

Frequently Asked Questions about Cardiac Anesthesia for Children

What information should I be sure to tell my anesthesia care team preoperatively?

It is very important to share your child's medical history with your anesthesiologist before surgery. This information includes allergies, current medications (including non-prescription, herbal or homeopathic treatments) and when last taken, prior surgeries, complications with surgery or reactions to anesthesia, family history of problems with anesthesia, and information about any other medical problems your child may have.

How do you monitor my child during procedures?

Heart surgery often requires placement of various catheters and monitors. Most of these lines can be placed after your child is asleep to prevent undue stress and anxiety. There are some circumstances which might require IV access while your child is awake. The anesthesiologist will discuss this with you and provide numbing medication in this situation.

Your child's vital signs will be monitored throughout the surgery and until your child is fully awake or transferred into the Intensive Care Unit (ICU). Advanced technology is used to ensure the brain is receiving enough blood to protect the brain and nervous system. A special machine to monitor the level of consciousness is used in some cases to minimize the risk of waking or awareness during surgery.

What are some common side-effects of anesthesia?

Most children are groggy and might be cranky or confused for a while—perhaps several hours—after waking up. Some children become severely agitated and upset after anesthesia. If this happens, the anesthesiologist can provide mild sedation to help your child calm down and recover. If your child feels nauseated when he or she wakes up, medicine may be given to help him or her feel better and decrease the nausea and vomiting. Other common side effects include sore throat and shivering. Keep in mind that any negative effects from anesthesia are usually short-lived. Notify your doctors if these symptoms persist into the next day after the procedure.

What are some of the risks of anesthesia and do multiple anesthetics affect this?

Pediatric cardiac anesthesiologists have an understanding of heart defects and the differences that can exist in children with Congenital Heart Disease (CHD). Children with CHD may require several procedures to understand their heart anatomy in an effort to improve their care and guide surgical planning. Many of these procedures will require anesthesia to get the most information in the safest and quickest way, especially in young children who may not be cooperative with staying still. Some heart conditions will require more than one surgical or catheterization procedure. Anesthesia is necessary to reduce the pain and stress associated with these visits. Post-traumatic stress disorder can occur in children exposed to many stressful conditions in the absence of anesthesia.

Why are patients not able to eat or drink before a procedure?

Anesthesiologists and their team are responsible for minimizing any avoidable risks to their patients. Anesthesia takes away a patient's ability to cough and clear their throat and by minimizing the amount of fluid and solids in the patient's stomach we hope to decrease the amount of possible material that could get into the patient's lungs if they were to have any reflux or vomiting. In general, the following guidelines are followed:

- **No heavy food for 8 hours prior**
- **No light food or formula/milk for 6 hours prior**
- **No breast milk for 4 hours prior**
- **Clear liquids up to 2 hours**

Clear liquids are generally regarded as those you can see through such as water, apple juice or PediaLyte™. Orange juice is NOT considered a clear liquid because of the food particles in it. Taking a small amount (a few sips) of water or apple juice with medications is generally acceptable. Do encourage the patient to have plenty of clear liquids up to 2 hours ahead of time, especially if they are taking diuretics such as furosemide (Lasix). Discuss with your doctor ahead of time which medications, if any, they want your child to have the day before and the day of the procedure.

When can the patient eat and drink after a procedure?

This depends upon the type of anesthesia and procedure performed and how rapidly the patient wakes up enough to swallow safely. This may be as soon as 15 to 20 minutes after sedation for an MRI, 1 to 2 hours after a cardiac catheterization to as long as 2 or 3 days after major surgery. Feeding a patient too quickly after surgery may cause excess nausea and vomiting and abdominal discomfort. Typically patients are first given clear liquids and then solids are introduced as tolerated.

When will my child be awake after heart surgery, heart catheterization or non-surgical procedures?

At the end of the procedure, the anesthesiologist will stop administering medicine, and the anesthesia will begin to wear off. Depending on the type of anesthesia and the procedure, your child may remain asleep for a few minutes to a few hours. For instance, it may be as soon as several minutes after sedation for an MRI, 1 to 2 hours after a cardiac catheterization, and as long as 2 or 3 days after major surgery. After heart surgery, it might be safest to keep your child asleep for a few hours or even days after the procedure and the breathing tube may remain in place during this time if needed. Additional medicine is used to keep your child asleep and comfortable and your child will be closely monitored at all times.

How will my child's pain be treated after heart surgery, heart catheterization or non-surgical procedures?

Whether pain medicines are given during and after a procedure usually depends on whether the procedure will likely cause pain or not. A procedure such as an MRI is not painful, and pain medicines are uncommonly needed afterwards. Your child might be sore after a heart catheterization, and oral or intravenous pain medicine can be given during and after the catheterization to make sure they are comfortable after waking up. Pain control is especially important after a big operation like heart surgery. Pain medicines are an important part of anesthesia during heart surgery and other surgeries and many children who go to the ICU afterwards will be given an infusion of pain medicine into their IV catheter. The amount of pain medicine given after surgery can be quickly adjusted to ensure your child is both safe and as comfortable as possible. These children may also receive sedation medicines to help manage their comfort in the ICU, which may keep them sleepy.

Are there special risks involved in anesthesia for CHD?

Young age and diseases like heart defects add an additional level of complexity to anesthetic care. However, anesthesiologists with specific training in pediatric cardiac anesthesia have experience in dealing with these additional risk factors. Some of the risks of anesthesia in children with congenital heart disease require specific attention by the anesthesiologist to blood pressure, heart rate and rhythm, oxygen and carbon dioxide levels.

What are the known effects of anesthesia on my child's development?

Many of the studies performed to assess the risk of anesthesia on the developing brain were performed in animals. Though there is concern in young animals exposed to anesthesia, this concern has not been seen in children with a one time, short exposure to anesthesia. There are retrospective (after the fact) studies in humans that suggest a potential risk of multiple or prolonged anesthetic exposure. There are ongoing studies which are attempting to measure the effects of anesthesia on child development. These studies are needed and specific studies are needed in children with heart defects. The Food and Drug

Administration has recommended that children under the age of 3 years not undergo prolonged general anesthesia (more than 3 hours) unless absolutely necessary. Repairs of congenital heart defects typically involve more than several hours but the risks of not repairing the defects generally outweigh any potential risks of anesthesia.

Can a parent or care-giver come back with the patient while they are going to sleep?

This depends greatly upon the hospital and the assessment of the anesthesia team. This should be discussed directly with your anesthesia care team. Please try to remember that an anxious parent can make even the youngest patients more anxious and upset and this can be a distraction to the team taking care of your child. Our first consideration is always for the health and well-being of your child. Your child's care team will reunite you with your child as soon as safely possible after the completion of the procedure.

What are the ways we can make you/your child less anxious preoperatively?

Children should hear about their hospital stay before they arrive. Avoiding talking about a procedure or surgery may make the patient more anxious on the date of the procedure and can make the patient less trusting for all future encounters. A guided tour of the hospital facilities several days prior to admission may help alleviate some of their fears. Bringing along a favorite book, blanket, toy or electronic device (such as an iPad or phone) may help this as well. Child Life specialists are available in many children's hospitals and can significantly help patients before and after through education and distraction techniques. Various medications can be given to help reduce your child's anxiety and fear prior to a procedure. The most commonly used medications include Versed™ (midazolam), pentobarbital, Precedex™ (dexmedetomidine), ketamine and narcotics. Depending upon the situation, these medications may be given intravenously, orally (or via G-button/G-tube), via nasal spray or by intramuscular injection. There are advantages and disadvantages to each route and each drug, but all are safe to use in appropriate doses. When given orally, some of these medications can be bitter and this can be offset by adding a sweetener and/or allowing a small sip of apple juice. Combative or uncooperative patients may sometimes need an intramuscular injection to assure the safety of the patient and the doctors, nurses and other staff taking care of them.

What types of medication do we use to provide anesthesia and postoperative pain control?

Depending upon the type and duration of the procedure, your child will likely receive multiple medications to help assure they are asleep and pain-free during their procedure. The drugs include narcotics such as fentanyl or morphine, benzodiazepines such as midazolam, inhaled anesthetics (isoflurane, sevoflurane), and others. The doses given are calculated based upon the patient's weight and medical history as well as the expected duration of the procedure and the need for post-operative sedation and pain relief. Many procedures such as cardiac catheterizations do not typically cause post-operative pain, while surgery may be uncomfortable. Post-operative pain control is typically achieved with narcotics such as morphine or fentanyl which may be supplemented with non-narcotic medications such as Tylenol™ (acetaminophen), dexmedetomidine, Toradol™ (ketorolac), and others. Sedation after a procedure may be helped by benzodiazepines, barbituates, dexmedetomidine and other medications. If your child has a history of being either resistant or sensitive to specific medications please let the anesthesia team know that so they may plan appropriately. Depending upon the procedure, a regional anesthetic block may be performed as well to reduce post-operative pain. When appropriate, a Patient (or Parent or Nurse) controlled pain pump (PCA) may be used to help reduce post-operative pain until the patient is taking medications safely by mouth. For non-surgical imaging procedures such as an MRI or CT scan sedation is frequently administered by IV medications alone and it is common for them not to require any supplemental breathing devices.

Blood products and their risks and what we can do to minimize usage and risk?

Almost all children undergoing open heart surgery will need a blood transfusion, especially in younger patients or smaller patients. Your anesthesiologist will work with the surgeons and the heart bypass

machine team (perfusionists) to minimize the need for transfusions through a variety of mechanisms, including using medications to assist in blood clotting as well as returning blood to the patient that has been suctioned from the operating field during the operation. The decision to transfuse patients is not taken lightly as all blood transfusions do carry some very small element of risk, but modern blood banking technology has dramatically improved the safety of the nation's blood supply. All blood in the U.S. and Canada, including that donated by family members, is tested for infections such as hepatitis, AIDS, Zika and more. No patient will receive more blood products than they need, but neither will they receive less than is indicated to keep them safe. If you or your child is a Jehovah's Witness or will not consent to transfusions for other reasons please inform your treatment team at the time of the initial consultation so that appropriate decisions may be made.

Why do some cases get cancelled at the last minute?

Case cancellations unfortunately happen. Either an emergency case needs to be performed for the health and safety of another patient, appropriate beds may not be available for your child to recover in or your child may not be in the best physical condition for a procedure due to a cold, fever or other change in medical condition. To minimize the risk of cancellation, please let your physician know as soon as possible if your child has a change such as a fever, diarrhea, asthma flare-up, infection or cold/runny nose. All of your providers do their best to avoid this happening and will try and contact you as soon as it becomes evident that a case is not going to occur. No one likes for cases to be cancelled and the inconvenience this causes parents and patients. Try to keep in mind that these decisions are made for the safety of your child and other children.

The following Parent Support Organizations for families of children with heart disease may be active in your area:

Pediatric Congenital Heart Association

<http://conqueringchd.org>

Mended Little Hearts

<http://mendedlittlehearts.org>

The Society for Pediatric Anesthesia has more information on their website for parents and children about anesthesia

<http://pedsanesthesia.org>



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