criteria

Patients who underwent arthroplasty of the hip and consented to follow-up for the specified duration were included in the study. The patients who had any other comorbidities such as infection, coagulation problems, lower limb thrombosis, and psychiatric issues were not included in this study.

Data measurement

The 30 patients participating in the study underwent total hip arthroplasty. They were treated with similar procedures. Preoperative antibiotics and intraoperative and postoperative analgesics were given. After the surgery physiotherapist was assigned to each patient. Patients were asked to follow up after 3 months, 6 months, 12 months, and 24 months of the surgery. Preoperatively, after the surgery and during the follow-up the hip bone was assessed using WOMAC score survey form 36. The bodily pain and physical function were assessed using the WOMAC score and SF-36, the score ranged from 0 to 100. These scores efficiently evaluated the functional abilities. However, comorbidities were evaluated by the Carlson index 0 meant no comorbidity, and 3 meant occurrence of comorbidity. If dislocation or surgical site infection were reported, then they were counted as occurrences of complications related to surgery. Other than that any severe medical condition that elongated the stay at the intensive care unit was counted as medical complications.

Ethical consideration

The institution's ethics committee evaluated the study and approved it.

Statistical analysis

The data obtained from the patients during their assessment using SF-36 and WOMAC scores were subjected to statistical analysis.

Result

30 patients who participated in this study were divided into groups as per their age. less than 40 years, between 40 to 50 years, between 50 to 60 years, between 60 to 70 years, and above 70 years. the occurrence of comorbidity was self-reported on this basis their Carlson index which indicated the occurrence of comorbidity was determined preoperatively and until their last follow-up. Table no. 1 illustrates the Carlson index.

Table no.1: Carlson comorbidity Index as per the age group

Parameters	Below 40 years	Between 40 to 50 years	Between 50 to 60 years	Between 60 to 70 years	Above 70 years
Frequency	6	5	6	7	6
Average Body Mass Index	22.6	22.3	22.5	22.8	22.4
Carlson comorbidity index average (before the surgery and last follow-up)	0.29 and 0.29	0.49 and 0.49	1.26 and 1.28	2.16 and 2.76	3.85 and 5.42

From Table 1, it was found that the occurrence of comorbidity increased with the age of the patient. With the advanced age above 70 years, the changes in postoperative CCI were prominent. Whereas the CCI index of the patients below the age of 70 remained almost similar from the preoperative phase till the last follow-up. After the retrospective analysis of the patients, they were divided as per the Carlson comorbidity index. The

preoperative cci was assigned based on the existing pathophysiological condition before the surgery and later on, the postoperative cci was assigned as per the progression of the existing condition. The postoperative clinical outcomes were used to determine the CCI. WOMAC score of body pain and physical function as well as the SF-36 score of body pain and physical function was correlated with the CCI assigned (table no.2)

Table no.2: Summary of WOMAC score and SF-36 score

Parameters	0	1	2	3
Frequency	11	6	7	6
Average age	43 years	55 years	64 years	72 years
WOMAC score for body pain				
Before the surgery	13.18	19.00	24.28	32.70
During the last follow-up	2.79	4.65	10.02	19.27
WOMAC score for physical function				
Before the surgery	42.43	46.44	50.09	66.32
During the last follow-up	20.66	23.12	32.94	51.23
Survey from-36 for body pain				
Before the surgery	50.74	43.31	38.86	31.57
During the last follow-up	71.95	70.60	68.57	59.76
Survey form-36 for physical function				
Before the surgery	51.93	42.35	34.39	25.25
During the follow-up	80.79	68.47	53.23	38.60

The improvement in the WOMAC body pain and physical function score and SF-36 body pain and physical function score was significant at the third-month follow-up. However, in the case of higher CCI patients, the rebound of the WOMAC score occurred after six months of follow-up. In cases where the CCI values were higher, the conduction of the surgery was contraindicated. In such cases patients were stabilized with treatment, this was regarded as the waiting time. The waiting time of the patient increased if their CCI values were on the higher end. Similarly, the complications were higher in patients with higher CCI. There were 3 surgical complications reported in the patients with CCI more than 3. Two complications related to the

infection of the surgical site were reported in the patients with CCI 2. None of the complications were reported in the patients with CCI 0 and 1. The occurrence of readmission was significantly higher in patients with advanced age, and mortality was found only in a single patient with higher CCI.

Discussion

In this study, it was found that with the increase in age, the probability of the occurrence of the comorbidity increased. CCI was used as the comorbidity index to estimate the occurrence of the comorbidity preoperatively. It was observed that the CCI determined before the surgery

improved substantially in all the participants irrespective of the age group. The advances in age can decrease the functional aspect of the joints which can decrease the CCI score. Also, the scores taken here are reported by the patients which were dependent on the perception of their pathological condition before the surgery. The study revealed a direct relationship between age and comorbidity occurrence, assessed by the Carlson comorbidity index (CCI), with preoperative CCI scores improving across all age groups, potentially influenced by patient perception and preoperative interventions. Similar studies conducted also reported a positive relation between the occurrence of comorbidity and advanced age [4,5].

CCI score preoperatively was influenced by the pathological state of the patient. In a study, it was found that the improvement in the recovery of the joint replacement surgery was dependent on the baseline CCI [6]. In this study, it was found that during the follow-up the CCI improved significantly but if the preoperative CCI score was high then the improvement was slower and the occurrence of comorbidity in such patients was evident. From thorough data analysis, it was found that the CCI improved significantly after 3 to 6 months of the surgery, this could be because the patient's functionality score after the surgery improved significantly. Another study reported improvement during the first year after the surgery [6,7].

Although a significant improvement was reported it was not sustained till the 24th-month follow-up in patients who had comorbidities. Gradually with the occurrence of comorbidity, the condition of the joint replacement deteriorated severely. It was also found that the patients with higher CCI could not undergo immediate joint replacement surgery. As this could increase the existing complications. Delayed surgery was also reported with each unit increase in the CCI in various previous studies [8,9].

Gauging the occurrence of the comorbidities that could be associated with joint replacement surgery can guide clinicians for a thorough follow-up and timely intervention which will improve the health-related quality of life of the patients [10]. Also, estimation of the baseline CCI improved the occurrence of longer hospital stays, delayed recovery, number of readmission rates and reduced the waiting time required for the surgery.

Generalizability

The study findings suggest that age-related comorbidities significantly influence outcomes in total hip arthroplasty (THA). These results apply to a wider population, particularly older individuals undergoing THA. The study underscores the importance of preoperative assessment and management of comorbidities to optimize surgical outcomes. Healthcare professionals can use this information to tailor care protocols for THA patients, potentially

reducing complications and improving overall outcomes on a broader scale.

Conclusion

From this study, it is found that the occurrence of comorbidity after the THA significantly decreased patient satisfaction. Also, the higher preoperative CCI resulted in the occurrence of comorbidity, delayed improvement, decreased recovery, increased rate of readmission, and decreased satisfaction of the patient.

Limitation

The duration of the follow-up was less and the cohort of the study was small. A study with a large population and a longer duration of follow-up is required to verify the findings of this study.

Recommendation

This association can guide clinicians in taking appropriate steps to intervene in the occurrence of comorbidities and treatment of the comorbidities to improve patient satisfaction.

Acknowledgment

We are grateful to the hospital's staff and patients involved in the study for their cooperation during the study.

List of abbreviation

CCI- Carlson Comorbidity Index
WOMAC- Western Ontario and McMaster Universities Osteoarthritis Index
THA- Total Hip Arthroplasty
SF-36- Survey Form 36
BMI-Body Mass Index

Source of funding

No source of funding.

Conflict of interest

No conflict of interest.


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