

Original article

Influence of intraoperative hypotension on leaks after sleeve gastrectomy

Simon W. Nienhuijs, M.D., Ph.D.^{a,*}, Uzay Kaymak, Ph.D.^b, Erik Korsten, M.D., Ph.D.^c,
Marc P. Buise, M.D., Ph.D.^c

^aDepartment of Surgery, Catharina Hospital, Eindhoven, The Netherlands

^bFaculty of Industrial Engineering & Innovation Sciences (IE&IS), Eindhoven University of Technology, Eindhoven, The Netherlands

^cDepartment of Anesthesiology, Catharina Hospital, Eindhoven, The Netherlands

Received June 2, 2015; accepted August 24, 2015

Abstract

Background: Leak after a sleeve gastrectomy (SG) is a severe complication. Risk factors, such as regional ischemia, increased intraluminal pressure, technical failure of the stapling device, and surgeon error, have been reported.

Objectives: It was hypothesized that intraoperative hypotension is another risk factor for leak, similar to that reported for colorectal surgery.

Setting: Tertiary teaching hospital in The Netherlands.

Methods: Results of a 7-year cohort of primary SGs were reviewed in relation to multiple intraoperative blood pressure measurements. The thresholds for the mean pressure were 40 to 70 mm Hg and for the systolic pressure 70 to 100 mm Hg. Only continuous episodes of 15 and 20 minutes were included.

Results: Twenty-four leaks were identified in a cohort of 1041 primary SGs. Episodes of systolic blood pressure <100 mm Hg for 15 min ($P = .027$) and 20 minutes ($P = .008$) were significantly related to a staple line leak. An episode of mean blood pressure <70 mm Hg for 20 min was significantly related to leak ($P = .014$). Episodes with lower thresholds of pressure occurred less frequently and revealed no significant differences. Other identified risk factors were smoking ($P = .019$), fast-track recovery program ($P = .006$), use of a tri-stapler ($P = .004$), and duration of surgery ($P = .000$). In a multivariate analysis, only intraoperative systolic pressure <100 mm Hg for 20 minutes remained significant (odds ratio, 2.45; $P = .012$).

Conclusions: Intraoperative hypotension may contribute independently to a leak after SG. (Surg Obes Relat Dis 2016;12:535–540.) © 2016 American Society for Metabolic and Bariatric Surgery. All rights reserved.

Keywords: Sleeve gastrectomy; Leak; Intraoperative hypotension

Bariatric surgery is the only treatment with long-term effect for morbid obesity. To benefit from the resulting weight loss and reduced co-morbidities, it is of utmost importance to diminish the risk of complications. Short-term complications in bariatric surgery primarily include

leaks and bleedings after the procedure. The leak rate after a sleeve gastrectomy (SG), the second-most used technique worldwide to treat morbid obesity [1], is around 2.2% [2]. Factors influencing this complication rate theoretically are related to regional ischemia, increased intraluminal pressure, failure of the stapling device, and surgeon error. In the aforementioned large, systematic review by Parikh et al., the distance from the pylorus, buttressing, and size of the bougie used were investigated for their relationship to leaks [2]. Only the bougie size was found to be of significant

*Correspondence: S.W. Nienhuijs, M.D., Ph.D., Department of Surgery, Catharina Hospital, Michelangelolaaan 2, 5623 EJ Eindhoven, The Netherlands.

E-mail: simon.nienhuijs@cze.nl

influence. Intraoperative hypotension (IOH) as a risk factor for leak has not been reported yet in bariatric surgery, although there is some evidence for this relationship in bowel surgery [3–5]. The risk for developing an anastomotic leak was increased significantly when intraoperative blood pressure was decreased in a cohort of 285 patients undergoing colorectal surgery [3]. The same pattern was found in emergency small bowel surgery [4] and major gastrointestinal surgery [5]. The objective of this study was to investigate the influence of IOH on the leak rate after SG.

Methods

For this project, a collaboration was established between the authors' hospital's departments of surgery and anesthesiology and the Faculty of Industrial Engineering & Innovation Sciences of a university of technology. The surgical database encompassed 1116 SGs performed between 2006 and 2012. SG was used as a revisional procedure in 75 patients. The outcome for SG as a primary procedure has been reported previously [6]. In summary, the surgical technique was consistent, with use of a 34-French tube and without additional reinforcement. Changes during the study period included different staplers being used at different times. The Endo GIA (Covidien, Norwalk, CT) green and blue cartridges were replaced by the Duet TRS stapler (Covidien Norwalk, CT) at the end of 2009, and the Duet TRS was replaced by the contemporary Tri-Staple technology with tan cartridges (Covidien, New Haven, CT) in the second quarter of 2010. In this study, the first 2 types of staplers were categorized as conventional staplers. A second change during the study was the introduction of a fast-track recovery program in 2011. The fast-track protocol consisted of the administration of short acting drugs and stimulation of patients to mobilize a few hours after surgery, similar to protocols of other fast-track or enhanced recovery after-surgery programs. The period before the fast-track program was implemented was defined as the conventional track. Abscesses were taken into account as leak. In total, 24 leaks were encountered (2.3%).

Patient characteristics, procedure details, and complications were extracted from the cohort database. Patient characteristics included age, body mass index, gender, waistline, weight, excess weight, co-morbidities, and smoking. This surgical database was combined with the anesthesiology registry. This registry included medication use, procedure duration, and the noninvasive blood pressure measurement every 2 to 5 minutes during the surgery of the corresponding patient from the surgical database. The medication was categorized into anticoagulants; antacids; analgesics; inhalations for lung diseases; and medication to correct hypertension, diabetes, or dyslipidemia. For each patient, the length and value of an IOH episode was computed. The definitions of hypotension were derived

from a study on hypotension and noncardiac surgery [7]. Hypotension episodes were considered to have occurred if the blood pressure dropped below a threshold for extended periods. The thresholds used for mean blood pressure were 40, 50, 60, and 70 mm Hg. The thresholds for the systolic pressures were 70 to 100 mm Hg. Cut-offs for time were 15 and 20 minutes. The analysis was performed for different combinations of thresholds and time cut-offs to determine the relevant definition of hypotension episodes. Because the blood pressure measurements were not continuous, the duration of the low blood pressure episode had to be estimated (the exact moment when the blood pressure dropped below the threshold was not observed necessarily). Two methods were used for this purpose: (1) the duration was computed as the difference between the known measurements below the threshold, and (2) the duration was computed after estimating when the signal fell below the threshold by using linear interpolation between the 2 measurements where the signal crossed the threshold (i.e., one measurement was above the threshold and the other was below the threshold, or vice versa). The analysis did not demonstrate significant differences between the 2 approaches.

The 2 databases were combined in an SQL server. To address class imbalance, SMOTE oversampling technique was applied in the WEKA data mining software [8]. Predictive models were developed by using logistic regression, decision trees, and random forests. The predictability of leak based on the features considered was confirmed by the results of these models. For associating a hypotensive period with a leak, the Fisher's exact and Mann-Whitney-U tests were used. For identifying relevant factors, a logistic regression analysis was used. A *P* value < .05 was considered significant.

Results

The median surgical time was 49 minutes, with a range of 20 to 248 minutes. The progress of the blood pressure during the procedure is provided in Figure 1. In this figure, *t* = 0 corresponds to the start of the procedure. The figure shows the average blood pressure computed over the population of patients. The colored bands show the 95% confidence interval (95% confidence interval). A uniform drop in pressure 20 minutes after induction of anesthesia (2 green squares) in both systolic and mean arterial is demonstrated. During longer surgeries, the 95% confidence interval is greater due to the low number of procedures with longer procedure times.

The group of patients with a leak (*n* = 24) was compared with the remaining patients (*n* = 1017). Gender, age, and weight measurements were not associated with leaks (*P* = .852, *P* = .461, and *P* = .542, respectively). A total of 175 patients were identified as smokers (16.8%). There were more smokers in the leak group (*P* = .019). None of

Download English Version:

<https://daneshyari.com/en/article/6111247>

Download Persian Version:

<https://daneshyari.com/article/6111247>

[Daneshyari.com](https://daneshyari.com)