



Original contribution



Does the obesity paradox apply to early postoperative complications after hip surgery?

A retrospective chart review ☆,☆☆,★,★★,☆☆☆,

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Abstract

Background: There is evidence that very obese patients (body mass index [BMI] >40 kg/m²) undergoing hip replacement have longer average hospital stays, as well as higher rates of complications and readmission compared with patients with normal BMI. However, there are sparse data describing how overweight and obese patients fare in the period immediately after hip replacement surgery compared with patients with low or normal BMI. In this study, we sought to explore the association of BMI with the rate of early postoperative complications in patients undergoing total hip arthroplasty.

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- ★ Submitted as a research report.
- ★★ This report describes human research. IRB contact information: Montefiore Medical Center/Albert Einstein College of Medicine IRB, David Wallach, CIP, 3308 Rochambeau Ave, Bronx, NY 10467; Tel.: 718-430-2237.
- ☆☆☆ The requirement for written informed consent was waived by the institutional review board.
- ☆☆☆☆ The study was not registered prior to patient enrollment.
- ★★★★ This was not an observational clinical study.
- ★★★★ This manuscript was screened for plagiarism using CrossRefMe.
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- ★★★★★★ Attestation: N.S., J.W., I.K., and E.D. have seen the original study data, reviewed the analysis of the data, and approved the final manuscript. S.N. has seen the original study data, reviewed the analysis of the data, approved the final manuscript, and is the author responsible for archiving the study files. D.G. approved the final manuscript.

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Methods: A proprietary hospital software program, Clinical Looking Glass was used to query the Montefiore Medical Center database and create a list of patients with *International Classification of Diseases, Ninth Revision* code 81.51 (hip replacement) from the period of January 1, 2010, through December 31, 2012. The medical records of patients with length of stay 5 or more days were reviewed to evaluate the reason for the extended stay. The primary outcome studied was the association between BMI and occurrence of early complications in patients who had undergone total hip replacement surgery. Logistic regression was used to calculate adjusted odds ratio (OR) and 95% confidence interval (CI) for the association of BMI and early postoperative complications.

Results: Of the 802 patients undergoing hip replacement surgery within our time frame, 142 patient medical records were reviewed due to their length of stay of ≥ 5 days. Overall complication rate in the analyzed patients demonstrated a J-curve distribution pattern, with the highest morbidity being 23.5% in the underweight group, the second highest in the normal-weight group (17.3%), and decreasing to nadir in the overweight (8.0%) and obese class I (10.0%) and then higher again in classes II (14.3%) and III (16.7%). Adjusted ORs demonstrated the same J distribution pattern similar to the pattern observed in the univariate analysis. Of the variables studied, Charlson score (OR, 1.1; 95% CI, 1.1-1.2; $P = .03$), diagnosis of hip fracture (OR, 5.2; 95% CI, 2.8-9.8; $P = .01$), normal weight (OR, 1.9; 95% CI, 1.1-3.8; $P = .04$), and obese class III (OR, 2.5; 95% CI, 1.1-6.3; $P = .04$) were the factors associated with the highest odds of early complications after hip replacement surgery.

Conclusions: In this retrospective review of hip replacement surgery patients, BMI classification was a predictor of early postoperative complications. Although the exact underlying mechanisms are still not clear, these results are consistent with the obesity paradox, in which obesity or its correlates provide some form of protection.

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1. Introduction

The prevalence of overweight and obesity in the American population has increased steadily over the last 25 years [1]. According to the Centers for Disease Control and Prevention, 68.8% of Americans are now classified as overweight (body mass index [BMI] 25-29.9 kg/m²) [1] or obese (BMI > 30 kg/m²) [2], with more than half these patients falling into the obese category. Elevated BMI is associated with comorbidities such as ischemic heart disease [3], type 2 diabetes [4], stroke [5], and hypertension [6], and BMI is positively correlated with all-cause mortality in the general population [7]. The average BMI is increasing in many populations around the world, mounting concern about the public health effects of this obesity epidemic [8].

Recent literature, however, has shown that obesity is associated with better outcomes in certain chronic disease states. This phenomenon was initially termed “reverse epidemiology” in a 2003 review by Kalantar-Zadeh et al [9] proclaiming the protective effect of obesity on survival among dialysis patients. Furthermore, Leavey et al [10] found that in patients undergoing hemodialysis, overweight patients have a lower relative risk of mortality compared with patients with BMIs in the normal, class I obesity, and class II obesity categories. Reverse epidemiology, also known as the “obesity paradox,” is seen in patients with established heart failure as well. A meta-analysis conducted by Oreopoulos et al [11] in 2007 showed that compared with normal BMI, overweight and obesity are associated with lower all-cause mortality in patients with heart failure. On the other hand, the study shows that underweight and low-normal weights compared

with normal weight are associated with a higher risk of cardiovascular mortality.

The incidence of hip fracture and its surgical repair are increasing every year [12]. Studies have reported a positive correlation of postoperative complications rates and 1-year mortality rates after the hip replacement surgeries [13]. The effect of increased BMI on the rate of complications in patients undergoing surgery, specifically total hip arthroplasty, is not as well described. There is some evidence that morbidly obese patients (BMI > 40 kg/m²) undergoing hip replacement have longer average hospital stays, as well as higher rates of complications and readmission when compared with patients with normal BMI [14]. However, there are few data describing how overweight and obese patients fare in the period directly after hip replacement surgery when compared with patients with low or normal BMI. The goal of this retrospective study was to explore the association, if any, of BMI and immediate postoperative complications in patients undergoing total hip arthroplasty.

2. Methods

This retrospective study was approved by our institutional review board. Patient data included hospital records from outpatient, inpatient, and emergency department visits. All diagnostic and surgical procedures entered into these records are indexed in a computer database, allowing the retrieval of all records of interest. We queried the Montefiore Medical Center database using a patented hospital software program,

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