ELSEVIER

Surgery for Obesity and Related Diseases ▮ (2015) 00–00

SURGERY FOR OBESITY AND RELATED DISEASES

Original article

Interest in bariatric surgery among obese patients with obstructive sleep apnea

Katherine A. Dudley, M.D.[a,*], Ali Tavakkoli, M.D.[b], Robert A. Andrews, M.D.[c], Ashley N. Seiger, B.S.[a], Jessie P. Bakker, Ph.D.[a], Sanjay R. Patel, M.D., M.S.[a]

[a]*Division of Sleep and Circadian Disorders, Brigham and Women's Hospital, Boston, Massachusetts, United States*
[b]*Center for Weight Management and Metabolic Surgery, Brigham and Women's Hospital, Boston, Massachusetts, United States*
[c]*Division of General, Minimally Invasive and Acute Care Surgery, North Shore–LIJ Lenox Hill Hospital, New York, New York, United States*

Received October 28, 2014; accepted January 9, 2015

Abstract

Background: Standard obstructive sleep apnea (OSA) therapies are poorly tolerated. Bariatric surgery is a potential alternative but the level of interest in this intervention among OSA patients is unknown.

Objectives: Determine the proportion of OSA patients who would be interested in bariatric surgery.

Setting: Sleep clinics, United States.

Methods: Consecutive adult patients with untreated severe OSA and a body mass index of 35–45 kg/m^2 were approached. Patients at low perioperative risk and no urgent indication for OSA treatment were invited to a separate informational visit about bariatric surgery as primary treatment for OSA.

Results: Of 767 eligible patients, 230 (30.0%) were not at low perioperative risk, 49 (6.4%) had drowsy driving, and 16 (2.1%) had no insurance coverage for bariatric surgery. Of the remaining 482 patients, over one third (35.5%) were interested in bariatric surgery. Surgical interest was 47.2% in women versus 27.6% in men ($P < .01$) and 67.3% in diabetics versus 31.0% in nondiabetics ($P < .01$). In multivariable adjusted models, female gender (odds ratio 1.89, 95% CI [1.10–3.25]) and diabetes (odds ratio 3.97, 95% CI [1.97–8.01]) remained highly predictive of bariatric surgery interest.

Conclusions: Nearly two thirds of obese patients with severe OSA are good candidates for bariatric surgery. Among candidates, over one third are interested in this treatment. Interest rates are highest among women and diabetics, indicating that metabolic improvements continue to be a major driver of surgery even in patients with severe OSA. Given patient interest, the role of bariatric surgery should be routinely discussed with obese OSA patients. (Surg Obes Relat Dis 2015;▮:00–00.)

Keywords: Obstructive sleep apnea; Bariatric surgery; Obesity; Diabetes; Perioperative risk

Obstructive sleep apnea (OSA) is an increasingly common disease associated with numerous adverse effects including excessive daytime sleepiness, motor vehicle accidents, and cardiovascular disease [1]. Obesity is the most common risk factor for OSA, with over 50% of OSA cases attributable to excess weight [2]. As such, OSA commonly co-exists with obesity and may exacerbate other obesity-related complications such as type 2 diabetes and hypertension [3–5].

*Correspondence: Katherine A. Dudley, M.D., Brigham and Women's Hospital, Division of Sleep and Circadian Disorders, 221 Longwood Avenue, BL-225, Boston, MA, 02115
E-mail: kdudley@partners.org

http://dx.doi.org/10.1016/j.soard.2015.01.006
1550-7289/

Continuous positive airway pressure (CPAP) is an efficacious treatment for OSA [6,7]; however, its effectiveness is frequently limited by suboptimal adherence [8]. Although CPAP treats OSA, it does not target obesity or obesity-related co-morbidities. In fact, CPAP may cause weight gain [9]. Furthermore, weight loss has a greater cardiovascular benefit than CPAP alone in OSA, supporting an important role for weight loss therapies in the management of OSA [10].

Bariatric surgery as treatment for OSA offers several advantages compared with CPAP. Importantly, it offers a potential cure of OSA to patients, whereas in most cases CPAP is recommended as a lifelong therapy. Equally significant, it offers health benefits beyond treatment of OSA, in that it treats co-morbid obesity and co-existing obesity-related diseases [11]. Among sleep clinics, however, bariatric surgery remains infrequently utilized. Reasons are unclear but may include the perception that many OSA patients are poor surgical candidates, a belief that patients are not interested in this option, sleep provider discomfort surrounding discussion of weight management, and/or a lack of familiarity with bariatric procedures. In this study, we sought to assess candidacy for bariatric surgery and the interest level in this treatment among obese patients presenting to sleep clinic for treatment of OSA.

Methods

Study population

Consecutive patients presenting to sleep disorders clinics with untreated OSA were screened for potential eligibility for a randomized trial comparing effectiveness of bariatric surgery versus CPAP (NCT01187771). Initially, recruitment took place throughout a network of for-profit sleep clinics throughout the metropolitan Boston, Massachusetts, as well as an academic medical center. After the for-profit sleep clinics closed due to bankruptcy, screening expanded to 2 additional academic sleep programs. The institutional review boards governing all of the participating sleep clinics approved the study.

Inclusion criteria were (1) aged 18–65 years, (2) body mass index (BMI) 35–45 kg/m^2, (3) severe OSA with at least 1 referable symptom (such as excessive daytime sleepiness), (4) no CPAP therapy in the past 2 years, and (5) no prior bariatric surgery. All patients had undergone either in-laboratory attended polysomnography or an unattended home-based study with a type 3 monitor as dictated by clinical provider and insurance coverage. Severe OSA was defined as an apnea hypopnea index (AHI) $\geq$30 events/hr based on the 2007 American Academy of Sleep Medicine (AASM) alternative scoring criteria [12]. For studies where this index was not available (primarily due to a home-based study), severe OSA was defined as an AHI $\geq$20 events/hr based on the 2007 AASM recommended scoring criteria.

Study protocol

All English-speaking patients being seen for OSA were screened. Patients who had (1) a history of congestive heart failure or ischemic heart disease; (2) other major health condition such as end-stage renal disease, cirrhosis, or any disease requiring chronic systemic steroid use; (3) poor functional status (e.g., inability to walk 200 ft) or other unstable health condition such as uncontrolled hypertension or diabetes mellitus, cancer being actively treated, or uncontrolled mood disorder; (4) active tobacco use; (5) history of venothromboembolism; (6) hypoventilation syndrome; and/or (7) were pregnant were considered to be at elevated risk for perioperative complications from bariatric surgery. Patients who reported drowsy driving were deemed poor candidates for primary surgical treatment due to a need for urgent therapy. Interest level was also not assessed in those lacking insurance coverage for bariatric surgery.

For remaining patients, permission was obtained to approach the patient about bariatric surgery. If the patient expressed interest, a separate informational session about OSA and bariatric surgery was scheduled with a sleep physician and bariatric surgeon. Patients who agreed to the visit or who already planned to obtain bariatric surgery were considered "interested" in bariatric surgery. Patients who declined the informational visit due to a lack of interest in bariatric surgery or preference for CPAP, oral appliance, medical weight loss, or no treatment were considered "not interested" in bariatric surgery. Patients who declined involvement due to other reasons such as difficulty attending appointments (e.g., for time, travel, family, or financial concerns) or lack of interest in research were excluded from analyses of interest in bariatric surgery.

Data collection

Information regarding demographic characteristics, co-morbidities, medications, and prior CPAP use was obtained from the electronic medical record. Co-morbidities were defined primarily based on medication use. If medication information was unavailable, physician diagnosis of the co-morbidity documented in the medical record was used.

Data analysis

Differences between groups were compared using Fisher's exact test for categorical variables and Student's *t* test for continuous variables. Multivariable logistic regression models were used to identify predictors of interest in bariatric surgery adjusting for potential confounders. Base models adjusted for age, gender, and clinic site. An additional model included BMI, AHI, prior CPAP use, hypertension, dyslipidemia, gastroesophageal reflux disease/peptic ulcer disease, and diabetes mellitus. All analyses were performed using SAS 9.3.