



Should you clear a child with a URI for surgery?

Answering that question requires that you consider the nature of the surgery, the type of anesthetic, and whether the patient has a fever or a cough.

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PRACTICE RECOMMENDATIONS

› Consult the anesthesiologist if a pediatric patient is about to undergo an elective surgical procedure and is febrile or coughing—especially if the child has significant comorbidities. These conditions may warrant postponing the procedure. **(A)**

› Avoid surgery in a child with cardiac disease who has inflammatory respiratory disease—especially if he or she has had palliative procedures for cyanotic lesions or has a hypoplastic right or left heart. **(A)**

Strength of recommendation (SOR)

- (A)** Good-quality patient-oriented evidence
- (B)** Inconsistent or limited-quality patient-oriented evidence
- (C)** Consensus, usual practice, opinion, disease-oriented evidence, case series

CASE ► You are seeing a 2-year-old boy with a runny nose in your busy clinic. He was sent to you by a local surgeon who plans to repair a hernia 3 days from now. Other than the upper respiratory tract infection, the child is healthy. The surgeon wants you to clear the boy for surgery to avoid the possibility of the anesthesiologist canceling on the day of the procedure.

What are your next steps?

In our experience, children are regularly brought to the ambulatory surgery suite after having seen their family physician or pediatrician. To better equip you for such visits, we've put together the following summary of the risks for a child with an upper respiratory infection (URI) who is about to undergo surgery. We've also detailed some of the reasoning and evidence behind the decisions that anesthesiologists make in cases like this.

Making decisions in the absence of consensus

While the American Society of Anesthesiologists has a consensus statement on preoperative fasting to reduce the risk of pulmonary aspiration,¹ there is no consensus on how to manage a child scheduled for elective surgery who develops a URI.

Historically, any child with a current or recent URI would not be considered a candidate for elective surgery due to the potential for respiratory complications caused by airway irritability.² These complications can include bronchospasm, laryngospasm, hypoxemia, croup, pulmonary shunting, atelectasis, postoperative apnea, negative pressure pulmonary edema, and airway or endotracheal tube obstruction from increased secretions.³

This concern has been based on the clinical observation that children with URI-related airway irritability are at a greater risk of having such events during the perioperative period.⁴ In fact, pulmonary function studies reveal an increase in airway

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irritability for as long as 6 weeks after a significant URI.

Many children with a URI will have airway edema and increased secretions in the upper nasopharynx and the posterior oropharynx down to the level of the vocal cords. In addition, patients with some viral infections—including respiratory syncytial virus—may experience increased edema in the larynx, trachea, and small and large bronchi. The presence of airway inflammation increases mucus production, which is normally coughed out in an awake patient.

The period between the awake state and surgical anesthesia—referred to as Stage 2—is the time of highest risk for the development of laryngospasm. Stage 2 occurs both during the induction of and the emergence from general anesthesia. Children who develop laryngospasm may be difficult to ventilate by mask, and tracheal intubation can be difficult through the closed glottis. In these clinically emergent situations, patients become hypoxemic rapidly. Ventilation may be possible only if the vocal cords are relaxed with agents such as succinylcholine.⁵

If the anesthesia team cannot quickly treat such laryngospasm, it can lead to postobstructive pulmonary edema. Negative pressure developed in the thorax during spontaneous ventilation against a closed glottis causes a pressure gradient across the alveolar-capillary membrane, leading to movement of fluid into the alveoli, characterized by a typically pink, frothy transudate. Hypoxia may ensue, and the chest x-ray will reveal pulmonary edema. Mild forms may respond to an increase in ambient oxygen alone, but severe cases may require intubation, ventilation, and diuretics to restore the child to a normal state.⁶

Certain anesthetic agents may be problematic

Unfortunately, airway irritability is only one of many problems to contend with. Inhalational anesthetic agents have an adverse effect on the mucociliary elevator, as well.^{7,8} Cilia on the surface of epithelial cells lining the trachea and bronchi act to move mucus from the distal to the proximal airway so that it can be

coughed out. Failure of this mechanism in a child with an inflammatory condition in the airway increases the risk of atelectasis from thickened secretions and occasionally from pneumonia.

Most of the potent general anesthetic agents have significant bronchodilatory properties. But desflurane, a commonly used agent, causes bronchoconstriction when used in a patient with an irritated, infected airway.⁹ This agent will produce predictable wheezing from bronchospasm, especially in patients who have confounding pulmonary disease such as asthma.

■ Talk to the anesthesiologist. With these concerns in mind, clinicians must consider the type of anesthetic and the nature of the surgical procedure and discuss these issues with the anesthesiologist in the preoperative period. Some anesthetic agents and techniques are less irritating to airways.^{2,3} Avoidance of both desflurane and endotracheal intubation, for instance, will minimize airway irritation.

Brief procedures that do not involve major body cavities (eg, abdominal, thoracic, and intracranial) may be done without instrumenting the trachea. Face masks and laryngeal mask airways have been shown to decrease the incidence of adverse reactions because these forms of airway management are less invasive and physiologically insulting than direct laryngoscopy and endotracheal intubation.

Clinical observations suggest that endotracheal intubation increases pulmonary risks for the child with a URI.^{10,11} Long procedures, a patient position that limits access to the airway, the anticipated need to use muscle relaxants, airway surgery, and surgery in major cavities all require intubation for airway management. In these circumstances, it's best to plan the perioperative care of a child suffering from a URI with an anesthesiologist who is comfortable caring for pediatric patients.¹²

Proceeding with surgery despite the risks

During emergency procedures on infants and children, the anesthesiologist has to do the

best possible job under less than ideal conditions. Bowel obstruction, an incarcerated inguinal hernia, or a foreign body in the airway can all be life-threatening. In these cases, the anesthesiologist will counsel the surgeon and parent on the risks of the anesthetic. They likely will proceed with the knowledge that the usual methods of anesthetizing a child may have to be altered to provide the safest possible conditions.

But even certain nonemergent procedures may require taking some risks. Anesthesiologists are likely to anesthetize a child for placement of pressure-equalizing (PE) tubes, for instance, even with a mild infection in the upper oropharynx. This is because the possibility is high that the patient will be infected throughout the winter season, and waiting for a URI-free period might mean that the child would not get the PE tubes at all. Furthermore, PE tube placement is performed very quickly, with no instrumentation of the airway necessary. The anesthesiologist performs a mask anesthetic, always has control and access to the airway, and the procedure can be aborted at any time, with no incision to close.

How long should you wait if a URI is serious?

As mentioned earlier, there is no consensus on how long to wait, but clinical studies have suggested delaying surgery for as long as 6 weeks after the acute episode.⁴ The thinking was that this long period allowed time for the inflammatory response to dissipate completely. Unfortunately, in the middle of the winter, it's likely that the child will be exposed to another viral strain and develop yet another URI. Clinical judgment plays a pivotal role here; it is always best to establish a relationship with an anesthesiologist in your community and call him or her with questions about individual patients.

Before you sign off on surgery

There are several other circumstances to consider when approving a child with a URI for surgery.

■ **Children with cardiac disease**, especially those who have had palliative procedures

for cyanotic lesions or who have a hypoplastic right or left heart, are characteristically unstable in the face of inflammatory respiratory disease. Unless the surgical procedure is an emergency, such patients should not be considered for general anesthesia if they have a URI.¹³ As an example, bronchiolitis plus cyanotic heart disease can be rapidly fatal, requiring prolonged ventilation or extracorporeal membrane oxygenation in order to save the patient.

■ **Intensive care nursery "graduates"** may present to your office for preoperative assessment. Many of these infants and children will have marginally compensated lung disease, some with substantial pulmonary hypertension. Their respiratory function will continue to improve, some until the age of 7 to 10 years. In the meantime, they, too, are at high risk for complications from general anesthesia if they have a URI, and the decision to take them to the operating room should be discussed with other care providers and the parents.

■ **Children with fever, mucopurulent discharge**, wheezing, lethargy, and cough are at high risk for complications during the perioperative period, regardless of any comorbidities. Many anesthesiologists would cancel surgery in these circumstances, even if the patient has been seen recently by his or her primary care physician and is taking antibiotics for coverage of a potential bacterial infection.

■ **Other indicators of increased risk** of pulmonary complications include a history of reactive airway disease, exposure to tobacco smoke, snoring, nasal congestion, the need for endotracheal intubation, and surgery on the airway.¹⁴

CASE ► You evaluate the 2-year-old and note that he has a history of mucopurulent nasal discharge and a productive cough. The child's temperature in the clinic is 99.8°F and his chest x-ray is consistent with bronchitis. After talking with a local anesthesiologist and the surgeon, you all agree that the boy's surgery should be postponed for a month. **JFP**

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Anesthesiologists are likely to anesthetize a child for placement of pressure-equalizing tubes, even if he or she has a mild infection in the upper oropharynx.

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