Blocks of the Head
Use caution when performing blocks near infected or neoplastic tissue. If there is any concern about seeding infection or tumor by performing a nerve block, don't perform the block!

Retrobulbar block results in blockade of the lacrimal, zygomatic, and ophthalmic nerves, which results in desensitization of the eye, orbit, conjunctiva, eyelids, and forehead skin. To perform this technique, insert needle ventral to the border of the zygomatic process at the lateral canthus. Advance the needle medial to the ramus of the mandible in a mediodorsal and caudal direction until it reaches the orbital fissure. Potential complications include bleeding, direct subarachnoid injection, incomplete blockade, penetration of the globe, intravascular injection, and seeding of tumors or infection.

Infraorbital nerve block results in blockade of the infraorbital nerve, which is a continuation of the maxillary nerve (a branch of the trigeminal nerve) which will desensitize the upper lip and nose, roof of the nasal cavity, and related skin ventral to the infraorbital foramen. Use a 22-gauge, 1 inch needle in brachycephalic dogs. In doichocephalic dogs, a 1.5 inch needle is often used. Insert the needle either intraorally or extraorally approximately 1 cm cranial to the body lip of the infraorbital foramen. Advance the needle to the infraorbital foramen, which can be felt between the dorsal border of the zygomatic process and the gingiva of the canine tooth. In cats, using a 25-gauge, 5/8 inch needle, insert the needle into the infraorbital foramen, which is ventral to the eye and approximately 1 cm dorsal to the third premolar at the junction of the maxilla and zygomatic arch. Angle the needle medially and dorsally. Advance the needle approximately 0.5 cm into the infraorbital canal. Complications include incomplete blockade and bleeding. In cats may also result in accidental puncture of the globe.

Mandibular nerve block in dogs and cats blocks the inferior alveolar branch of the mandibular nerve, which is a branch of the trigeminal nerve, which results in desensitization of the mandibular teeth, canine, incisors, skin, and mucosa of the chin and lower lip. To perform this technique, insert the needle at the lower angle of the jaw approximately 0.5 cm rostral to the angular process; advance the needle 1.5 cm dorsally against the medial surface of the ramus of the mandible to the palpable lip of the mandibular foramen. Complications include incomplete blockade and bleeding.

Mental nerve block in dogs and cats blocks the mental nerve, which is a continuation of the mandibular nerve (a branch of the trigeminal nerve), which results in desensitization of the lower lip and rostral portion of the mandible. To perform this block, insert a 25-gauge needle over the mental nerve, rostral to the middle mental foramen at the level of the lower second premolar tooth. In dogs, the needle can be inserted into the foramen; in cats, local anesthetic can be injected just outside the foramen. Complications include incomplete blockade and bleeding.

Regional limb blocks in small animal patients
Three point block in cats block the superficial branches of the radial nerve, the palmar and dorsal cutaneous branches of the ulnar nerve, and the medial nerve resulting in brief anesthesia for onychectomy. Using a 25 or 22 gauge needle, the superficial branches of the radial nerve and the dorsal cutaneous ulnar nerve are blocked on the dorsal aspect of the limb proximal to the carpus by injecting local anesthetic subcutaneously. The palmar branch of the ulnar nerve is blocked just proximal and lateral to the accessory carpal bone. The median nerve is blocked on the palmar surface, just proximal to the median carpal pad. Complications include incomplete blockade, intravascular injection, and bleeding.

Brachial plexus blocks in dogs usually results in blockade of the radial, median, ulnar, musculocutaneous, and axillary nerves, however, there are 11 nerves that comprise the brachial plexus in a dog. A brachial plexus block will block from the elbow distally. There are three techniques for performing a brachial plexus block: a blind
technique, use of a nerve stimulator, and ultrasound-guided. To perform a brachial plexus block, insert needle medial to the shoulder joint and direct the needle parallel to the vertebral column toward the costochondral junction. With the other hand, lift-up the leg. Palpate for the axillary artery, which is located near the nerves of the brachial plexus. Inject local anesthetic and infuse through this area. Use of a nerve stimulator will improve the depth and duration of the blockade by ensuring that local anesthetic is deposited close to the nerve of the brachial plexus. Ultrasound-guidance will also improve duration and depth of local blockade (Vet Anaesth Analg 2010;37:144-153). Complications include incomplete blockade, bleeding, intravascular injection, and pneumothorax.

**RUMM block in dogs** block the Radial, Ulnar, Median, and Musculocutaneous nerves, resulting in sensory blockade of elbow, antebrachium, and paw. To block the radial nerve: With the dog in lateral recumbency, limb to be blocked is up with the elbow flexed 90°. Measure the length of humerus and divide into thirds. Radial nerve located at junction of middle and distal thirds, ~1 cm caudal to this line and between lateral head of triceps and brachialis muscles. Insert needle at 45° degree angle, perpendicular to long axis of humerus, penetrating the lateral head of the triceps. To block the ulnar, musculocutaneous, and median nerve blocks: With the dog in lateral recumbency, limb to be blocked is down with the elbow flexed 90°. Measure the length of medial aspect of humerus. Nerves are ½ the distance along this line from the medial epicondyle at the most proximal point at which humeral shaft can be palpated. Insert needle at 45° angle from a caudal direction, perpendicular to the long axis of the humerus until it contacts the caudomedial aspect of the humerus (Vet Surg 2010;39:785-796). Complications include incomplete blockade, intravascular injection, and bleeding.

**Intravenous regional anesthesia (aka Bier block)** provides short-term anesthesia in the distal limb, distal to a tourniquet by injecting lidocaine into a vein following tourniquet placement. An esmarch bandage is applied to the limb to force blood proximally. A tourniquet is then placed. The esmarch bandage is then removed and lidocaine is injected into a vessel. Alternatively, a venous catheter may be placed prior to the esmarch bandage, and lidocaine can be injected into the catheter following removal of the esmarch bandage. The tourniquet allows for a blood-free surgical site. The tourniquet should remain in place for less than 2 hours (ideally less than 90 minutes). Return of sensation occurs within 5 to 15 minutes, and residual analgesia remains for approximately 30 minutes. Prolonged tourniquet placement may result in tourniquet-induced ischemia, shock, sepsis, and death. Lidocaine is the only local anesthetic that should be used for this procedure.

**Epidurals and Spinals**

**Lumbosacral epidurals** in dogs are performed by placing a spinal needle with stylet at midline of the lumbosacral (L7-S1) space. A distinct “pop” is felt when the needle is advanced through the interarcuate ligament (ligamentum flavum). No blood or spinal fluid should be observed. Minimal resistance to injection should be felt. Advantages of epidural anesthesia include good muscle relaxation, postoperative analgesia, minimal effects on the body, low cost. Complications include inadequate anesthesia due to faulty technique, if the animal is awake during surgery (might move); hypotension, respiratory depression, or apnea after excessive blockade; accidental administration into the subarachnoid space. Hypovolemia and hypotension (when using local anesthetics), bleeding disorder, and skin infection are contraindications to performing epidurals.

**Lumbosacral epidurals** in cats are performed by placing a 22-gauge needle at midline of the lumbosacral (L7-S1) space. A distinct “pop” is felt when the needle is advanced through the interarcuate ligament (ligamentum flavum). No blood or spinal fluid should be observed. Minimal resistance to injection should be felt. Complications include inadequate anesthesia/analgesia due to faulty technique, hypotension, respiratory depression, or apnea after excessive blockade; accidental administration into the subarachnoid space. Due to anatomical differences from dog, are more likely to perform a spinal rather than an epidural (spinal cord ends at L6 to S2). Hypovolemia and hypotension (when using local anesthetics), bleeding disorder, and skin infection are contraindications to performing epidurals. Local anesthetics should be used with caution when performing LS epidurals in cats.

**Coccygeal epidurals in cats** can be performed at either the sacrococcygeal interspace or Co1-Co2. Palpate the space between sacrum and Co1 or Co1 and Co2. Insert 25g needle on midline, direct at a 30 to 45° angle, and advance through the ligamentum flavum. Aspirate through the needle to check for blood (if blood is aspirated, start over). Infuse 0.1 to 0.2 ml/kg of lidocaine 2%. The techniques has been described for use in cats with urethral obstruction. Other possibilities: dystocias, tail amputation, perineal procedures. Complications include bleeding and incomplete blockade. (J Vet Emerg Crit Care 2011;21:50-52).
Local Infiltration

**Tissue infiltration/Line blocks** utilize direct injection of local anesthetic drug into tissues. This is the easiest, most reliable, and safest local anesthetic technique. The most common local anesthetic used for tissue infiltration is lidocaine 2%, but other local anesthetics can be used for this purpose. If you are desensitizing large areas, dilute your local anesthetic with sterile saline solution. Due to adverse side effects of large doses of local anesthetics, keep your total lidocaine dose below 10 mg/kg during tissue infiltration.

Local anesthetic containing epinephrine (1:200,000) can be used to reduce absorption and increase the local anesthetic effect and duration (up to 50%). Epinephrine causes local vasoconstriction, which results in decreased uptake into the vasculature and away from the site of action. Epinephrine should not be injected into tissues supplied by end arteries (e.g. ears and tails), because of the risk of severe vasoconstriction, local ischemia, and necrosis. To perform tissue infiltration, it is desirable to have sharp, sterile needles. There are two basic techniques for performing local tissue infiltration. The first is to make multiple intradermal or subcutaneous injections of 0.5 ml of lidocaine or lidocaine/saline. The second is to inject slowly while advancing the needle along the line of proposed incision or surrounding a mass. It is very important to aspirate back prior to injection to avoid intravascular administration during tissue infiltration. The most common complications include incomplete blockade and accidental injection into vascular structures. Additionally, injection of local anesthetic along a proposed incision line may be associated with decreased wound healing. Excessive doses or inadvertent intravascular administration of lidocaine (over 10 mg/kg) may produce seizures, apnea, cardiovascular collapse, and death. The maximum doses of other local anesthetic drugs are dependent on the drug. Intravascular administration of ropivacaine or bupivacaine has been associated with increased cardiac toxicity and should be avoided.

**Wound infiltration catheters** utilize a sterile fenestrated catheter, extension tubing, and either intermittent boluses of local anesthetic or a syringe pump for continuous infiltration anesthesia. This equipment allows for long term administration of local anesthetics into a wound to provide extended analgesia. There is a “pain buster” kit that can be purchased for this use. The most common use for wound infiltration catheters is following total ear canal ablation surgery in dogs, but they can be used for other kinds of wounds/surgical sites. The most common complications are related to potential for decreased wound healing, fluid accumulation, and accidental overdose of local anesthetic.

**Lidocaine patches** are adhesive patches that contain lidocaine and can be applied over or alongside incisions. Several studies have demonstrated that systemic absorption is variable, but tends to be low (J Vet Pharmacol Ther 2008;31:359-367, J Am Anim Hosp Assoc 2007;43:280-283, Vet Anaesth Analg 2007;34:443-446). Patches are effective for 24 hours. There are no reported side effects in veterinary patients.

**Advantages of Loco-Regional Anesthesia**

Use of local anesthetic techniques should result in decreased need for systemic analgesics/sedatives as they prevent or abolish pain. Local anesthetic techniques can be utilized preoperatively, intraoperatively, or postoperatively. Local anesthetic techniques and drugs must be tailored to the patient in order to maximize beneficial effects. Local and regional anesthetic techniques can be:

1. Used in combination with sedation or tranquilization to produce a cooperative patient (e.g. small mass removal)
2. Used when general anesthesia is unnecessary or a risk for the animal (e.g. c-section)
3. Used in patients during general anesthesia to minimize the required concentration of inhalant (MAC reduction) (e.g. epidural lidocaine prior to TPLO surgery)
4. Used in patients when surgery is not yet an option (HBC)
5. Used in patients to provide preemptive and postoperative analgesia (e.g. epidural morphine following TPLO surgery)
6. Used in patients to provide a balanced approached to analgesia – especially to diminish the detrimental side effects of systemic drugs

**Additional Resources**