Q: Do all patients undergoing bariatric surgery need polysomnography to evaluate for obstructive sleep apnea?

ROOP KAW, MD
Department of Hospital Medicine,
Cleveland Clinic, Cleveland, OH

VESSELIN DIMOV, MD
Department of Hospital Medicine,
Cleveland Clinic, Cleveland, OH

CHARLES BAE, MD
Sleep Disorders Center, Neurological Institute,
Cleveland Clinic, Cleveland, OH

A: Yes. Clinical scoring schemes are not accurate enough to replace polysomnography in the evaluation for obstructive sleep apnea (OSA).

Sleep apnea: A prevalent and serious risk factor in bariatric surgery patients

Obesity is associated with an increased risk of OSA. The prevalence of OSA in patients with a body mass index (BMI) greater than 30 is 20% to 40%.[1] Recent series of patients evaluated for bariatric surgery have shown that the prevalence in these patients can range between 70% and 91%.[2–4]

OSA can have a significant effect on both the perioperative and postoperative care of the surgical patient. A 2001 study found that up to one third of patients with OSA undergoing hip replacement or knee replacement surgery developed substantial respiratory or cardiac complications (including arrhythmias, myocardial ischemia, unplanned intensive care unit transfers, and/or reintubation), mostly within the first 72 hours after surgery.[5] A more recent review of more than 3,000 patients undergoing bariatric procedures from a single institution found that sleep apnea was a positive predictive factor for anastomotic leaks.[6] In another series of 311 patients undergoing bariatric surgery, the presence of OSA more than doubled the odds of having a hospital stay longer than 3 days (odds ratio [OR] = 2.25).[7]

Clinical scoring systems for apnea severity in obese patients

Despite the ease with which it can be assessed, day-time sleepiness is not a good predictor of OSA in the morbidly obese population. Several studies have attempted to determine whether clinical parameters such as the Epworth Sleepiness Scale (ESS) or BMI can predict OSA or its severity. In a study of 66 patients undergoing bariatric surgery, patients with an ESS score greater than 6 were selected to undergo polysomnography for evaluation for OSA.[8] No correlation was noted between the BMI, history of snoring, an elevated ESS score, and the severity of OSA as determined by the respiratory disturbance index.[8]

A larger study of 99 severely symptomatic obese patients undergoing bariatric surgery identified several independent clinical predictors of significant OSA, defined as a score of 15 or greater on the apnea-hypopnea index (AHI).[9] Conveniently expressed as the acronym BASH'IM, these predictors include the following (presented with OR and 95% confidence interval [CI] for an AHI score $\geq$ 15):

- **BMI $\geq$ 45** (OR = 4.3; 95% CI, 1.7 to 11.1)
- **Age $\geq$ 38 years** (OR = 3.4; 95% CI, 1.3 to 9.2)
- **Observed sleep apnea** (OR = 3.3; 95% CI, 1.4 to 8)
- **HbA$_{1c}$ $\geq$ 6%** (OR = 5.9; 95% CI, 2.2 to 15.8)
- **Fasting plasma insulin $\geq$ 28 μmol/L** (OR = 10.2; 95% CI, 3.4 to 30)
- **Male sex** (OR = 5.2; 95% CI, 1.9 to 14.8).

Alternately, an additional factor—neck circumference of 43 cm or greater—can replace BMI and male sex and, together with the remaining four factors, provide similar predictive value (Cox and Snell r^2 = 0.46).

Although the mean ESS score for this study population was higher than the community norm, none of these variables was associated with a higher ESS score. Furthermore, clinical symptoms such as habitual snoring were present in 94% of the study population, but the predictive value of such symptoms was poor, except for observed sleep apnea. A composite BASH'IM score of 3 or greater (in which 1 point is assigned for each factor present) was found to have a sensitivity of 80% and specificity of 91% for an AHI score of 15 or greater. The authors concluded that the BASH'IM score can be used to identify patients who are appropriate candidates for polysomnography. For instance, if polysomnography had not been performed on patients with a BASH'IM score of 0 to 1, 49% of negative polysomnographic findings in this study would have been avoided.[9]

Evidence supporting routine polysomnography before bariatric surgery

Polysomnography remains the gold standard for the diagnosis of OSA. In a study of 100 consecutive patients evaluated prior to gastric bypass surgery, Rasheid et al diagnosed OSA by polysomnography in 58% of subjects and concluded that the severity of OSA cannot be reliably predicted by preoperative BMI or ESS score.[10] Similarly, O'Keeffe and Patterson demonstrated a 77% prevalence of OSA by polysomnography in a cohort of 170 consecutive patients presenting for bariatric surgery and found no correlation of OSA with BMI; the prevalence of OSA was higher in severely obese patients (BMI 35 to 39.9) than in morbidly obese patients (BMI 40 to 49.9).[3] In the most recent and largest study to date,[4] 19% of patients presenting for bariatric surgery had a clinical diagnosis of OSA. However, routine polysomnography prior to bariatric surgery demonstrated a 91% prevalence of OSA, as opposed to 58% when clinical parameters and ESS score alone were used to screen for OSA.[4] These and other authors strongly recommend polysomnography for all patients undergoing bariatric surgery.[2–4,10]

Conclusions

Clinical evaluation continues to miss a significant proportion of OSA cases among morbidly obese patients presenting for bariatric surgery, and OSA portends a significant increase in postoperative complications. Until there is a reliable method to predict the presence of OSA, routine polysomnography is indicated for all patients undergoing bariatric surgery.

■ REFERENCES

1. **Kyzer S, Charuzi I.** Obstructive sleep apnea in the obese. World J Surg 1998; 22:998–1001.
2. **Frey WC, Pilcher J.** Obstructive sleep-related breathing disorders in patients evaluated for bariatric surgery. Obes Surg 2003; 13:676–683.
3. **O'Keeffe T, Patterson EJ.** Evidence supporting routine polysomnography before bariatric surgery. Obes Surg 2004; 14:23–26.
4. **Hallowell PT, Stellato TA, Schuster M, et al.** Potentially life-threatening sleep apnea is unrecognized without aggressive evaluation. Am J Surg 2007; 193:364–367.
5. **Gupta RM, Parvizi J, Hanssen AD, Gay PC.** Postoperative complications in patients with obstructive sleep apnea syndrome undergoing hip or knee replacement: a case-control study. Mayo Clin Proc 2001; 76:897–905.
6. **Fernandez AZ Jr, DeMaria EJ, Tichansky DS, et al.** Experience with over 3,000 open and laparoscopic bariatric procedures: multivariate analysis of factors related to leak and resultant mortality. Surg Endosc 2004; 18:193–197.
7. **Ballantyne GH, Svahn J, Capella RF, et al.** Predictors of prolonged hospital stay following open and laparoscopic gastric bypass for morbid obesity: body mass index, length of surgery, sleep apnea, asthma, and the metabolic syndrome. Obes Surg 2004; 14:1042–1050.
8. **Serafini FM, MacDowell Anderson W, Rosemurgy AS, Strait T,**

Murr MM. Clinical predictors of sleep apnea in patients undergoing bariatric surgery. Obes Surg 2001; 11:28–31.

9. Dixon JB, Schachter LM, O'Brien PE. Predicting sleep apnea and excessive day sleepiness in the severely obese: indicators for polysomnography. Chest 2003; 123:1134–1141.

10. Rasheid S, Banasiak M, Gallagher SF, et al. Gastric bypass is an effective treatment for obstructive sleep apnea in patients with clinically significant obesity. Obes Surg 2003; 13:58–61.

Correspondence: *Roop Kaw, MD, Department of Hospital Medicine, Cleveland Clinic, 9500 Euclid Avenue, S70, Cleveland, OH 44195; kawr@ccf.org.*