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Original article

Preoperative immobility significantly impacts the risk of postoperative complications in bariatric surgery patients

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Abstract

Background: Preoperative immobility in general surgery patients has been associated with an increased risk of postoperative complications. It is unknown if immobility affects bariatric surgery outcomes.

Objectives: The aim of this study was to determine the impact of immobility on 30-day postoperative bariatric surgery outcomes.

Setting: This study took place at a university hospital in the United States.

Methods: The Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program 2015 data set was queried for primary minimally invasive bariatric procedures. Preoperative immobility was defined as limited ambulation most or all the time. Logistic regression analysis was performed to determine if immobile patients are at increased risk (odds ratio [OR]) for 30-day complications.

Results: There were 148,710 primary minimally invasive bariatric procedures in 2015. Immobile patients had an increased risk of mortality (OR 4.59, $P < .001$) and greater operative times, length of stay, reoperation rates, and readmissions. Immobile patients had a greater risk of multiple complications, including acute renal failure (OR 6.42, $P < .001$), pulmonary embolism (OR 2.44, $P = .01$), cardiac arrest (OR 2.81, $P = .05$), and septic shock (OR 2.78, $P = .02$). Regardless of procedure type, immobile patients had a higher incidence of perioperative morbidity compared with ambulatory patients.

Conclusions: This study is the first to specifically assess the impact of immobility on 30-day bariatric surgery outcomes. Immobile patients have a significantly increased risk of morbidity and mortality. This study provides an opportunity for the development of multiple quality initiatives to improve the safety and perioperative complication profile for immobile patients undergoing bariatric surgery. (Surg Obes Relat Dis 2018;■:00–00.) © 2018 American Society for Metabolic and Bariatric Surgery. All rights reserved.

Keywords: Bariatric surgery; Immobility; Postoperative outcomes

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Preoperative immobility in general surgery patients has been associated with an increased risk of postoperative complications. Immobile postoperative patients have an increased incidence of deep vein thrombosis and worsening functional status [1]. Therefore, early mobilization has become a standard of care in general surgery patients. Immobility has not been studied in the bariatric surgery

population, and its impact is unknown on bariatric surgery outcomes.

Although immobility in general surgery and bariatric patients has not been addressed in the literature, functional status has been identified as an important perioperative factor influencing postoperative outcomes. A study by Scarborough et al. [2] presented a National Surgical Quality Improvement Program analysis of functionally dependent general and vascular surgery patients and identified a higher rate of morbidity and a 1.75-fold greater odds of mortality compared with functionally independent patients. Gupta et al. [3] used the National Surgical Quality Improvement Program data set to identify preoperative risk factors that increased the incidence of postoperative complications in bariatric surgery patients. Patients with dependent functional status, defined as assistance for all activities of daily living in the 30 days before surgery, had a 3.48-fold increased risk of postoperative complications [4]. Whether this classification applies independently to immobile patients is unclear.

The Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) is a quality initiative that provides a database for tracking bariatric surgery national outcomes. A variety of demographic information is obtained about patients preoperatively, one of which is immobility. According to the MBSAQIP, the definition of immobility is patients with limited ambulation who require assistive devices, such as a scooter or a wheelchair, for ambulation most or all the time. Additionally, patients require a home lift or elevator to negotiate stairs. The aim of this study was to determine the impact of immobility on MBSAQIP captured 30-day postoperative bariatric surgery outcomes.

Methods

The MBSAQIP 2015 data set was queried for primary minimally invasive bariatric procedures, including laparoscopic sleeve gastrectomy (SG, Current Procedural Terminology [CPT] code 43775), Roux-en-Y gastric bypass (RYGB, CPT codes 43644 and 43645), adjustable gastric band (LAGB, CPT code 43770), and biliopancreatic diversion/duodenal switch (BPD/DS, CPT codes 43845 and 43633). Inclusion criteria included adolescent and adult bariatric surgery patients who underwent a minimally invasive operation, including both laparoscopic and robotic-assisted procedures. Exclusion criteria included all primary open procedures, conversions to open procedures, and bariatric surgery not listed as the primary procedure. Patients were categorized as either immobile or ambulatory with immobility being defined as limited ambulation most or all the time. All 30-day perioperative complications listed in the MBSAQIP data set were identified. Additional outcomes analyzed included reoperation, readmission, operative time, hospital length of stay, and mortality.

Statistical analysis was conducted using SPSS version 21 (IBM Corp., Armonk, NY, USA). Logistic regression analysis was performed to determine a correlation between immobility and the risk of 30-day postoperative complications. All postoperative complications listed in the MBSAQIP data set were analyzed, and an odds ratio (OR) was determined to correlate immobility with the risk of developing these complications as a whole and by procedure type. A P value $< .05$ was considered statistically significant. Institutional review board approval was obtained for this study.

Results

There were 148,710 primary minimally invasive bariatric procedures in 2015: 98,200 (66.0%) SG, 44,527 (29.9%) RYGB, 4631 (3.1%) LAGB, and 1352 (.9%) BPD/DS. Of these patients, there were 2969 (2.0%) immobile patients and 145,741 (98.0%) ambulatory patients.

Preoperative demographic differences between immobile and ambulatory bariatric surgery patients are listed in Table 1. All preoperative co-morbidities were found significantly more often in immobile compared with ambulatory patients. Immobile bariatric surgery patients were older with a mean age of 52.2 years compared with 44.6 years in ambulatory patients ($P = .003$), and their body mass index (BMI) was higher, with a mean of 49.7 kg/m² compared with 45.0 kg/m² in ambulatory patients ($P < .0001$). Additionally, regarding procedure type, immobile patients were more likely to undergo an RYGB (34.9% versus 29.8%, $P < .0001$) or BPD/DS (2.0% versus .9%, $P < .0001$) compared with ambulatory patients. An SG was more commonly performed in ambulatory over immobile patients (66.2% versus 59.9%, $P < .0001$). There was no difference in the types of patients for whom an LAGB was performed (3.2% immobile versus 3.1% ambulatory, $P = .705$).

Regarding postoperative complications, immobile patients had a significantly increased risk of multiple 30-day complications compared with ambulatory patients, demonstrated in Table 2. The 3 complications that were not found to be statistically different in immobile compared with ambulatory patients included intra- or postoperative coma, stroke, and myocardial infarction. Fig. 1 demonstrates the unadjusted ORs of these statistically significant complications, including the 95% confidence interval (CI). These complications include urinary tract infection (OR 2.48, CI 1.64–3.75, $P < .001$), unplanned intensive care unit admission (OR 3.37, CI 2.66–4.27, $P < .001$), acute renal failure (OR 6.42, CI 3.81–10.81, $P < .001$), progressive renal insufficiency (OR 3.20, CI 1.56–6.55, $P = .001$), unplanned intubation (OR 4.33, CI 2.79–6.70, $P < .001$), pulmonary embolism (OR 2.44, CI 1.20–4.97, $P = .01$), perioperative blood transfusion (OR 2.05, CI 1.51–2.79, $P < .001$), wound disruption (OR 4.47,

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