In: **50th Annual Convention of the American Association of Equine Practitioners, 2004, Denver, Colorado**, (Ed.). Publisher: American Association of Equine Practitioners, Lexington KY. Internet Publisher: International Veterinary Information Service, Ithaca NY (www.ivis.org), 4-Dec-2004; P1433.1204

How to Perform Effective Equine Dental Nerve Blocks

B. W. Fletcher

Bennington, NE, USA.

1. Introduction

The benefit of local anesthesia in dentistry is widely recognized. As an equine dental practitioner, the necessity for an effective nerve block is important in advanced dental procedures. Dental nerve blocks are easy to perform and tolerated well by the standing horse. Less sedation is required during dental procedures when successful local anesthesia is obtained. Thus, the procedure is safer for the practitioner and the horse. As equine dentistry evolves, more advanced procedures are being used for treatment of dental problems. To treat conditions such as periodontal disease, apical root infections, and fractured teeth, adequate restraint is required. Equine dental nerve blocks are beneficial in many advanced dental cases, and they can be treated in the standing horse.

2. Materials and Methods

Equipment

A 3.5-in, 22-gauge spinal needle, 2% lidocaine, and a syringe are needed.

Restraint

The maxillary foramen block and mandibular foramen block are tolerated well by the sedated horse. The infraorbital foramen block and mental foramen block are more difficult to perform. These procedures are not tolerated well by the sedated horse, and thus, will require more restraint.

Trigeminal Nerve

Enervation of the dental arcades and their immediate surrounding structures is supplied by the trigeminal nerve, which is the fifth cranial nerve. This nerve exits the cranium below the ear and progresses cranially, dividing into the maxillary nerve and mandibular nerve (Fig. 1). Four dental nerve blocks can be achieved by means of the maxillary foramen, infraorbital foramen, mandibular foramen, and the mental foramen. The maxillary nerve enters the maxillary foramen below the eye as shown in Figure 2. Then, the nerve proceeds through the infraorbital canal and exits the infraorbital foramen as the infraorbital nerve. As the maxillary nerve proceeds through the infraorbital canal, branches from this nerve supply connect to the maxillary cheek teeth and surrounding structures. The mandibular nerve progresses cranially along the medial side of the mandible, branching off into smaller nerves. The inferior alveolar nerve, which is a branch of the mandibular nerve, enters the mandibular foramen on the medial side of the mandible (Fig. 3) and supplies all enervation to the lower dental arcade. A nerve block in the area of the maxillary foramen and the mandibular foramen would effectively provide local anesthesia for the entire upper and lower arcades. These foramens are easy to access with proper orientation, and most horses have little objection to needle placement in these areas.

Figure 1. Anatomical view of a dental arcade enervation. - To view this image in full size go to the IVIS website at www.ivis.org . -

Figure 2. Maxillary foramen. - To view this image in full size go to the IVIS website at www.ivis.org . -

Figure 3. Mandibular foramen. - To view this image in full size go to the IVIS website at www.ivis.org . -

Technique: Maxillary Foraman Block

The maxillary foramen is accessed between the zygomatic bone and the mandible at the level of the posterior one-third of the eye (Fig. 4). It is helpful to examine a skull before performing the block to aid in identifying this area and the exact location of the maxillary foramen. A 22-gauge spinal needle is inserted just below the zygomatic bone at the level of the posterior third of the eye at a 90° angle. A local skin bleb of local anesthesia may be used before insertion of the spinal needle, if desired. The needle is advanced slowly ~2 - 2.5 in deep. If the nerve is contacted, the horse will show a slight head jerk. Otherwise, advance the needle until it contacts the bone. Then, withdraw the needle slightly and inject 20 ml of 2% lidocaine. Complete anesthesia usually takes ~15 min, and it last for ~2 - 4 h.

Figure 4. (A-E) These photos show nerve access locations and needle placement for the maxillary foramen nerve block. This nerve block provides anesthesia for all the teeth in the upper arcade. - To view this image in full size go to the IVIS website at www.ivis.org . -

Technique: Mandibular Foraman Block

The mandibular foramen is located by drawing a line along the buccal edge of the upper dental arcade, which is easily palpated, and extending this line to the back of the mandible (Fig. 5). The foramen is ~3.5 in from the back edge of the mandible along this line in an average-sized horse. The mandibular foramen is located on the medial surface of the mandible. Therefore, it is also helpful to examine a skull before performing the surgery to help orientate the needle in this location. To aid needle insertion, the head is extended to gain access to the back of the mandible. A 22-gauge spinal needle is also used for this nerve block, and it is directed cranially from the back medial edge of the mandible to the area pre-determined to be the location of the mandibular foramen. The medial side of the mandible is concave, and it is important to keep the direction of the needle insertion close to the medial surface of the mandible (Fig. 5). It is not necessary to penetrate the foramen, and it should be avoided whenever possible. The ideal area to block is just before the inferior alveolar nerve enters the mandibular foramen. This nerve block is also tolerated well by the horse. Twenty milliliters of 2% lidocaine is injected into this area. It requires ~15-30 min for onset depending on the accuracy of the block (Fig. 6).

Figure 5. (A) This line along the molar arcade bisects the mandibular foramen. (B) The mandibular foramen is approximately 31/2 inches anteriorly to the caudal edge of the mandible. (C) Needle placement for the mandibular foramen nerve block. (D) The mandibular foramen nerve block supplies anesthesia to all the teeth in the lower arcade. - To view this image in full size go to the IVIS website at www.ivis.org . -

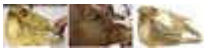

Figure 6. The infraorbital nerve must be blocked caudal to the cheek tooth desired for anesthesia. For example, local anesthesia for the last molar will require a depth of 4.5 in into the infraorbital canal. - To view this image in full size go to the IVIS website at www.ivis.org . -

Technique: Infraorbital Foramen Block
The infraorbital foramen is found between the facial crest and the commissure of the nasal bone. The foramen is palpated. A needle is placed into the foramen, and lidocaine is injected as the needle is slowly advanced. Ten milliliters of lidocaine is injected while proceeding through the foramen, and 10 ml is injected at the end of the foramen, an area ~4.5 - 5 in long depending on the size of the horse (Fig. 7).

Figure 7. The mental foraman is more difficult to palpate, and it is very difficult to thread a needle caudally through the foramen. - To view this image in full size go to the IVIS website at www.ivis.org . -

Technique: Mental Foraman Block
The mental foramen is found on the distal lateral edge of the mandible just anterior to the lower cheek teeth. The same procedure is used as for the infraorbital foramen block, except that the needle cannot be advanced to any extent. This block is used to block the incisors only on the appropriate side. The infraorbital foramen and mental foramen blocks are not tolerated well by the horse, because it is difficult to perform these blocks without contacting the nerve.

Perfusion of Local Anesthesia
Perfusion of local anesthesia around a tooth and tooth root is effective when dealing with wolf teeth or incisors, but it is not very effective for the large cheek teeth. Cheek teeth have a large reserve crown and a deep-seated root that is hard to access. When using local perfusion around the incisors, it is important to inject both the labial side and the palatine side for effective anesthesia.

3. Discussion

Maxillary foramen and mandibular foramen nerve blocks are effective, economical, and easy to perform with proper orientation. These nerve blocks are tolerated well by the horse, and they reduce the amount of sedation needed to perform advanced dental procedures. Also, these nerve blocks can be used before surgery that requires general anesthesia to reduce the stimulation caused by the surgeon and to reduce the amount and depth of the general anesthesia. The maxillary and mandibular nerves do not supply enervation to the skin, SC tissue, and muscle of the head but only to the dental arcades and their immediate surrounding structures. These nerve blocks are effective only for surgical and dental procedures involving the dental arcades. I have been using these nerve blocks for >2 yr in my practice, and the only complication that I have seen was a swelling around the eye and cheek on a horse in which a maxillary foramen nerve block was performed. In this case, the needle was inserted and repositioned several times to obtain the correct anatomical location, and the swelling resolved in 48 h with no further complications. I believe that complications could possibly occur, such as hematoma formation, edema caused by irritation from the local anesthetic, neuritis from needle damage to the nerve, and infection caused by improper aseptic techniques.

References

1. Budras KD, Sack WO, Röck S, eds. Anatomy of the horse: an illustrated text. Iowa State Press 2001.

2. Lumb, Jones. Veterinary anesthesia, 3rd ed. Williams & Wilkins, 1996.

3. Riebold, Goble, Geiser. Large animal anesthesia-principles and techniques. Iowa State University Press, 1982.

4. Baker GJ, Easley J. Equine Dentistry. WB Saunders Company, 1998.