JOIN THE LOCAL BLOCK PARTY!

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OVERVIEW OF THE ISSUE

Oral and dental diseases, as well as their treatment, can be painful. Local and regional oral blocks are one part of a multi-modal pain management approach from which each patient should benefit. In addition to appropriate pre-operative and post-operative analgesic protocols, providing peri-operative nerve blocks makes the patient more comfortable, can reduce the level of general anesthetic needed and can help smooth out recovery and return to function.

OBJECTIVES OF THE PRESENTATION

1. To be able to identify oral and dental conditions that can cause pain and inflammation.
2. To review peri-operative multi-modal pain management.
3. To discuss common local anesthetic agents used.
4. To learn or review optimal local and regional block techniques

ORAL AND DENTAL PAIN – ACUTE

There can be acute pain issues in the patient due to tooth trauma, especially if the pulp/nerve complex is open and exposed. While this can cause significant discomfort initially, once the neurovascular bundle dies and becomes necrotic, the acute pain typically is decreased and any underlying chronic infection or inflammation may not seem to cause significant pain, unless an abscess occurs. The owner may not realize there is an issue, but with any compromised tooth – open canal or discoloration indicating pulpal death – the tooth should either be extracted or have a root canal procedure (endodontic therapy). Osseous fractures from more severe trauma can certainly cause significant pain until the damage is repaired and healed. One of the most common causes of acute pain in the oral cavity is that caused by surgical extractions and repairs, and even periodontal therapy. A multi-modal pain management protocol is optimal to minimize any discomfort for our patients.

A complete peri-operative analgesic protocol is critical for every dental surgery patient, no matter how extensive the procedure may or may not be. In fact, even if ‘just a dental’ is anticipated, there are often many surprises once radiographs are taken, so start with pre-operative analgesics in every patient. In the presence of significant infection and inflammation or pain, oral medications for a few days prior to the procedure may help decrease the extent of the

disease, make the patient more comfortable and give you healthier tissues to work with. Antibiotics should only be used in the presence of distinct infection, and will not be needed in many cases, based on individual situations. NSAIDs can be dispensed for those patients with good renal health pre-operatively, and in most patients post-operatively. Many patients can benefit from a pre-operative dose of maropitant, either the night before the procedures, or injectable prior to surgery. A pre-anesthetic regimen may consist of a low dose of an opioid for pain, a mild sedative and even an alpha 2 antagonist in select patients. Transdermal opioids are now available for use in cats, for an extended duration; these can be applied prior to surgery.

Once under general anesthesia with appropriate monitoring and patient support, local or regional blocks should be placed to provide local analgesia that will extend into the post-operative period. These will also allow the levels of inhalant anesthesia to be kept to a minimum. There are various techniques for regional blocks for regions that include the maxilla (infraorbital or caudal maxillary blocks) and mandible (inferior alveolar or caudal mandibular, and mental blocks). Some of these can be technique sensitive, so get good training for your veterinary team to provide these blocks. There are many local anesthetic drugs available, and individual preference may be based on their clinical time-to-onset and duration-of-action. Lidocaine hydrochloride and bupivacaine hydrochloride are commonly use, though the longer duration of bupivacaine is an important benefit, especially used in conjunction with buprenorphine to potentiate the duration (a 9:1 ratio bupivacaine:buprenorphine) or in its liposomal-encapsulated form (though dental blocks are an off-label use of Nocita$^{(R)}$). Please note: mixing of local anesthetic agents such as lidocaine and bupivacaine results in a negligible time to onset and a much shorter duration of action. As noted previously potentiating the local with an opioid or alpha-2 is preferred. The most accepted combination is bupivacaine + buprenorphine as previously suggested. As the anesthesia wears off, the analgesia has been shown to persist for 48-96 hours post procedure. Post-operative instructions for patients may include starting or continuing the NSAID, using cool compresses and avoiding hard diets and chews until healed. Devices used to help decrease pain and inflammation, including cold laser and targeted pulsed-electromagnetic fields (tPEMF – Assisi DentaLoop) may also be considered.

DENTAL BLOCKS

For most regional blocks, an understanding of the applied anatomy and training is recommended. If for some reason a regional block cannot be placed, consider at least infiltrating the local anesthetic agent into the alveolar mucosa at the site to assist with analgesia, and apply directly to tissues during the procedure (within dose volume allowances).

Maxillary Nerve

Infraorbital nerve block (infraorbital foramen technique): Push the lip up and palpate the canal opening in the mucosa over the infraorbital foramen in the region dorsal to the third premolar. Insert the needle into the canal and advance the needle no further than a site level with the medial canthus of the eye. Hold the needle and the syringe parallel to the palate and flat against the maxilla. Aspirate, then use a slow, steady injection to deposit the anesthetic evenly within the canal. Due to the short length of the infraorbital canal in cats and brachycephalic dogs, the needle should either not be introduced into the canal or only introduced to the level of the medial

canthus (only a few mm). Variations of the infraorbital block have been described using catheters.

Caudal approaches to the maxillary nerve have been considered to target the branches of the superior alveolar nerve, which branches off the maxillary nerve caudal to the infraorbital nerve to innervate the 1st and 2nd molars in dogs and the 3rd and 4th premolars in cats. Dye studies in the cat have shown similar distribution between the infraorbital foramen technique and percutaneous caudal block.

An *Intraoral caudal maxillary block* has been described with inserting the needle, pointed dorsally, in the mucosa immediately caudal to the midsection of the maxillary second molar. Accidental glove penetration has been reported, so the needle should not be inserted more than 2-4 mm, depending on patient size. A slight rostral redirection of the needle has also been suggested.
The *Percutaneous approach* involves inserting the needle percutaneously just below the ventral border of the midsection of the zygomatic arch, perpendicular to the skin and directed medially , with an insertion point about 0.5 cm caudal to a vertical line drawn from the medial canthus of the eye in a medium sized dog. The needle is then advanced into the region of the pterygopalatine fossa, aiming slightly rostrally towards the maxillary foramen; aspirate and inject.

A *Modified caudal approach* to the maxillary nerve block can be done through mucosa (with enough laxity in the commissure) or percutaneously if need be. The lips are retracted caudally to palpate the ventral aspect of the zygomatic arch from the oral cavity or use a modified percutaneous approach. Approach from the caudal direction and keep the needle and syringe in a plane parallel to the palate. Introduce the needle into the mucosa (or skin) ventral and medial to the junction of the zygomatic arch and palatine bones, in a rostral-medial direction, as if aiming for the opposite nostril. Advance the needle just dorsal to the palatal bone in the direction of the pterygopalatine fossa. Infiltrate the local anesthetic at the fossa and also while withdrawing the needle in order to block the caudal superior alveolar nerve. This is an especially important approach when treating the maxillary molars in the dog.

Mandibular Nerve

The *Inferior Alveolar Block* (caudal mandibular) can be performed in an external or internal approach. Using a ‘line’ drawn from the center of the ventral notch of the mandible to the lateral canthus of the eye, a needle can be directed along the lingual cortex, and one-third of the mandibular body height. The caudal opening of the mandibular canal can also be approximated by determining the line between the last molar and the angular process of the mandible and determining the midpoint of that line. These landmarks can used for both approaches. Excess amounts of agent or placement too far medially could affect the lingual nerve causing numbness to the tongue, so care must be taken.

External approach: While palpation of the caudal opening of the mandibular canal can be challenging (especially in smaller patients) and may not be possible, exact location of the opening by palpation may improve agent placement. Palpate the mandibular foramen intraorally with one hand (on the ‘up’ side with the patient in lateral recumbency). With the other hand,

insert the needle through the skin close to the medial aspect of the mandible and advance it dorsally in the gingiva to the area of the foramen. Aspirate and inject the anesthetic slowly. Other tips for block placement: As the foramen is ½ between the last molar and the far end of the mandible, the location can be visually estimated. Contacting the bone and sliding the needle against the medial aspect of the mandible makes it more likely that the block agent(s) will reach the foramen as the liquid injection should spread out when placed against the periosteum vs. soft tissues.

Internal approach: With the dog/cat in lateral recumbency and the syringe aimed at the recumbent side, insert the needle through the gingiva near the foramen at the site described above. Center the extraoral end of the syringe over the 1st premolar on the up side; aspirate and inject slowly over 30 seconds. Visualizing the ½ way point as mentioned above before placing can also aid in knowing how far back to administer the block agents. When advancing the needle caudally, sliding it along the bone can also aid in ensuring the syringe contents spread out and reach the foramen.

The *Mental Nerve block* can potentially impact the rostral inferior nerve and rostral portion of the mandibular canal. With the middle mental foramen identified through radiographs and palpation, placement inside the canal can sometimes be accomplished in medium to large sized dogs. Guide the needle into the foramen in a cranial to caudal direction with a slight medial angle. Advance as far as possible, approximately 2–4 mm depending upon dog/cat size. In smaller patients, inject local anesthetic directly under the gingiva immediately rostral to the foramen. Some variability has been shown in the scope of desensitization making the inferior alveolar block the preferred method of desensitization.

The *Palatal nerve block* may be performed for palatal procedures rostral to the emergence of the palatal nerve at the level near the midpoint of the maxillary 4th premolar or as far back as the mesial root of the maxillary first molar. Inject the local anesthetic at this level halfway between the midline of the palate and the dental arcade.

ORAL AND DENTAL PAIN – CHRONIC

Dogs and cats can also experience chronic pain due to a number of issues, from untreated periodontal and peri-apical infections, TMJ dysfunction (osteo-arthritis, ankylosis) and even neuropathic pain conditions or after surgical procedures. Ulcerative diseases such as feline stomatitis (FCGS – feline chronic gingivostomatitis) and CCUS (Canine Chronic Ulcerative Stomatitis) can have varying levels of pain associated with the inflammation and ulceration that is typically due to an overactive host response. Extractions often help these patients extensively, but at times they can have refractory inflammation and discomfort and require additional management. Feline Oral Pain Syndrome (FOPS), most prevalent in Burmese cats, seems to flare in response to stress and stimuli ranging from erupting permanent teeth to periodontal disease. Traditional medications such as corticosteroids and NSAIDs generally don't help much with FOPS, whereas many patients will respond to phenobarbital, diazepam or gabapentin.

ORAL AND DENTAL INFLAMMATION – ACUTE AND CHRONIC

By definition, acute inflammation is the local immune response to cellular injury, serving as a mechanism to initiate the elimination of noxious agents and of damaged tissue. It can be a complex response, with various cell types and multiple inflammatory mediators involved. As the body's normal response to damaged tissue or the presence of harmful organisms, inflammation typically has a beneficial goal of helping tissues heal, including in the post-operative period. Management of acute inflammation may include the use of corticosteroids or NSAIDs and treating the underlying disease or trauma that was the inciting cause. Short-term use of these pharmaceutics can be very effective, but there can be potential side-effects. When short term inflammation or pain is not adequately controlled, there can be a ramping up of symptoms and concerns.

Chronic pain or inflammation often requires additional levels of a multimodal approach starting with the appropriate use of medications if the condition is severe, such as in chronic oral pain or osteoarthritis (OA). Additional therapies may include nutritional intervention, supplements, antioxidants and application of esterified fatty acids to the gingival tissue for oral issues, and specifically targeted nutraceuticals such as glucosamine/ chondroitin sulfate for cartilage and connective tissue management for co-morbidities. Chronic inflammation has also been identified as a factor in aging morbidity and mortality (inflammaging).

KEY THERAPEUTIC POINTS

Key Drug	Drug Class	Dose Range	Frequency	Route	Indications
Bupivacaine	Local anesthetic	Cat 0.1mg/kg Dog 0.2 mg/kg		Loco-regional block	Oral and dental pain and surgery

SUMMARY INCLUDING 5 KEY "TAKE HOME" POINTS

1. Start a comprehensive pain management regimen prior to the procedure, with medications to be given at home.
2. Use whatever combination of medications or therapies that are appropriate for that patient.
3. Administer local and regional blocks wherever discomfort may be present or occur and get them done early in the procedure.
4. Obtain skulls for each species you treat to help identify landmarks and aid in block placement.
5. Consider potentiating the duration of the blocks, especially in complicated cases

SUMMARY

Providing a comprehensive, multi-modal approach to pain management is the optimal way to handle pain, even before it starts (surgical). By providing adequate care, we can improve the quality of life of our patients.

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