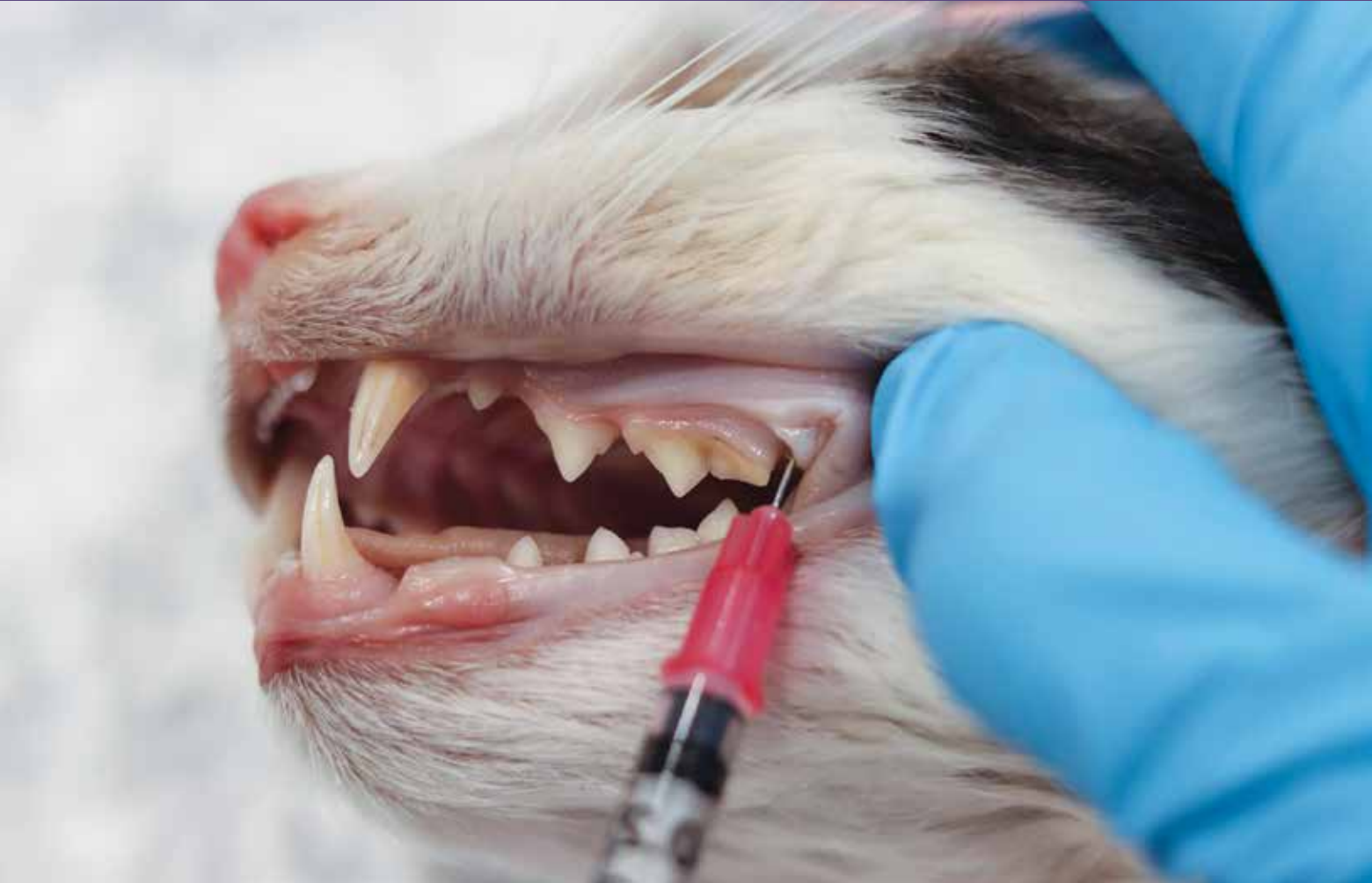




SKILLS CHECK

Performing Oral Regional Nerve Blocks

Sheena Davis, LVT, VTS (Dentistry)
Bond Vet, New York, New York

Abstract

All oral surgical procedures should include a regional block. The materials are readily available in practice, and the local anesthetic will help provide more balanced anesthesia. Local anesthetics can be administered intraorally or extraorally and are categorized by region as infraorbital, caudal maxillary, middle mental, and caudal mandibular/inferior alveolar. Complications vary according to the drug used, patient species, and injection technique.



Take-Home Points

- Regional blocks provide excellent intraoperative and postoperative analgesia for dental procedures.
- Materials for regional nerve blocks are cost-effective and readily available within the clinic.
- Whether extraoral or intraoral, the area to which a regional block will be administered should first be disinfected.
- The maximum calculated dose of the desired local agent should not be exceeded.
- To avoid trauma to local structures, the needle entering a foramen within the oral cavity should not exceed 3–5 mm.
- Aspiration is needed to avoid injecting a local agent into a vessel.

Regional nerve blocks (also called locoregional, oral, local, or dental nerve blocks) provide excellent intraoperative and postoperative analgesia for patients undergoing dental procedures. They add to the safety and balance of the anesthetic event by minimizing the amount of inhalant anesthetic required.¹ Research supports using regional blocks to reduce the minimal alveolar concentration of inhalant needed without causing significant hemodynamic adverse effects.¹ Performing a regional block safely and successfully requires a strong understanding of small animal oral anatomy and landmarks.²

The materials needed to administer a regional anesthetic can be found within a general clinic. The amount of anesthetic agent to be delivered depends on the dose, the patient's weight, and the number of regions to be blocked.

Small-gauge short (12 to 36 mm) needles are recommended for superficial nerve blocks because they are less likely to cause nerve injury.³ When an anesthetic agent is administered into multiple areas, needles should be changed to maintain their sterility and sharpness (**TABLE 1**).

STEP 1: ASSEMBLE THE NECESSARY MATERIALS

- Gloves (sterile or nonsterile depending on the block)
- Local antiseptic
- Sterile syringes
- Sterile needles
- Local anesthetic agent

STEP 2: CHOOSE AN ANESTHETIC AND CALCULATE THE DOSE

When choosing a local anesthetic, consider the duration of the surgical procedure and the effects of the local anesthetic (**TABLE 2**).

TABLE 1 Materials Needed for Oral Regional Nerve Blocks³

MATERIAL	DETAILS
Antiseptic agent	• Chlorhexidine solution 0.05% to 0.1% (for intraoral use) • Isopropyl alcohol 70% (for extraoral use)
Needles	• 27 g, 25 g, 23 g, or 22 g (extra-short 12 mm, short 25 mm, or long 36 mm)
Syringes	• 1 to 3 mL

TABLE 2 Local Anesthetic Agent Duration of Action and Onset⁴

AGENT	DOSE	ONSET	DURATION
Bupivacaine 0.5%	• 1–2 mg/kg (dog) • 0.5–0.1 mg/kg (cat)	6–10 min	4–9 hours
Lidocaine 0.2%	• 2 mg/kg (dog)	2–3 min	1–2 hours
Buprenorphine (added to bupivacaine 0.5%)	• 15 µg/patient (dog/cat)	Variable	48–96 hours
Dexmedetomidine (added to bupivacaine 0.5%)	• 1 µg/kg (dog/cat)	Variable	48–72 hours



Lidocaine is a short-acting agent commonly used for regional blocks. Use caution when administering this medication. Cats are significantly more sensitive to lidocaine than dogs; a potential adverse effect of lidocaine administration to cats is central nervous system excitation, resulting in convulsions.⁵

Bupivacaine is a long-acting agent used for regional blocks. Cats are also sensitive to high doses of bupivacaine; known complications are neurotoxicity and cardiotoxic complications, such as tremors, seizures, coma, respiratory depression, profound cardiac depression, ventricular fibrillation, asystole, or death.⁵

Buprenorphine is an adjunctive medication that can be added to bupivacaine or lidocaine to extend the action of a regional block. The recommended dose to be added to a regional nerve block is 15 µg per patient; a study proved that when bupivacaine was combined with an opioid, it increased the duration of action of the local anesthetic.⁶

Dexmedetomidine is another adjunctive analgesic that can enhance the efficacy and duration of a local anesthetic. The recommended dose is 1 µg/kg; keep in

mind that using an α_2 agonist will cause associated dose-related systemic adverse effects (e.g., hypertension, bradycardia).^{6,7}

The following formula can be used to calculate the appropriate dose:

1. Patient weight (kg) $\times$ dose of anesthetic agent = mg to be given
2. The mg to be given / anesthetic concentration = total mL to be given
3. Total mL / 4 = amount of anesthetic agent to be applied per quadrant of the mouth

Example:

1. 10-kg (dog) $\times$ 1 mg/kg 0.5% bupivacaine = 10 mg
2. 10 mg / 5 mg/mL (concentration) = 2 mL
3. 2 mL / 4 (quadrants) = 0.5 mL per quadrant

STEP 3: ADMINISTER THE LOCAL ANESTHETIC

A regional block is accomplished by administering a local anesthetic adjacent to or surrounding a peripheral nerve or nerve branch to temporarily inhibit nociception.⁸

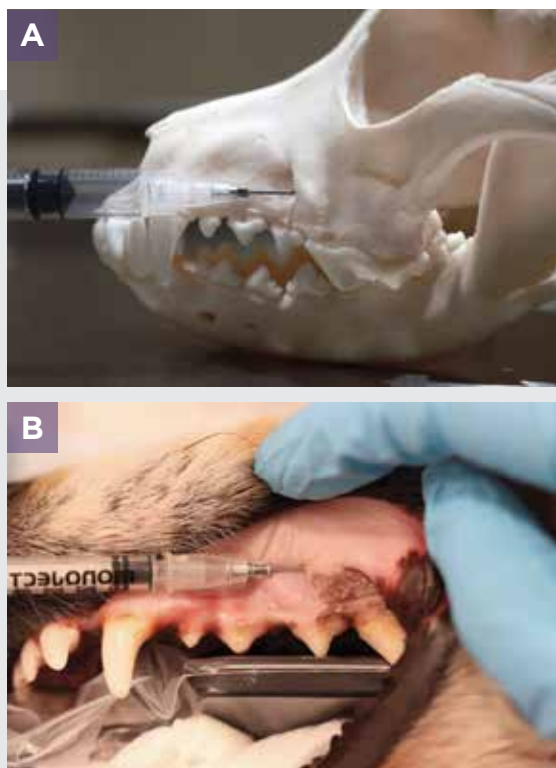


FIGURE 1. Infraorbital block. (A) Demonstrated on a canine skull. (B) Performed on a canine patient.

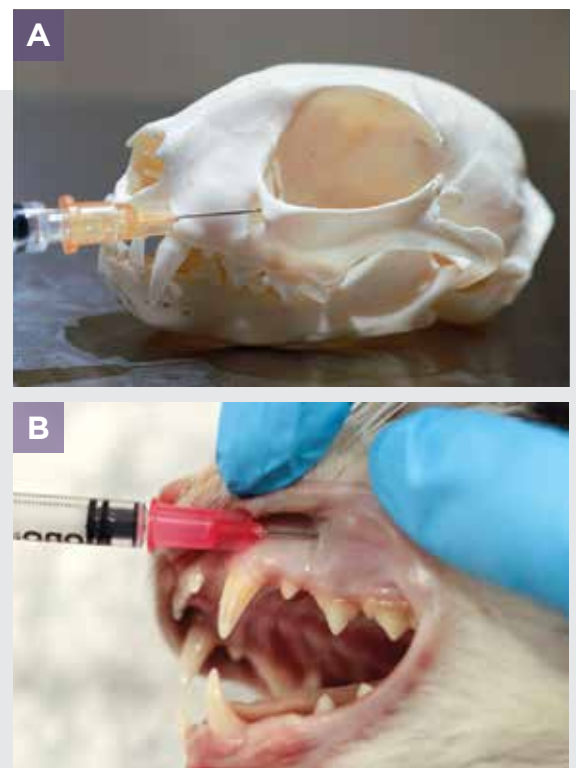


FIGURE 2. Infraorbital block. (A) Demonstrated on a feline skull. (B) Performed on a feline patient.



The 4 types of regional nerve blocks of the oral cavity are the infraorbital, caudal maxillary, middle mental, and caudal mandibular/inferior alveolar.⁸

Before a local anesthetic agent is injected, the injection site must be prepared with an antiseptic such as alcohol (extraoral approach) or chlorhexidine (intraoral approach).

Type 1: Infraorbital Block

Infraorbital (rostral maxillary) blocks affect bone, teeth, and intraoral soft tissue from the maxillary third premolar rostral to the midline.⁸ The infraorbital foramen can be located by palpating the buccal mucosa dorsal to the maxillary third premolar (**FIGURES 1 AND 2**).⁸

Intraoral approach

1. Locate the infraorbital foramen by retracting the lip dorsally and palpating the buccal mucosa over the third premolar.
2. After locating the infraorbital foramen, place the needle next to the maxillary bone, advancing it in a

Cats are significantly more sensitive to lidocaine than dogs; a potential adverse effect of lidocaine administration to cats is central nervous system excitation, resulting in convulsions.⁵

caudal direction to just inside the canal. The needle should pass into the canal effortlessly. If it does not, the tip of the needle has encountered alveolar bone and needs to be redirected; retract the needle slightly and redirect it to pass into the canal smoothly.

3. Before administering the agent into the foramen, aspirate the syringe to be sure the needle is not in a blood vessel.



FIGURE 3. Caudal maxillary block. **(A)** Demonstrated on a canine skull. **(B)** Performed on a canine patient.



FIGURE 4. Caudal maxillary block. **(A)** Demonstrated on a feline skull. **(B)** Performed on a feline patient.



Type 2: Caudal Maxillary Blocks

Caudal maxillary (caudal infraorbital) blocks affect bone, teeth, and intraoral soft tissue from the last molar rostral to the midline, including the ipsilateral soft and hard palatal mucosa and bone (**FIGURES 3 AND 4**).⁸ The opening to the caudal maxillary foramen is dorsal to the last maxillary molars (teeth 110 and 210).⁸

Intraoral approach

1. Use your finger to palpate the maxillary tuberosity just after the last molar.
2. Advance the needle dorsally, perpendicular to the last molar, entering the mucosa directly behind the maxillary second molar. To avoid injuring the eye, do not advance the needle more than 3 to 5 mm.
3. Before administering the agent, aspirate the syringe to be sure the needle is not in a blood vessel.

Type 3: Middle Mental Blocks

Middle mental (rostral mandibular) blocks affect bone, teeth, and intraoral soft tissue from the mandibular second to third premolar rostral to the midline.⁸ The

middle mental foramen is ventral to the mesial root of the second premolar (**FIGURES 5 AND 6**).⁸

Intraoral approach

1. Retract the mandibular buccal frenulum ventrally and hold.
2. With your other hand, insert the needle in a caudal-ventral position (about 45 degrees) until the tip of the needle contacts the alveolar bone. If the opening to the middle mental foramen is large, the tip of the needle will fall into the entrance of the foramen. In the dog, the entrance to the middle mental foramen is about one-third of the distance from the border of the mandible; in the cat, it is about halfway between the mandibular canine and the third premolar.
3. Before administering the agent, aspirate the syringe to be sure the needle is not in a blood vessel.

Type 4: Caudal Mandibular Blocks

Caudal mandibular (inferior alveolar) blocks affect bone, teeth, and intraoral soft tissue from the



FIGURE 5. Middle mental block. **(A)** Demonstrated on a canine skull. **(B)** Performed on a canine patient.

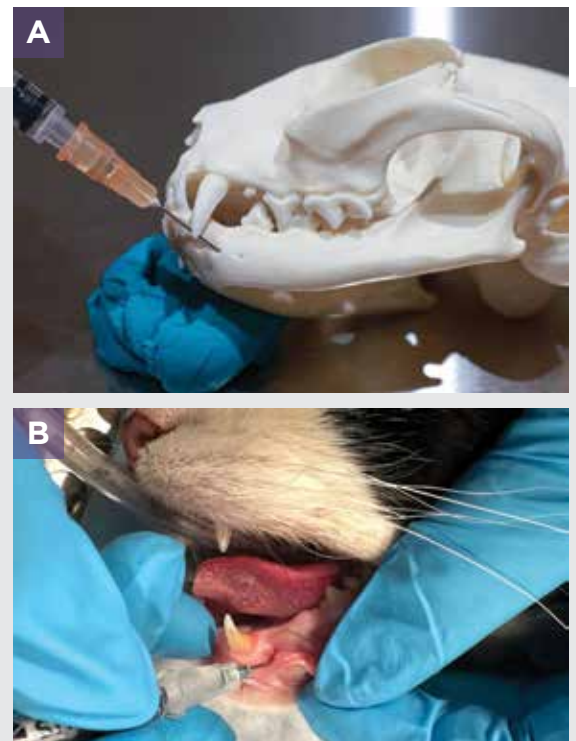


FIGURE 6. Middle mental block. **(A)** Demonstrated on a feline skull. **(B)** Performed on a feline patient.



mandibular third molar rostral to the midline.⁸ In the dog, the entrance to the inferior alveolar foramen is dorsal to the third molar and angular process. In the cat, the inferior alveolar foramen can be located by palpating the dorsal aspect of the angular process dorsal to the last molar of the mandible (**FIGURES 7 AND 8**).⁸

Extraoral approach

1. Use your finger to palpate the indentation on the ventral aspect of the caudal mandible, just rostral to the angular process.
2. Insert the needle into the skin on the lingual aspect of the caudal portion of the indentation.
3. Maintain the needle parallel to the lingual aspect of the mandible while advancing the needle along the bone until it reaches one-third of the way, keeping the needle pointed toward the mandible.
4. Before administering the agent, aspirate the syringe when the needle is near the opening of the mandibular foramen to be sure the needle is not in a blood vessel.

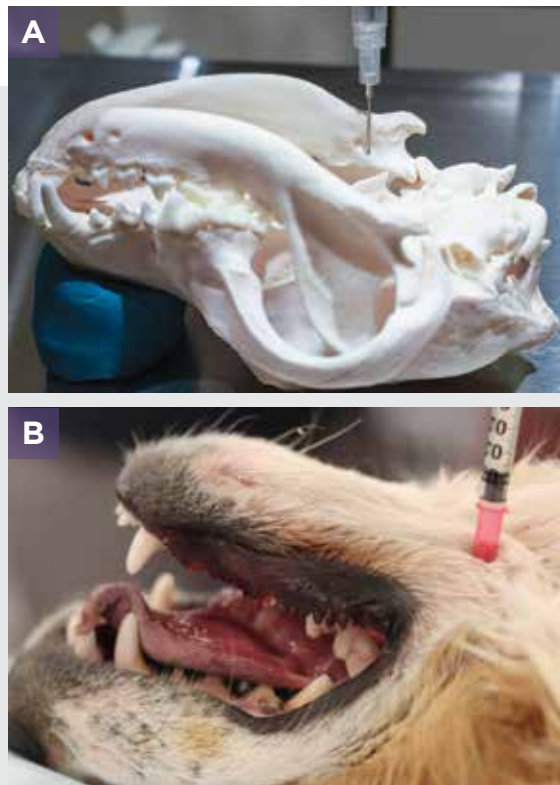


FIGURE 7. Caudal mandibular block. **(A)** Demonstrated on a canine skull. **(B)** Performed on a canine patient.

COMPLICATIONS/ ADVERSE EFFECTS

Some of the complications that can arise from a regional block are accidental intravenous administration of local anesthetic, neurologic signs, hemorrhage/hematoma, ocular injury, allergic reaction, nerve injury, and cardiovascular effects (atrial fibrillation).⁹

To avoid a hemorrhage/hematoma after administration of a regional block, apply digital pressure over the injection site for approximately 1 minute (or longer, until bleeding stops).

In cats and brachycephalic patients, the orbit of the eye encompasses the space within the zygomatic arch in front of the infraorbital foramen and the caudal maxillary foramen. To avoid puncturing the orbit of the eye when administering a regional block to these patients, take care to not advance the needle too far as

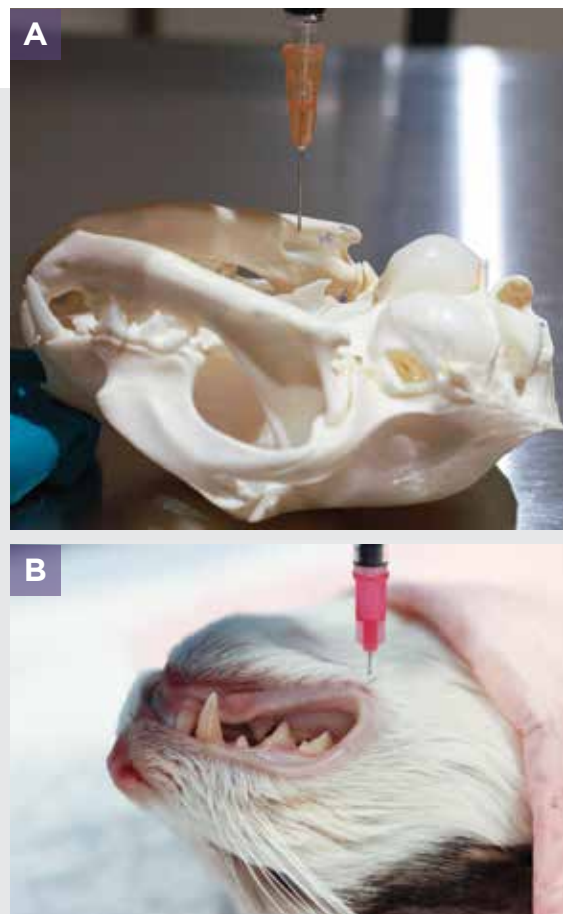


FIGURE 8. Caudal mandibular block. **(A)** Demonstrated on a feline skull. **(B)** Performed on a feline patient.



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the distance from the infraorbital foramen and caudal maxillary foramen is small. Signs of ocular trauma resulting from a regional block are proptosis, sudden blindness/vision loss, and severe uveitis.

SUMMARY

Regional nerve blocks are safe when performed correctly and the agent is administered at the proper dose. Local anesthetics are a recommended part of an anesthetic protocol, but users should be familiar with the drugs used, the anatomy of the oral cavity, and the potential adverse effects. **TVN**

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Sheena Davis

Sheena is the owner of Big Apple LVT Consulting and Education and has worked in private practice for over 16 years. In 2020, she achieved VTS certification in dentistry and certification as a Veterinary Cannabis Counselor. She curates the library for the Veterinary Cannabis Society. In her personal time, Sheena can be found gardening and enjoying a movie at home with her husband and 2 cats.