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Kashif Abbas
Aga Khan University

Ghulam Murtaza
Aga Khan University

Masood Umer
Aga Khan University

Haroon Rashid
Aga Khan University

Irfan Qadir
Aga Khan University

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Complications of Total Hip Replacement

Kashif Abbas, Ghulam Murtaza, Masood Umer, Haroon Rashid and Irfan Qadir

ABSTRACT

Objective: To determine the factors causing complications in unilateral total hip replacement.

Study Design: Analytical study.

Place and Duration of Study: The Aga Khan University Hospital, Karachi, between 2000 and 2010.

Methodology: During the study period, 199 patients underwent elective unilateral total hip replacement at the Aga Khan University Hospital. Patients were divided into two groups on the basis of postoperative complications within 30 days of surgery. Significant factors at 5% significance level on univariate analysis were further analyzed by multivariate logistic regression.

Results: Postoperative complications occurred in 39 patients (19.6%); dislocation being most common in 13 patients (6.5%), followed by wound infection in four (2%), all of these patients required intervention. Other minor complications which were managed conservatively included wound infection (2.5%), urinary tract infection (2.5%), dislocation (1%), pleural effusion and pneumonia (2%), deep venous thrombosis (0.5%) and myocardial infarction (0.5%). On univariate analysis, patients with ASA III and IV, peri-operative blood transfusion, pre-operative hip deformity and post-operative bisphosphonate use were significantly associated with complications. On multi-variate analysis, adjusted odd's ratio for perioperative transfusion (3; 95% CI: 1.17-7.7) and hip deformity (3.2, 95% CI: 1.4-3.4) was found statistically significant.

Conclusion: Pre-operative hip deformity and perioperative blood transfusion significantly influence the rates of complication after unilateral THR.

Key words: Unilateral total hip replacement. Complications. Pre-operative hip deformity. Perioperative blood transfusion.

INTRODUCTION

Total hip replacement (THR) provides a very effective symptomatic and functional treatment in a wide variety of conditions including osteoarthritis, inflammatory arthritis, infections etc. Osteoarthritis (OA) is the most common indication for THR. Treatment modalities for hip pain in OA include conservative measures (analgesia, exercise, education, weight reduction), with surgical intervention i.e. THR being the most effective treatment for end stage disease.^{1,2} Most common indications for THR are to alleviate pain and improve functional status,³ hence every effort is made to yield best possible outcomes. Despite the efficacy of THR, complications can occur resulting in poor functional outcomes for such patients.

Common major complications include mortality, infection, dislocation, revision, and pulmonary embolism. The rates of these complications vary across different registry and health care systems. Several factors have been implicated in increasing the morbidity after THR.⁴⁻¹¹ Identifying risk factors that predict postoperative complications and, more specifically, being able to

predict those patients at higher risk of complications before surgery, is an important step in searching for strategies that might reduce complication rates.

Various modifications in the component designs and metallurgy have been tried in the developed countries in order to get superior results, avoid complication and improve longevity of implant. However, the issues are different from a developing country perspective, where the debate moves around the prevention of complications with the use of standardized implant design and composition. There are several studies focusing on the same topic from developed nations; however, data is lacking from low income countries.

The objective of this study was to determine the factors associated with complications in adult patients who underwent unilateral THR at the Aga Khan University Hospital, Karachi.

METHODOLOGY

Adult patients who underwent unilateral total hip replacement at the Aga Khan University Hospital, Karachi, between 2000 and 2010 were included. Patients were identified from hospital information management system by ICD code 81.51. Patients requiring revision arthroplasty, bilateral arthroplasty; those transferred or initially treated at other institutions and those with missing data were excluded. After reviewing the files, the patients were divided into groups of those with complications and those without complications.

Department of Surgery, The Aga Khan University Hospital, Karachi.

Correspondence: Dr. Ghulam Murtaza, Resident in General Surgery, The Aga Khan University Hospital, Stadium Road, Karachi-74800.

E-mail: shaikh.murtaza@aku.edu

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Medical records of all the patients were reviewed by orthopaedic resident and pertinent details recorded were baseline demographics, medical co-morbidities, indication for surgery, hip deformity, pre-operative anticoagulation and surgical factors (including surgical approach, type of prosthesis, use of cement, operative times). Complications were divided into major (requiring intervention in operating room) and minor complications (managed without intervention). As per institutional guidelines, this study fulfilled the criteria for exemption of ethical review committee approval as it was a retrospective review of the available data.

Data was analyzed in Statistical Package for Social Sciences (SPSS) version 17. Continuous variables were analyzed as means \pm standard deviation if normal distribution was found on histograms with distribution curve and student t-test was applied to compare cases and controls. Categorical variables were analyzed as proportion and percentages and chi-square test was used to compare cases with controls. All those risk factors which turned out to significantly influence the morbidity at 15% level of significance on univariate analysis were then analyzed by multivariate logistic regression. Association of factors with complications is presented as adjusted odd's ratio (AOR) with 95% confidence interval (CI). The significance level was set at $p < 0.05$ for multivariate analysis.

RESULTS

During the study period, 215 patients underwent total hip replacement; 16 patients were excluded from the study due to missing data. Data were analyzed for 199 patients; 39 cases with complication and 160 cases without complications. The mean age of patients was 49.6 ± 16.5 years. Male to female ratio was 1:1. Most common indication for THR was osteoarthritis (31.2%) and avascular necrosis (30.2%), followed by ankylosing spondylitis (10%) and tuberculosis (6.5%).

Baseline comparison of cases and controls is summarized in Table I. Duration of surgery was longer in cases as compared to controls (232 ± 79 minutes vs. 197 ± 67 minutes, $p = 0.012$). Cases had higher frequency of ASA III-IV, peri-operative transfusion, hip deformity, and postoperative bisphosphonate use.

Postoperative complications occurred in 39 patients (19.6%); dislocation being most common in 13 patients (6.5%), followed by wound infection in 4 (2%), all of these patients required intervention. Other minor complications which were managed conservatively included wound infection (2.5%), urinary tract infection (2.5%), dislocation (1%), pleural effusion and pneumonia (2%), deep venous thrombosis (0.5%) and myocardial infarction (0.5%).

On univariate analysis, ASA III and IV, peri-operative blood transfusion, pre-operative hip deformity and

post-operative bisphosphonate use were significantly associated with complications. On multi-variate analysis, adjusted odd's ratio with 95% confidence interval for perioperative transfusion 3, 95% CI: 1.17-7.4 and hip deformity ($n = 3.2$, 1.4-7.4) were found statistically significant (Table II).

Table I: Baseline comparison of cases and controls.

Variables	All (n=199)	Cases (n=39)	Controls (n=160)	p-value
Age	49.6 \pm 16.5	52 \pm 16.8	49 \pm 16.4	0.3 ¹
ASA				
I-II	146 (73.4%)	24 (61.5%)	122 (76%)	
III-IV	53 (26.6%)	15 (38.5%)	38 (28%)	0.045 ²
BMI	26.4 \pm 6.9	27.4 \pm 6.8	26.1 \pm 6.9	0.29 ¹
< 25	93 (46.7%)	17 (43%)	76 (47%)	
25-29.9	68 (34.2%)	10 (25.6%)	58 (36.3%)	
≥ 30	38 (19.1%)	12 (30%)	26 (16.2%)	0.067 ²
Hip deformity	68 (34.2%)	19 (48.7%)	49 (30.6%)	0.018 ²
Length of surgery	204 \pm 70	232 \pm 79	197 \pm 67	0.012 ¹
Estimated blood loss	622 \pm 321	680 \pm 401	608 \pm 298	0.21 ¹
Blood transfusion	120 (60.3%)	32 (82 %)	88 (55%)	0.001 ²
Anti-coagulants	155 (77.9%)	30 (76.9%)	125 (78.1%)	0.51 ²
Prolonged antibiotics	43 (21.6%)	13 (33.3%)	30 (18.8%)	0.062 ²
Postoperative bisphosphonates	04 (2%)	03 (7.7%)	01 (0.6%)	0.024 ²
Length of hospital stay	11.8 \pm 7.8	15 \pm 13.5	11 \pm 5.5	0.087 ¹

¹Student's t-test, ²Chi square test.

Table II: Univariate and multivariate analysis of predictive factors.

Variables	Univariate OR	Multivariable analysis		
		AOR	95%CI	p-value
ASA				
I-II	1	1	-	
III-IV	0.48	0.43	0.14-1.01	0.054
Blood transfusion				
No	1	1	-	
Yes	3.6	3	1.17-7.7	0.022
Hip deformity				
No	1	1	1	
Yes	2.3	3.2	1.4-7.4	0.005
Postoperative Bisphosphonates				
No	1	1		
Yes	13.2	11.5	0.95-141	0.055

DISCUSSION

In this study, major postoperative complications occurred in 19.6% patients; dislocation followed by wound infection were the most common complications. On multivariate analysis, patients with pre-operative hip deformity and perioperative blood transfusion had three times greater odds of having complications as compared to controls.

Dislocation and wound infection are the two major complications of THR,^{4,5} as observed in other hip surgeries like hemiarthroplasty.¹² The incidence of dislocation after THR ranges between 0.5% to nearly 10%.^{13,14} There is paucity of data pertaining to the risk

factors of complications of THR from developing countries. Comparison with data from developed world may be unjustified because of difference in case mix, surgical practices, quality of care, financial and social conditions. However, studies from the developed countries demonstrate that various factors are implicated in affecting rates of dislocation including: (a) patient factors, such as gender, weak hip musculature, excessive alcohol intake, smoking,⁷ body mass index,⁷ primary disease/indication⁸ and age; (b) surgical factors, such as surgical approach, capsular excision or repair, positioning of implant, and previous hip surgery;^{8,10} and (c) implant factors, such as femoral neck length, offset and head diameter.¹⁵

Pre-operative deformity has been shown to have positive association with postoperative morbidities such as leg length discrepancy and abductors imbalances, which may lead to poor satisfaction of patients and recurrent dislocations, respectively. In this series it was observed that patient with pre-operative flexion contracture of > 30 degree have high rates of complications including dislocation and wound infections.

Most previous studies on orthopaedic patients have reported an increased risk of postoperative infections, short-term mortality, length of hospital stay and intensive care unit stay in patients receiving blood transfusions.¹⁶ Marik and Corwin published a systematic review based on 45 cohort studies, suggesting that transfusions are associated with increased morbidity and mortality risk in high risk hospitalized patients.¹⁷ The present results are also consistent with this observation. Higher rates of transfusion may reflect the overall difficulty of procedure leading to prolonged surgery and greater blood loss and subsequent need of transfusion. Moreover, the process of transfusion itself limits mobility of patient and prolongs the length of bed rest with subsequent problems of recumbency such as heel sore and atelectasis. The duration of surgery and the length of bed rest/immobilization are influenced by other factors as well, which were, however, not analyzed in this study. Therefore, every effort should be made to minimize the blood loss to reduce the risk of complications.

There is an increased risk of revision due to deep infection in postoperative users of bisphosphonates. Bacterial pathogens, causing periprosthetic joint infection, can stimulate osteoclastogenesis and potentiate bone resorption in order to clear the infection. However, osteoclastogenesis is inhibited by bisphosphonates and, therefore, results in an inappropriate response to periprosthetic joint infection and thus exacerbation of the course of infection. In a study by Thillman *et al.*, 10-year cumulated implant revision rate in the underlying cohort of 16,145 primary THA procedures among osteoporotic patients was 8.3% (95% confidence interval (CI): 7.3 - 9.3).¹⁸ The use of bisphosphonates was associated with an adjusted relative risk of revision due to

deep infections of 2.59 (95% CI; 1.30 - 6.53).¹⁸ In this study, we had 3 patients with postoperative use of bisphosphonates; two developed wound infection and third had dislocation after stumbling in washroom, which was reduced in ward under cover of intravenous pethidine and diazepam.

This study provides an experience of THR from a tertiary care hospital of developing country and the complication rate is higher as compared to developed countries. This might be attributed to different surgical practices and postoperative care. Where the world is moving from conventional to fast track surgeries in order to reduce the complications,^{1,2} there was a quite prolonged hospital stay i.e. 11.8 ± 7.8 days in this study. Apart from that, this is a retrospective study; there might be reviewer's bias and missing data bias confronted during chart reviewing. One of the major determinants of surgical outcomes is the surgeon itself; and this study reports experiences of more than one surgeons. There is also limited sample size of this study as evident from the fact that ASA III-IV and peri-operative bisphosphonates use were statistically significant on univariate analysis, but became insignificant on multivariable analysis. This might be due to the limited sample size. The evidence may further be strengthened by conducting a prospective multicentre study with a larger sample size.

CONCLUSION

The results from this study indicate that pre-operative hip deformity and perioperative blood transfusion significantly influence the rates of complications after THR. Based on this observation, one might be able to control or at least identify individuals who would require greater attention in term of postoperative rehabilitation and critical care requirements.

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