

EPIDURAL

Bupivacaine

EPIDURAL ADVERSE REACTIONS

THIS POST FOCUSES ON BUPIVACAINE

Bupivacaine can cause:

- + Excessive plasma levels
- + Restlessness
- + **Anxiety**
- + Dizziness
- + Tinnitus (ringing ears)
- + Blurred vision
- + Tremors
- + Convulsions
- + Drowsiness
- + Unconsciousness
- + **Respiratory arrest**
- + Nausea/vomiting
- + Chills
- + Constriction of the pupils
- + Depression of the myocardium
- + **Decreased cardiac output**
- + Heartblock
- + Hypotension (low blood pressure)
- + Bradycardia (slow heart rate)
- + Ventricular arrhythmias
- + Headache
- + Backache
- + **Fecal/urinary incontinence**
- + Ventricular tachycardia
- + Ventricular fibrillation
- + **Cardiac arrest**
- + Urticaria (hives)
- + Pruritus (itchy Skin)
- + Erythema
- + Angioneurotic edema
- + Laryngeal edema
- + Tachycardia (fast heart beat)
- + Sneezing
- + Syncope (fainting)
- + Excessive sweating
- + Elevated temperature
- + Anaphylactoid-like symptomatology including severe hypotension)
- + Persistent anesthesia
- + **Paralysis of the lower extremities**
- + **Loss of perineal sensation and sexual function**
- + Paraesthesia
- + Weakness
- + Urinary retention
- + **Loss of sphincter control with slow, incomplete or no recovery**
- + Cranial nerve palsies

Are cardiac and respiratory arrest safe adverse reactions for women in labor?



SOURCES FROM FDA + HOSPIRA MANUFACTURER INSERT

WHAT IS AN EPIDURAL?

THE FOLLOWING IS FROM THE NATIONAL INSTITUTE OF HEALTH

Epidural anesthesia can be used to supplement general anesthesia or as the main anesthesia method in certain surgical procedures involving thoracic, abdominal, pelvic, or lower extremities regions. However, spinal anesthesia is more commonly used in these instances.

Epidural analgesia is indicated for pain management during or after surgical procedures involving the regions previously mentioned, severe chronic pain in the context of malignancy, and for labor and delivery.

Several drugs can be used in different combinations to achieve neuraxial anesthesia:

Local anesthetics: Lidocaine 1% and 2%, bupivacaine 0.25%, 0.5% and 0.75%, tetracaine 0.5%, mepivacaine 1%, 1.5% and 2%, ropivacaine 0.75%, levobupivacaine 0.5%, chloroprocaine 2% and 3%.^[5]

Epidural Additives: Vasoconstrictors such as epinephrine and phenylephrine are used to decrease the vascular absorption of local anesthetics.

Opioids: fentanyl, morphine, hydromorphone, oxycodone, or sufentanil (augment analgesic effects of the LA).^[6]

Alpha-agonists: clonidine prolongs epidural analgesia.^[7]

Do patients understand **opioids** such as fentanyl, morphine, and oxycodone are used to augment analgesic effects of local anesthetics?

ACCORDING TO THE INSERT

THE FOLLOWING IS FROM THE MANUFACTURER INSERT ON THE FDA WEBSITE

Carcinogenesis, Mutagenesis, Impairment of Fertility: Long-term studies in animals to evaluate the carcinogenic potential of bupivacaine hydrochloride have not been conducted. The mutagenic potential and the effect on fertility of bupivacaine hydrochloride have not been determined.

What does that mean?

That the manufacturer has not evaluated if the product:

- has carcinogenic potential

carcinogenic A cancer-causing substance or agent.

- has mutagenic potential

Mutagen, any agent capable of altering the genetic constitution of a cell by changing the structure of the hereditary material, **deoxyribonucleic acid (DNA)**.

- affects fertility

Fertility is the natural capability to produce offspring.

According to Stanford Medicine, 71% of pregnant women get epidurals or other spinal anesthesia. Why aren't these products evaluated for any agents that can cause cancer, alter DNA, or affect future fertility?

scopeblog.stanford.edu/2018/06/26/epidurals-increase-in-popularity-stanford-study-finds/

WHAT STUDIES HAVE BEEN DONE?

According to the insert,

Pregnancy Category C: There are no adequate and well-controlled studies in pregnant women.

MARCAINE should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus. Bupivacaine hydrochloride produced developmental toxicity when administered subcutaneously to pregnant rats and rabbits at clinically relevant doses. This does not exclude the use of MARCAINE at term for obstetrical anesthesia or analgesia.

Why is this product still approved by the FDA to use at term when there are no adequate and well-controlled studies in pregnant women?

Especially with the following sections from the insert:

Local anesthetics rapidly cross the placenta, and when used for epidural, caudal, or pudendal block anesthesia, can cause varying degrees of **maternal, fetal, and neonatal toxicity**.

Careful and constant monitoring of cardiovascular and respiratory (adequacy of ventilation) vital signs and the patient's state of consciousness should be performed after each local anesthetic injection. It should be kept in mind at such times that restlessness, anxiety, incoherent speech, lightheadedness, numbness and tingling of the mouth and lips, metallic taste, tinnitus, dizziness, blurred vision, tremors, twitching, depression, or drowsiness may be early warning signs of central nervous system toxicity.

Adverse reactions in the parturient, fetus, and neonate involve alterations of the central nervous system, peripheral vascular tone, and cardiac function.

Wouldn't these adverse reactions require more safety studies?

CAN IT PROLONG LABOR?

Epidural, caudal, or pudendal anesthesia may alter the forces of parturition through changes in uterine contractility or maternal expulsive efforts. Epidural anesthesia has been reported to prolong the second stage of labor by removing the parturient's reflex urge to bear down or by interfering with motor function. The use of obstetrical anesthesia may increase the need for forceps assistance.

Yes. According to the insert, it also may increase the need for forceps assistance.

What is forceps?

In a forceps delivery, a health care provider applies forceps — an instrument shaped like a pair of large spoons or salad tongs — to the baby's head to help guide the baby out of the birth canal. This is typically done during a contraction while the mother pushes.

Although a forceps delivery may be recommended during delivery of your baby, it might be associated with certain risks. If a forceps delivery fails, a cesarean delivery (C-section) might be needed.



WHAT ABOUT NURSING?

Nursing Mothers: Bupivacaine has been reported to be excreted in human milk suggesting that the nursing infant could be theoretically exposed to a dose of the drug. Because of the potential for serious adverse reactions in nursing infants from bupivacaine, a decision should be made whether to discontinue nursing or not administer bupivacaine, taking into account the importance of the drug to the mother.

Why is this important? According to the CDC,

The American Academy of Pediatrics (AAP) recommends that infants be exclusively breastfed for about the first 6 months with continued breastfeeding while introducing appropriate complementary foods for 1 year or longer.¹ The World Health Organization also recommends exclusively breastfeeding up to 6 months with continued breastfeeding along with appropriate complementary foods up to 2 years of age or older.²



71% of women get epidurals and 60% do not breastfeed as long as they intend. Wouldn't that be a cause for further research?

Why Do Mothers Stop Breastfeeding Early?

Sixty percent of mothers do not breastfeed for as long as they intend to.⁴ How long a mother breastfeeds her baby (duration) is influenced by many factors including:

- Issues with lactation and latching.⁴
- Concerns about infant nutrition and weight.⁴
- Mother's concern about taking medications while breastfeeding.⁴
- Unsupportive work policies and lack of parental leave.⁵
- Cultural norms and lack of family support.⁵
- Unsupportive hospital practices and policies.⁶

cdc.gov/breastfeeding/data/facts.html

ADDITIONAL WARNINGS

THE 0.75% CONCENTRATION OF MARCAINE IS NOT RECOMMENDED FOR OBSTETRICAL ANESTHESIA. THERE HAVE BEEN REPORTS OF CARDIAC ARREST WITH DIFFICULT RESUSCITATION OR DEATH DURING USE OF MARCAINE FOR EPIDURAL ANESTHESIA IN OBSTETRICAL PATIENTS. IN MOST CASES, THIS HAS FOLLOWED USE OF THE 0.75% CONCENTRATION. RESUSCITATION HAS BEEN DIFFICULT OR IMPOSSIBLE DESPITE APPARENTLY ADEQUATE PREPARATION AND APPROPRIATE MANAGEMENT. CARDIAC ARREST HAS OCCURRED AFTER CONVULSIONS RESULTING FROM SYSTEMIC TOXICITY, PRESUMABLY FOLLOWING UNINTENTIONAL INTRAVASCULAR INJECTION. THE 0.75% CONCENTRATION SHOULD BE RESERVED FOR SURGICAL PROCEDURES WHERE A HIGH DEGREE OF MUSCLE RELAXATION AND PROLONGED EFFECT ARE NECESSARY.

UNDERVENTILATION FROM ANY CAUSE, AND/OR ALTERED SENSITIVITY MAY LEAD TO THE DEVELOPMENT OF ACIDOSIS, CARDIAC ARREST AND, POSSIBLY, DEATH.

In the practice of caudal or lumbar epidural block, occasional unintentional penetration of the subarachnoid space by the catheter or needle may occur. Subsequent adverse effects may depend partially on the amount of drug administered intrathecally and the physiological and physical effects of a dural puncture. A high spinal is characterized by paralysis of the legs, loss of consciousness, respiratory paralysis, and bradycardia.

Maternal hypotension has resulted from regional anesthesia. Local anesthetics produce vasodilation by blocking sympathetic nerves. Elevating the patient's legs and positioning her on her left side will help prevent decreases in blood pressure. The fetal heart rate also should be monitored continuously and electronic fetal monitoring is highly advisable.



LET'S LOOK AT SOME OF THE LISTED ADVERSE REACTIONS

Urinary incontinence happens when you lose control of your **bladder**. In some cases, you may empty your bladder's contents completely. In other cases, you may experience only minor leakage. The condition may be temporary or chronic, depending on its cause.

Fecal incontinence, also called bowel incontinence, is a loss of bowel control that results in involuntary bowel movements (fecal elimination). This can range from an infrequent involuntary passage of small amounts of stool to a total loss of bowel control.

Anxiety feels different depending on the person experiencing it. Feelings can range from butterflies in your stomach to a racing heart. You might feel out of control, like there's a disconnect between your mind and body.

Other ways people experience anxiety include nightmares, panic attacks, and painful thoughts or memories that you can't control. You may have a general feeling of fear and worry, or you may fear a specific place or event.

Symptoms of general anxiety include:

- increased heart rate
- rapid breathing
- restlessness
- trouble concentrating
- difficulty falling asleep



CRANIAL NERVE PALSIES

The cranial nerves are a set of twelve nerves that originate in the brain. Each has a different function for sense or movement.

The functions of the cranial nerves are sensory, motor, or both:

- Sensory cranial nerves help a person to see, smell, and hear.
- Motor cranial nerves help control muscle movements in the head and neck.

The **oculomotor nerve** helps control muscle movements of the eyes.

The trochlear nerve, like the oculomotor nerve, originates in the midbrain. It powers the contralateral superior oblique muscle that allows the eye to point downward and inward.

The **abducens nerve** also helps control eye movements.



The **trigeminal nerve** is the largest cranial nerve and has both motor and sensory functions.

Its motor functions help a person to chew and clench the teeth and gives sensation to muscles in the tympanic membrane of the ear.

The **vestibulocochlear nerve** is involved with a person's hearing and balance.

The **vagus nerve** has a range of functions, providing motor, sensory, and parasympathetic functions.

The **accessory nerve** provides motor function to some muscles in the neck:



The **glossopharyngeal nerve** possesses both motor and sensory functions.

- The sensory function receives information from the throat, tonsils, middle ear, and back of the tongue. It is also involved with the sensation of taste for the back of the tongue.
- The motor division provides movement to the stylopharyngeus, which is a muscle that allows the throat to shorten and widen.

The **hypoglossal nerve** is a motor nerve that supplies the tongue muscles.