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Original article

Influence of continuous positive airway pressure on postoperative leakage in bariatric surgery

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Abstract

Background: Obstructive sleep apnea (OSA) affects two third of morbidly obese individuals undergoing bariatric surgery. Perioperative usage of continuous positive airway pressure (CPAP) is advised for moderately and severe OSA to avoid respiratory failure and cardiac events. CPAP increases the air pressure in the upper airway, but also may elevate the air pressure in the esophagus and stomach. Concern exists that this predisposes to mechanical stress resulting in suture or staple line disruption (further referred to as suture line disruption).

Objectives: To evaluate whether perioperative CPAP usage is associated with an increased risk of suture line disruption after bariatric surgery.

Setting: Obesity Center Amsterdam, OLVG-west, Amsterdam, the Netherlands.

Methods: All patients who underwent bariatric surgery including a suture line were eligible for inclusion. Only patients with information regarding OSA severity as defined by the apnea-hypopnea-index and postoperative CPAP usage were included.

Results: From November 2007 to August 2016, postoperative CPAP status was documented in 2135 patients: 497 (23.3%) used CPAP postoperatively, whereas 1638 (76.7%) used no CPAP. Mean body mass index was 44.1 kg/m² (standard deviation 6.6). Suture line disruption occurred in 25 patients (1.2%). The leakage rate was not associated with CPAP usage (8 [1.6%] in CPAP group versus 17 [1%] in non-CPAP group, $P = .300$). CPAP was no risk factor for suture line disruption in multivariable analysis as well.

Conclusion: Postoperative CPAP does not appear to increase the risk of suture line disruption in bariatric surgery. CPAP is recommended in all patients with moderate or severe OSA who undergo bariatric surgery. (Surg Obes Relat Dis 2017;■:00–00.) © 2017 American Society for Metabolic and Bariatric Surgery. All rights reserved.

Keywords:

Bariatric surgery; Obstructive sleep apnea; Continuous positive airway pressure; Postoperative leakage; Suture line disruption

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Excessive adipose tissue, obesity, affects cardiovascular function, glucose metabolism, and musculoskeletal performance. The overall global population is progressively affected by obesity. Worldwide, the prevalence increased

from 5% to 8% in 1980 to 13% in 2014 [1]. Except for parts of sub-Saharan Africa and Asia, all regions include more individuals with obesity than underweight [1]. Morbidity due to obesity can be reversed by diets, physical exercise, or bariatric surgery. The latter modality is reserved for those individuals with morbid obesity, which represents such severe forms of obesity that prevent normal physical activity and cause onset of pathologic conditions. Defining morbid obesity remains a difficult task as obesity-related health risks vary among individuals. Commonly used definitions are a body mass index >40 kg/m² and a body mass index >35 kg/m² with coexistence of obesity-related co-morbidities. In 2013, over 500,000 bariatric surgical procedures were performed worldwide [2].

One third of the morbidly obese population has a moderate or severe form of obstructive sleep apnea (OSA), a disease that is characterized by at least 15 events of obstruction of the upper airway per hour during sleep [3]. OSA is associated with an increased risk of postoperative respiratory failure and cardiac events [4]. The Society of Anesthesia and Sleep Medicine guidelines recommend the perioperative usage of continuous positive airway pressure (CPAP) therapy to reduce this risk [5].

CPAP provides continuous pressure in the upper airway, which is directly connected to the upper gastrointestinal tract, and concern exists that the increased intraluminal pressure in the esophagus and stomach predisposes to mechanical stress resulting in suture or staple line disruption (further referred to as suture line disruption). The prevalence of suture line disruption is 1.9% after laparoscopic Roux-en-Y gastric bypass (RYGB) and 2.3% after laparoscopic sleeve gastrectomy (SG) [6]. Leak associated mortality varies between 6.3% and 16.7% [7–9].

The influence of postoperative CPAP usage on suture line disruption was evaluated in 3 studies, which all concluded that CPAP was not associated with an increased leakage rate [10–12]. Ramirez et al. [10] reported the largest sample size of 310 patients and stated that a larger series would be necessary to assess the differences between groups. This study presents an analysis of more than 2000 patients.

Methods

Study design and population

All patients who underwent bariatric surgery at the Obesity Center Amsterdam, the Netherlands, met the International Federation for the Surgery of Obesity and Metabolic Disorders criteria for bariatric surgery. All surgical procedures including a suture line were eligible for inclusion. Those with available data on CPAP usage were finally included. Data were retrospectively collected from patient medical records and registered in an anonymous database. The institutional review board provided

approval for this study. Obtaining informed consent for this study was not required.

Surgical procedures

All bariatric procedures including a suture line were considered for inclusion. These included RYGB, SG, one anastomosis gastric bypass, and single anastomosis duodeno-ileal bypass with sleeve gastrectomy. Both primary and revisional procedures were included. All surgical procedures were performed laparoscopically and according to standardized techniques. Anastomoses were created with linear Echelon Flex (Johnson and Johnson, Somerville, NY, USA) and V-lock (Covidien, Dublin, Ireland). Staple lines were created with above-mentioned staplers. The Seamguard Reinforcement (Gore, Newark, DE, USA) was introduced for SG procedures in May 2016 and has been used on routine basis few months later.

OSA and CPAP

From 2012 onward, all patients scheduled for bariatric surgery undergo a poly(somno)graphy to evaluate the presence of OSA and its severity. Before this period, sleep studies were only performed in limited cases. Reasons for performing these sleep studies were severe complaints that may be related to OSA or high clinical suspicion by the physician. Some patients had undergone a sleep study before referral to a bariatric clinic. The apnea hypopnea index (AHI) is a severity index for OSA and represents the number of apneic events per hour during sleep. An AHI >15 /hour defines moderate or severe OSA and is generally an indication for CPAP therapy. Indicating need for CPAP therapy is a collaboration of the otorhinolaryngologist and pulmonologist. The amount of positive pressure is variable. Patients are asked to bring their own CPAP mask and machine to the hospital.

Statistical analysis

All data were analyzed using SPSS 21.0 for Windows (SPSS, Inc., Chicago, IL, USA). Continuous baseline variables were compared with independent *t* test or Mann-Whitney *U* test, depending on normality evaluated with histograms. Categorical variables were compared with χ^2 test. Effect of CPAP usage on leakage rate was calculated with χ^2 test. The predictive value of CPAP usage and CPAP pressure for suture line disruption was evaluated with (multivariable) logistic regression analysis.

Results

Study population

From November 2007 until August 2016, 2410 patients underwent a bariatric procedure including a suture line. Information regarding postoperative CPAP usage was

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