

CLINICAL ANESTHESIOLOGY

Increasing BMI Adds to Risk for Hypoxemia in Monitored Anesthesia Care

BOSTON—Although the risk factors for hypoxemia in obese patients undergoing general anesthesia are well known, the risk is less clear when it comes to monitored anesthesia care (MAC). Yet, as a study by a team of NYU Langone Medical Center researchers has shown, the relationship is the same under MAC anesthesia, with the incidence of hypoxemia rising sharply in patients with a body mass index (BMI) greater than 30 kg/m². Their study also found that increased age and the addition of any comorbidity markedly increased the probability of hypoxemia in these individuals.

“As we all know, there’s an epidemic of obesity in the United States,” said Samion Shabashev, MD, a cardiothoracic anesthesiology fellow at the New York City–based institution. “Whether we want to blame video games, fast food or just laziness, the fact is that our patient population is getting bigger. At the same time, the concept of perioperative efficiency places more and more pressure to move patients through our ambulatory centers.

“Anyone that has treated obese patients knows that ventilation is a challenge,” Dr. Shabashev said. “In our institution alone, we’ve had publications demonstrating that the incidence, severity and duration of hypoxemia is strongly associated with increased BMI during general anesthesia [*J Clin Anesth* 2016;33:97-104]. However, there haven’t really been any studies looking at the incidence of hypoxemia when patients are undergoing monitored anesthesia care.”

In an effort to better define this relationship, Dr. Shabashev and his colleagues analyzed the records of 11,595 patients undergoing MAC for ambulatory endoscopy procedures at six freestanding ambulatory gastroenterology practices between June 2015 and June 2016. Patients were excluded from the ambulatory facilities if their BMI was greater

than 42 kg/m², although one of the six locations, which boasted redundant anesthesia staff, allowed for a BMI limit of 45 kg/m². “All the patients in the study were relatively healthy, meaning they had no other comorbidities or they were well controlled,” Dr. Shabashev said.

For purposes of the investigation, hypoxemia was defined as peripheral capillary oxygen saturation less than 90%, and was measured using a targeted query of intraoperative vital signs recorded in an anesthesia electronic information system. Oxygen saturation was recorded in the database at one-minute intervals. BMI was separated into five categories based on obesity severity:

- 10 to 24.9 kg/m² (n=5,194)
- 25 to 29.9 kg/m² (n=3,932)
- 30 to 34.9 kg/m² (class I obesity; n=1,756)
- 34.9 to 40 kg/m² (class II obesity; n=584)
- greater than 40 kg/m² (class III obesity; n=129)

Logistic regression controlled for a number of variables, including age, sex, asthma, chronic obstructive pulmonary disease, gastroesophageal reflux disease, smoking history, type of procedure and length of case. A restricted cubic spline plot was generated to graphically represent the relationship between BMI and hypoxemia.

As Dr. Shabashev reported at the 2017 annual meeting of the American Society of Anesthesiologists (abstract A1098), the cubic spline plot suggests that the incidence of hypoxemia began to rise at a BMI of approximately 25 kg/m², then rose sharply to 30 kg/m². The analysis also revealed a significant association between hypoxemia and class I obesity patients (odds ratio [OR], 1.6; 95% CI, 1.3-1.8), class II obesity patients (OR, 2.8; 95% CI, 2.2-3.4) and class III obesity patients (OR, 1.8; 95% CI, 1.1-2.9).

“We found it interesting—and were somewhat surprised to see—that there was a significant

rise in hypoxemia once the BMI hit 30 kg/m²,” Dr. Shabashev said (Figure). “Previous studies have shown that you really have a higher chance of developing hypoxemia once you go over 40 kg/m². But our study in MAC anesthesia demonstrated that the incidence of hypoxemia starts to increase once you start hitting a BMI of 30 [kg/m²].

“What’s more,” he added, “if you were to include patients that had any additional comorbidities, the graph would look the same in terms of the curve but would shift upward, meaning these individuals had a higher probability of developing hypoxemia.”

What Is the Significance?

These results, he continued, demonstrate that even relatively healthy obese patients are at increased risk for hypoxemia during MAC anesthesia. Nevertheless, the study did not address the implications of hypoxemia in these individuals. “Because we didn’t measure the duration and severity, the clinical significance of hypoxemia is still unknown,” he said. “However, this does start the conversation and begin to help us define whether obese patients should be undergoing MAC in ambulatory care centers.”

Yet, for Girish P. Joshi, MBBS, MD, a professor of anesthesiology and pain management at UT Southwestern Medical School, in Dallas, it was this missing piece that makes all the difference. “As you pointed out, the biggest question here is what are the consequences of hypoxemia,” Dr. Joshi said. “Without that, having hypoxemia itself doesn’t mean that much; we’ve got to go to the next step. There are many studies showing that these patients experience hypoxemia, but what we need to know is if there’s a consequence to it. I think it’s time to start looking at the consequences of hypoxemia,” Dr. Joshi said, adding, “We’ve got to go beyond hypoxemia itself.”

However, for study co-investigator Tessa K. Huncke, MD, a clinical professor of anesthesiology, perioperative care and pain medicine at NYU Langone, the trial’s results were a perfect starting point for evidence-based decision making. “We’re under pressure all the time to increase the BMI threshold of the patients we see in our ambulatory endoscopy suites,” Dr. Huncke said. “One of the reasons we performed the study was to show our gastroenterologists that we really are increasing the risk with increased BMI. And it just takes one disastrous event to shut the facility down. So our goal is to make our decisions based on evidence.”

For Richard M. Sommer, MD, a clinical professor of anesthesiology, perioperative care and pain medicine at NYU Langone, the issue begins and ends with hypoxemia itself. “The first thing I’d like to point out is that hypoxemia has never been shown to be great for patients,” Dr. Sommer said. “In fact, patients who get severe hypoxemia that is not relieved can die.

“I think it’s very clear—and this study helps point it out—that taking care of the obese and severely obese patient is a very challenging thing,” he said. “And hypoxemia cannot necessarily be improved by just doing simple maneuvers like opening up the airway.”

—Michael Vlessides

Dr. Shabashev and Huncke reported no relevant financial disclosures.

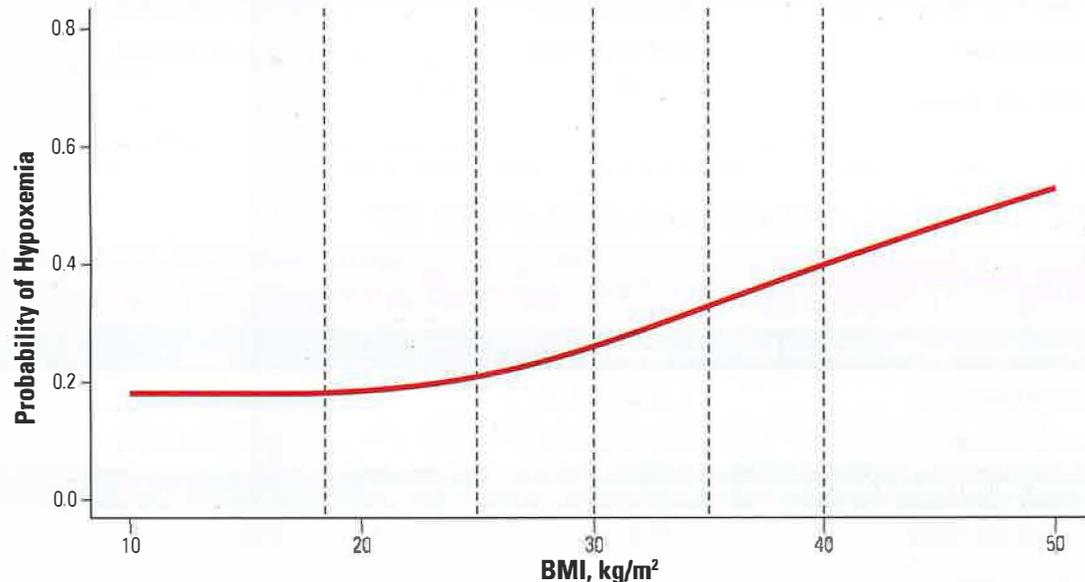


Figure. Spline plot of probability of hypoxemia related to body mass index.