

EPIDURAL ANALGESIA TECHNIQUES

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Introduction

This paper will discuss the indications, contraindications, advantages and disadvantages of epidural analgesia and anesthesia. It will also describe the anatomical landmarks and the process of introducing a drug into the epidural space. Commonly used drugs and their doses are also listed.

Definitions

Epidural analgesia: the injection of an opiate agonist, a phencyclidine, or an alpha-agonist into the epidural space which produces a loss of sensation.

Epidural anesthesia: the injection of a local anesthetic into the epidural space which produces sensory and motor loss.

Indications

Epidural analgesia works well for procedures such as cesarean sections, thoracotomies, pelvic or pelvic limb fractures, amputations, orthopedic procedures, and surgery of the tail or perineum. It also works well for post-operative analgesia.

Contraindications

Contraindications for the use of epidural analgesia include clotting disorders, sepsis, an infection at the site of needle placement, and increased intra-cranial pressure (such as may occur with head trauma and brain tumors). Epidurals using local anesthetic drugs are contraindicated in patients with uncorrected hypovolemia.

Advantages

The administration of an analgesic drug into the epidural space provides analgesia of long duration with very few systemic side effects. It also reduces the requirements for inhalant anesthesia, has less of a roller-coaster effect on pain management, and can reduce the expense of an anesthetic procedure by reducing the amount of other drugs that are needed. Single as well as multiple injections may be used depending on the patient's needs. Patients are generally more comfortable after surgery and have better recoveries.

Disadvantages

Although the advantages often outweigh the disadvantages, there are some significant disadvantages and possible complications to using epidural analgesia. The disadvantages include difficulty in proper needle placement in obese patients and in patients with severe pelvic fractures (the landmarks may be displaced), and general anesthesia is often necessary to administer the epidural. Possible complications from epidural analgesia are infection, epidural hemorrhage, spinal or nerve root trauma, weakness or ataxia, seizures, and respiratory depression.

The Epidural

The supplies necessary for delivering epidural analgesia are basic and include: sterile gloves, a sterile spinal needle (a hypodermic needle may be substituted for cats or very small patients) in an appropriate gauge and length for the patient, a fenestrated drape, a 3 ml test syringe with 2 mls of sterile saline and one ml of air, and a syringe containing the proper dose of the drug of choice.

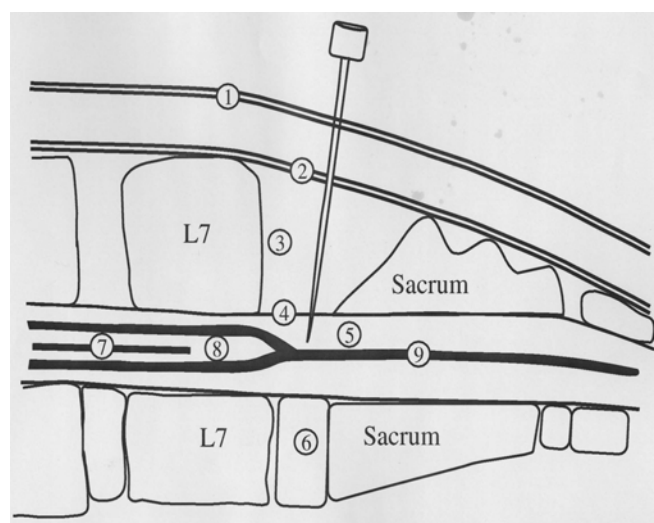
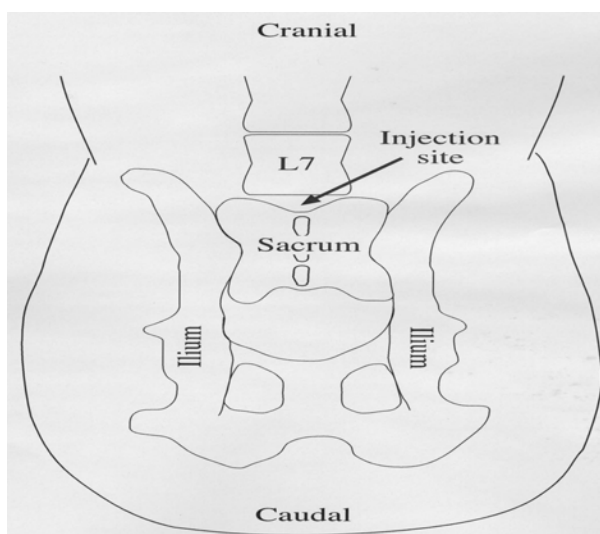
The animal may be positioned in lateral or in sternal recumbency. The pelvic limbs should be drawn cranially to flex the spine at the lumbo-sacral junction. To identify the anatomical landmarks for the injection site first palpate the cranial aspects of the wings of the ileum, then staying on the midline palpate the raised spinous process of L6, continue moving caudally on the midline to palpate the spinous process of L7, then continue to palpate caudally to find the dip between L7 and the sacrum (the lumbo-sacral depression) where the spinal needle will be inserted.

To prepare the epidural site first palpate the anatomical landmarks to find the injection site. Clip the hair from a wide area around the site, being careful not to damage the skin, and remove the loose hair and any debris that

may be present. Alternate between chlorhexadine scrub and alcohol for a series of three sterile scrubs or until the site is clean.

Make sure that all the supplies and drugs needed for the epidural are present and correct. Don sterile gloves and place the fenestrated drape over the injection site. Palpate and locate the injection site.

Hold the spinal needle securely to insure that the needle and stylet stay together. Turn the opening of the bevel on the spinal needle towards the area intended to receive pain medication. Brace the hand holding the needle on the patient's back and slowly advance the epidural needle transcutaneously at a 90 degree angle to the skin at the center of the epidural site (the lumbo-sacral depression). In order, the layers the spinal needle will penetrate are: Skin/subcutaneous tissues, supraspinous ligament, intraspinous ligament, ligamentum flavum, and the epidural space. As the spinal needle advances, changes of resistance may be noticed as the needle moves through the different layers, a pop followed with a loss of resistance may be noted when the bevel enters the epidural space.



Diagrams courtesy of Gwendolyn L. Carroll, MS, DVM, DACVA

Several methods are available to test for correct needle placement:

1. Air leakage test: If the spinal needle tip is properly placed in the epidural space, an injection of 0.5-2.0 ml of air will proceed with no resistance and with no visible leakage into subcutaneous tissue.

2. "Whoosh" test: A stethoscope is used to auscult cranial to the needle on midline during the injection of 0.5-2.0 mls of air. An audible "whoosh" will be heard if the spinal needle is in the proper position. A loud crepitus noise will be heard if the spinal needle is incorrectly placed.

3. The "air bubble" test: 2 mls of sterile saline and one ml of air are drawn into a 3 ml syringe, the stylet is removed and kept sterile, and the sterile saline is slowly injected through the spinal needle. If the spinal needle is in the proper position, the sterile saline will freely flow into the epidural space without compressing the air bubble in the syringe. If the air bubble is compressed, then the spinal needle is not in the proper position.

4. The "hanging drop" test: Advance the spinal needle to a point near the ligamentum flavum and withdraw the stylet, keeping it sterile. Inject or drop a small amount of sterile saline into the needle hub to form a small bubble above the edge of the hub. Slowly advance the spinal needle toward the epidural space. When the spinal needle enters the epidural space, which has negative pressure, the bubble in the needle hub will disappear as the sterile saline is drawn into the epidural space.

Once the spinal needle is in the proper position, remove the stylet (if it hasn't been removed already) without moving the needle, and keep it sterile. Carefully attach the syringe with the chosen drug and slowly inject the drug into the epidural space. When the injection is completed, carefully remove the syringe, without moving the spinal needle, replace the sterile stylet (which pushes the remaining drug into the epidural space), and then remove the spinal needle and stylet together by pulling it straight out. If the area intended to receive pain medication is on one

side or the other, place the patient with that side down for 10-15 minutes so gravity can assist the flow of the analgesic drug to the proper area.

Epidural Drugs

Local Anesthetic Epidural Drugs	Dosage	Conc.	Onset	Duration	Comments
Lidocaine 2%	Dog: 1 ml/3.4 kg, (T ₅) Cat: 1 ml/4.5 kg (T ₅)	20 mg/ml	10 min. 2-10 min	1-1.5 hrs 0.75-1 hrs	Dosage of epidural to T ₅
Bupivacaine 0.5%, Marcaine®	Dog: 1ml/4.5 kg Cat: 1 ml/7.0 kg	5 mg/ml	20-30 min.	4-6 hrs	Minimal motor blockade

Local anesthetic epidurals provide excellent muscle relaxation and short-term analgesia. They are inexpensive and do not require the use of scheduled drugs. The disadvantages include the potential for overdose, hypotension, excessive muscle relaxation, temporary loss of motor function, and injection site discomfort. It is important to keep the patient's head elevated when using local anesthetic drugs for epidurals so that they do not migrate to the brain.

Opioid Epidural Drugs	Dosage	Conc.	Onset	Duration	Comments
Morphine Duramorph®	0.1 mg/kg	0.5 mg/ml	20 min.	Up to 24 hrs	90 minutes to peak analgesia "Use Preservative free"
Oxymorphone Numorphan®	0.05-0.1 mg/kg	1.5 mg/ml	15 min.	10 hrs	Dilute in 2-6 mls of sterile saline
Buprenorphine Buprenex®	Dog: 0.005 mg/kg Cat: 0.001mg/kg	0.3 mg/ml	30 min.	18 hrs	Less likely to produce urine retention. Dilute in 2-6 mls of sterile saline

Opioid epidurals provide prolonged analgesia, ambulation is not impaired, the need for inhalant anesthetics is reduced and the effects can easily be antagonized or reversed. The disadvantages of opioid epidurals are that they are more expensive and the drugs used are controlled and require exact record-keeping. They also provide poor muscle relaxation and have a slower onset of action. Potential complications of opioid drugs include nausea, panting, respiratory depression, urine retention, cranial migration, myocardial depression, and hypotension. Opioids are metabolized by the liver and eliminated by the kidneys. Animals with hepatic disease or a congenitally deficient hepatic metabolism require reduced doses of opioids to avoid prolonged drug side-effects such as respiratory depression and bradycardia.

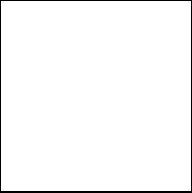
Conclusion

Epidural analgesia can provide excellent pain management for a variety of patients. It requires basic supplies and with care and practice can easily be incorporated into your surgical protocols.

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