ANESTHESIA & BRAIN MONITORING

FREQUENTLY ASKED QUESTIONS

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WHAT IS ANESTHESIA?

The word 'anesthesia' means 'loss of sensation'. Today, safe and effective methods of anesthesia allow surgery to be performed on millions of patients each year. You should know a few important things about anesthesia:

- most importantly, it stops you from feeling pain and other sensations during your operation
- it can be given in various ways
- not all anesthesia makes you unconscious
- it can be directed to different parts of the body

Drugs that cause anesthesia work by blocking the signals that pass along your nerves to your brain. When the drugs wear off, you start to feel normal sensations again, including pain. Some of these medications work on your whole body, while some of the medications work directly on the nerves going to parts of your body.

WHAT ARE THE TYPES OF ANESTHESIA?

There are basically three types of anesthesia in use today: **general anesthesia, regional anesthesia** and **local anesthesia**. In addition, sedation medication may be used before and/or during various forms of anesthesia for your comfort.

General anesthesia is a state of controlled unconsciousness during which you feel nothing and may be described as 'anesthetized'. For some operations, general anesthesia may be the only option for safe care during surgery. In other operations, general anesthesia may be an alternative to regional anesthesia. During general anesthesia, anesthetic medications are injected into a vein, or anesthetic gases may be breathed into the lungs. When these medications are carried to the brain by the blood, they effectively "numb" the brain, and produce unconsciousness. Other medications are given to prevent pain and relax the muscles of the body. During general anesthesia, you may need assistance to support adequate breathing. In this case, you may have a breathing tube placed after you have fallen asleep. General anesthesia produces a period of controlled unconsciousness, which is quite different from sleep, and is also different from unconsciousness due to disease or injury. At the end of surgery, as the anesthetic drugs wear off, your consciousness starts to return.

Regional anesthesia is the specialized use of local anesthetic to numb a part of the body. Regional anesthesia can be used for operations on larger or deeper parts of the body. Local anesthetic drugs are injected near to the bundles of nerves which carry signals from that area of the body to the brain. The most common regional anesthetics (also known as regional 'blocks') are spinal and epidural anesthetics. These can be used for operations on the lower body such as Caesarean sections, bladder operations or replacing a hip joint. You stay conscious but free from pain. Nerve blocks in the neck or armpit area are used to numb the arm or shoulder for surgery.

Local anesthesia numbs a small part of your body. It is used when the nerves can easily be reached by injections, drops, sprays, or ointments. You stay conscious but free from pain.

Sedation is the use of small amounts of anesthetic or similar drugs to produce a 'sleepy-like' state. It makes you physically and mentally relaxed during an investigation or procedure which may be unpleasant or painful (such as an endoscopy) but where your cooperation is needed. You may remember a little about what happened but often you will remember nothing. This is frequently called 'conscious sedation', and may be used by other professionals as well as anesthesia professionals. If you are having a regional or local anesthetic, you may want to ask for some sedation as well. Combining types of anesthesia: anesthetic drugs and techniques are often combined. For example: a regional anesthetic may be given as well as a general anesthetic to provide pain relief after the operation. Sedation is frequently used with either regional or local anesthesia. The anesthetic prevents you from feeling pain, while the sedation makes you feel drowsy and mentally relaxed during the operation.

WHO TAKES CARE OF ME DURING MY ANESTHESIA?

An anesthesia professional will be involved in your care during anesthesia. These professionals include both doctors (anesthesiologists) as well as specialized nurses (Certified Registered Nurse Anesthetists) who have had training in anesthesia care, in the treatment of pain, in the care of very ill patients, and in emergency care. Your anesthesia professional is responsible for:

- your wellbeing and safety throughout your surgery
- agreeing upon a plan with you for your anesthetic
- giving your anesthetic
- planning your pain control with you
- managing any transfusions you may need
- your immediate care following anesthesia

You will be treated by an anesthesiologist or CRNA, either working together or independently. However, you can ask to talk to the attending anesthesiologist or CRNA if you want to – there is always one available to help if needed.

Your anesthesia professional will work closely with your surgeon and other operating room staff. Your anesthesia professionals may work with a technician who prepares and maintains equipment, help them and take part in your care. The circulating nurse in the operating room will be involved in your care throughout the operation, and may assist the anesthesia professional as well. Trained staff in the recovery room will care for you after your surgery until you are ready to go home or be admitted to the hospital.

In some hospitals, you may be cared for by an anesthesia resident or a student nurse anesthetist. Medical students and other healthcare staff in training can only take part in your care with your permission. If they do, they are closely supervised.

WHAT ARE THE RISKS OF ANESTHESIA?

With all of the advances in medicine and anesthesia, you should be comforted to know that serious problems arising from your anesthesia are uncommon. Risk cannot be completely avoided, but the combination of your anesthesia professional's training, modern equipment used to deliver anesthesia and monitor your condition, and modern medications have made anesthesia a much safer procedure in recent years.

Although anesthesia is considered very safe, it is not risk free. It is important for you to have an opportunity to discuss risks with your anesthesia professional. For any given risk from anesthesia, you may want to know how frequent the complication is, that is, how likely it is to happen. You may want to know how serious a complication is, as well as how it can be treated. Your anesthesia professional is the best person to know how your individual situation may change the risk. For example your previous medical conditions, your body size, your surgical procedure, and your habits like smoking will influence the risks of certain complications.

Uncommon complications include chest infections and difficulty breathing, damage to teeth, lips or tongue, and awareness under general anesthesia [See 'What is "awareness" under anesthesia?']. The rare and very rare complications of anesthesia include damage to the eyes, serious allergic reactions to medications, nerve damage and death.

Deaths caused solely by anesthesia are very rare, and are usually the result of several serious complications together. If you are healthy and having a minor, elective operation, the risk of death from anesthesia is very, very small.

HOW WILL I FEEL AFTER MY SURGERY?

Although anesthesia is very safe, the combination of a surgical procedure and the use of anesthesia medications may result in common side-effects. The most common side effects after anesthesia include feeling sick and vomiting, a sore throat, and dizziness or headache. Your anesthesia professional, as well as the nurses in the recovery area, will do their best to minimize these side effects as you fully awaken from anesthesia.

Pain is also common after surgery. Your anesthesia professional and your surgeon will work hard to minimize the discomfort after an operation – including the use of local anesthetics at the surgical site, as well intravenous and oral pain medications. Patients who go home after their operation are typically given an oral pain medicine to use for the first few days after surgery. If you are admitted to the hospital, more options for your pain control are available including pain medication on demand (referred to as PCA – patient-controlled analgesia) and continuous regional anesthesia like an epidural.

In addition to pain at the site of your operation, you may have additional aches and pains at other places on your body. Although you may be "asleep" during your operation, the operating room bed is not as comfortable as the bed you sleep on at home. In addition, in order to facilitate the surgical operation, you may be positioned in such a way that your body feels uncomfortable following the operation.

You may also notice bruising after surgery. Although the surgical incision may be quite small, a larger area of your body may be disrupted beneath the incision, and a bruise would not be uncommon.

Although general anesthesia is frequently referred to as "being asleep", you may find it more difficult to wake up than from a full night of normal sleep. You may feel tired for a number of hours – even a day – after your anesthetic, and your vision may not be normal for several hours. You might feel confused or have trouble with your memory after a general anesthetic. Occasionally, you may need help with urination after an operation, particularly if you are an older man.

WILL I BE ASLEEP DURING MY SURGERY?

During general anesthesia you should plan on being 'asleep' during your operation. As stated earlier, there are differences between the unconsciousness produced during general anesthesia and natural sleep. However the goal of general anesthesia is to render the patient unconscious and oblivious to their surroundings – very similar to our impression of sleep. It is also interesting to note that some – but not all – patients do dream during their general anesthetic. During regional or local anesthesia particularly when sedation is given, you may also sleep. Typically this type of anesthesia provides less medication and a lighter sleep than general anesthesia.

WILL I WAKE UP DURING MY SURGERY?

If you are having general anesthesia, you should not wake up during surgery. Your anesthesia professional will be working hard to ensure that a sufficient amount of medication is given to you to produce the state of unconsciousness that is typical of general anesthesia. During the anesthesia, you will be asleep (unconscious) – perhaps even with dreaming – throughout the entire operation. With the other forms of anesthesia like regional or local anesthesia with sedation, it is more likely that you will wake up during surgery. Because the numbing medicine used during these types of anesthesia are designed to prevent pain, many patients wake up during surgery but are not uncomfortable. If you have pain during a local or regional anesthesia procedure, it is important to tell your anesthesia professional immediately.

WHEN WILL I WAKE UP AT THE END OF SURGERY?

Most patients wake up within a matter of minutes following the end of surgery. When you wake up will depend on a number of factors including your age, your operation and your medical conditions. Typically, the anesthesia medications are stopped right as surgery is finishing or bandages are being applied. In the next few minutes, you will emerge, or "wake up" from the anesthesia. Frequently, as part of a general anesthetic, a breathing tube will be in place during the operation. You may remember waking up with this tube in your mouth, which may be uncomfortable. As soon as your breathing is normal, the breathing tube should be removed, and then you will be taken to the recovery area.

After some operations, your anesthesia professional and surgeon may decide to care for you in the intensive care unit for very close observation. If the breathing tube needs to remain after surgery, additional sedation medicine is typically given.

WHAT IS "AWARENESS" UNDER ANESTHESIA?

Awareness under general anesthesia means becoming conscious – or awake – during some part of your operation and remembering things that happened. Awareness is an uncommon complication that may or may not be accompanied by pain. When using local or regional anesthesia with sedation, it is expected that patients may have some recollection of the procedure. The remote possibility of awareness should not deter you from having needed surgery. Your anesthesia professional can help you to feel comfortable and informed about your upcoming experience with anesthesia.

WHAT CAUSES ANESTHESIA AWARENESS?

Awareness occurs when you are not receiving enough anesthetic medication to keep you unconscious. Some people may react differently to the same level or type of anesthesia. Sometimes different medications can mask important signs that anesthesia professionals monitor to help assess the depth of anesthesia. In some situations, such as emergency, trauma and cardiac surgery, or in situations involving patients whose condition is unstable, the medical condition of the patient may prevent the anesthesia professional from using sufficient anesthesia to prevent awareness. Because anesthesia has certain effects on the body, including lowering blood pressure and slowing breathing, a deep anesthetic may not be in the best interest of the patient. In these and other situations – such as emergency cesarean delivery - awareness may not be completely avoidable. Awareness also may happen if the equipment that delivers the anesthetic to your body malfunctions, or if your anesthesia professional misjudges the amount of medication needed to keep you unconscious.

CAN ANESTHESIA AWARENESS BE PREVENTED?

Before surgery, you should meet with your anesthesia professional to discuss anesthesia options and determine the plan for your operation. You should describe any problems you may have experienced with previous anesthetics, and also discuss any prescription medications or over-the-counter medications you are taking. Should you have concerns regarding awareness, before surgery is the ideal time to express them and to ask questions.

Your anesthesia professional cares for you during surgery by relying on his or her clinical experience, training and judgment combined with safe medications and continuous monitoring. During general anesthesia, your anesthesia professional will use multiple ways to determine if you are getting sufficient amount of anesthetic medication to keep you unconscious. This can be difficult in some patients. Recently, the introduction of brain monitors – like the BIS monitor – has provided anesthesia professionals with another method to help care for their patients.

WHAT IS A BIS™ MONITOR?

A BIS monitor is a medical device that measures your brain wave activity, and provides your anesthesia professional with information regarding your brain during surgery, anesthesia and sedation.

HOW IS BIS MONITORING DONE?

In order for the BIS monitor to measure your brain activity, the brain waves inside your head need to be recorded. To do this, a special strip of electrodes is placed on your forehead, and then connected via a cable to the brain monitor.

HOW IS BIS MONITORING USED DURING ANESTHESIA?

The BIS monitor can used by your anesthesia professional to help adjust the amount of medications that you are receiving during the operation. By having information from your brain that tells your anesthesia professional how you are responding to the medications, they can change the amount of medication to be certain you are not getting too much or too little anesthesia. Helping your anesthesia clinician find the right amount is very important – patients getting too much anesthesia medication are more likely to have the anesthesia side-effects described earlier. If you get too little medicine, you are at greater risk of being awake during anesthesia.

DOES BIS MONITORING HELP PREVENT AWARENESS?

Recent studies have demonstrated that using a BIS monitor during your operation is an effective method to decrease your chance of awareness. In the hands of a trained anesthesia professional, use of a BIS monitor reduces the frequency of awareness more than 5-fold. BIS monitoring helps your anesthesia professional recognize those periods of an operation when you need more anesthesia medication to stay asleep, or identify potential problems with the anesthesia medications getting into your body.

DOES BIS MONITORING IMPROVE RECOVERY FROM ANESTHESIA?

A number of studies involving thousands of patients have shown the additional benefits to you when your anesthesia professional uses a BIS monitor to help adjust the amount of medications that you receive during your operation. Typically, the amount of medication given to you is reduced by one-fifth. As a result of this, you will generally wake up faster at the end of surgery, have less nausea and vomiting, and be able to leave the recovery room sooner. Improving the speed and quality of your recovery from general anesthesia, in addition to reducing the risk of awareness, are important benefits of your anesthesia professional using the BIS monitor during your operation.

CAN I REQUEST A BIS MONITOR TO BE USED DURING MY ANESTHESIA?

This would be a good question to ask during your discussion with your anesthesia professional prior to your operation. Currently, there are brain monitors like the BIS monitor, available in almost half the operating rooms in the United States. So there is a good chance that your anesthesia professional would have one available for your surgery. It is OK for you to ask what types of safety monitors – including the BIS monitor – will be available and used for your operation.

WHAT DO I DO IF I HAD AWARENESS UNDER ANESTHESIA?

If you have distinct recollections of your surgery after general anesthesia, you should discuss it with one of the people involved in your care. Any of the nurses who care for you, your surgeon or your anesthesia professional will be a good place to start. Sometimes, patients will not remember being awake during surgery for several days. If this happens to you, be sure to mention it to your surgeon at next appointment or if the hospital calls you for follow-up check. Regardless of whom you first mention your experience to, it is important to try to speak directly with the anesthesia professional who was involved in your surgery. Your anesthesia professional can best explain to you the events that took place in the operating room at any stage of your surgery and why you might have been aware at certain times. If your recollections of surgery or the awareness episode distresses you, your anesthesia professional can help you or refer you to a counselor or to other appropriate resources.