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Topic:

Pediatric Obesity, OSA, Prematurity, and Ambulatory Surgery

Objectives:

After reading this problem based learning case, the learner will be able to:

1. Describe the perioperative management of obesity and obstructive sleep apnea (OSA) in patients presenting for ambulatory surgery;
2. Summarize the current literature examining pediatric obesity and OSA and how these comorbidities increase the risk for perioperative adverse events;
3. Identify which factors may make certain patients inappropriate candidates for ambulatory surgery – as applies to the patient themselves as well as the particular capabilities of your ASC;
4. Apply knowledge of the impact of pediatric obesity, prematurity and suspected or diagnosed OSA to everyday ambulatory anesthesia practice.

Background:

Patient:

A 5 year old male is scheduled at your ambulatory surgical center for dentistry under GETA. His parents state that he snores AND “holds his breath when he sleeps” but he hasn’t had a sleep study. He also has a diagnosis of ADHD. They have Medicare and have been waiting 6 months for this procedure.

PMH: Obesity and prematurity – ex 31 weeker, intubated x 2 weeks, but no current respiratory diagnosis or symptoms.

PE: 3 feet 5 inches tall (107 cm) weighing 55 pounds (25 kg) (BMI 23: > 99th ile for age/sex)

LABS: None

Medications: Gummy vitamins, clonidine nightly for sleep.

PSH: No prior surgeries

Guiding Questions:

1. Is this patient appropriate for ambulatory surgery? What do you tell the parents about anesthetic risks?
2. Does the patient need a sleep study prior to dentistry? What data would you be looking for and how would it influence your decision making process?
3. What anesthetic challenges can you anticipate in an obese pediatric patient?
4. How does the patient’s previous prematurity impact your evaluation of perioperative risk?
5. What is your plan for perioperative pain control? Discuss how both obesity and obstructive sleep apnea affect your choice of analgesic agents, specifically opioids.
6. Should the fact that rescheduling the case will result in another 6 month wait for an open slot influence your decision?
7. How would the above issues impact your discharge policy for this patient?

Discussion:

There is no overarching list of selection criteria for ambulatory surgery for pediatric patients. Individual centers create criteria in alignment with the capacities of their staff and institution. For example, a university associated ambulatory surgery center staffed by fellowship trained pediatric anesthesiologists and with a transferring hospital 10 minutes away may have more lenient selection criteria than a rural ambulatory center staffed by general anesthesiologists who care for children infrequently and is an hour and a half away from any transferring hospital. That being said, there are certain patient characteristics and comorbidities predictive of an increased incidence of perioperative complications. One of the most common in the pediatric population is obesity.

Obese pediatric patients have an increased risk for perioperative adverse events¹⁻⁴, amongst these are increased incidence of upper airway obstruction, desaturations and bronchospasms. Most anesthesiologists who take care of children regularly are adept at managing these respiratory complications⁵, but individuals who care for children infrequently may have more difficulty. Again, the comfort level and skillset of the provider are what are most important in determining outcomes. Similarly to adults, obese children are more difficult to mask ventilate and tend to desaturate more quickly. They can be very difficult IV access, which can become an issue if there is ventilatory compromise during an inhalation induction. In addition, obese children may receive overdoses of opioids and underdoses of paralytic or reversal agents, leading to adverse sequelae⁶. They have greater rates of unplanned hospital admissions, prolonged PACU lengths of stay and an increased need for antiemetics¹⁻². All of this runs antithetical to the goals of an ambulatory surgery center which are efficiency and rapid throughput.

In pediatric patients, obesity is the major risk factor associated with obstructive sleep apnea (OSA)⁷. While not all obese children have OSA it is likely a majority of them do to some degree - estimates range from 50-60%. In addition, there is no good screening tool for OSA in children⁸. Snoring does not have a 1:1 correlation with OSA. While polysomnography is the gold standard for diagnosis of obstructive sleep apnea (OSA) in both adults and children, only a

small percentage of children with OSA will have undergone this testing. The reasons for this are multifactorial but involve expense, difficulties in scheduling, and poor patient cooperation. Regardless of definitive testing, the prevalence and severity of OSA increases with increasing BMI. Therefore the obese pediatric patient presents a twofold conundrum – do they have OSA, and if so to what degree? Most times the answer to this remains a mystery and it is safest to operate under the assumption that 1. Yes they do, and 2. Moderate – Severe. Children with OSA will demonstrate an increased sensitivity to opioid analgesics^{9,10}. This can lead to recurrent or prolonged apnea in the recovery period, especially if long acting opioids are used. While most of the literature regarding OSA examines adenotonsillectomy, dentistry under general anesthesia is generally performed with an intubated patient and arguably involves the airway. The same precautions in terms of opioid use and prescription should be applied. The dentist should be encouraged to use local anesthetic if performing extractions. Opioids can be avoided entirely or small doses of a short acting opioid given intraoperatively. Multimodal analgesia should be applied. Acetaminophen and ibuprofen or acetaminophan and ketorolac should be sufficient for the remaining discomfort.

Prematurity is a risk factor for increased respiratory complications during anesthesia and sedation well beyond infancy. Havidich et al.¹² demonstrated that patients born preterm (prior to 37 weeks PCA) are nearly twice as likely to develop sedation and or anesthesia adverse events – generally respiratory complications. In addition they found that this risk continues up to 23 years of age. This finding highlights the importance of asking about prematurity in the preoperative evaluation, especially when you are weighing risk factors.

In order to safely take care of a patient with multiple risk factors for respiratory complications one must do what is reasonable to minimize them. Along with the above mentioned minimization of opioids and utilization of multimodal analgesia the manner of anesthesia induction may have an impact. A recent study by Ramgolam et al.¹³ demonstrated that inhalation induction is associated with greater perioperative respiratory adverse events in children susceptible to respiratory complications when compared to IV induction. If a patient is at increased risk for respiratory complication performing an IV as opposed to an inhalational induction may temper those complications.

There are many factors involved in deciding how to or whether to proceed with an anesthetic for surgery. Evaluation of the child's risk factors for respiratory complications is chief amongst them. It is also reasonable to consider the time and effort put forth by the child's caregivers⁵ in terms of travel, time off work, etc. All of this should be done with an honest consideration of the skillset and comfort level of the anesthesia provider. There is no perfect answer, only the delicate interplay of what can be safely done at one particular institution, with one specific patient, and one particular provider – all of which are continually moving parts.

Be aware that the incidence of childhood obesity continues to increase¹⁴ and that obese children have a higher incidence of perioperative respiratory complications. The rise in pediatric obesity will be accompanied by a concomitant rise in the number children with OSA and its perioperative sequelae. Children presenting for surgical procedures will have comorbidities that need to be addressed and awareness of and careful planning for these patients will enable you to provide the safest anesthetic care.

The most significant thing you can do to enhance patient safety is to be aware of the likelihood of respiratory complications and be prepared to manage them.

Take Home Points:

1. Pediatric obesity and obstructive sleep apnea are closely related
2. Obese pediatric patients are at greater risk of respiratory complications during anesthesia and sedation
3. Multimodal analgesia and avoidance or minimization of opioids is recommended for obese pediatric patients
4. A history of prematurity is a significant compounding risk factor for perioperative respiratory complications
5. There is no one answer or guideline to determine the appropriateness of a patient for ambulatory anesthesia. There is a complex interplay of the skills and comfort level of the providers and the capabilities of the ASC in terms of staff, equipment, and transfer of care agreements.

References:

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