Extraction of Incisor and Canine Teeth

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1. Introduction
The main function of equine incisor teeth is grasping and grooming, while the canine teeth function for defense and offense. Incisors are radicular, hypsodont teeth with long reserve crowns that erupt continually throughout the life of the horse. Therefore, as a horse ages, incisor extraction should theoretically become easier. The interproximal bone between the incisors on the maxilla and mandible is relatively thin. This is significant when considering extraction, as the interproximal bone will be easier to deform, allowing for instrument placement around incisors than the bone surrounding the canine teeth. Due to their location in the mouth, equine incisors are prone to trauma including dental fracture, supporting bone fracture, avulsion, impaction, and severe rapid abrasion caused by behavioral or environmental conditions. Supernumerary and malpositioned incisors can cause significant malocclusions and/or feed entrapment leading to periodontal disease. Supplementation and malpositioned incisors can cause significant malocclusions and/or feed entrapment leading to periodontal disease. Iatrogenic pulp exposure caused by overzealous reduction to treat incisor diagonals, curvatures (“smiles” and “frowns”) can lead to apical pathology. All of these conditions may necessitate the extraction of one or more incisor teeth.

Though evolution has significantly reduced the size of the canine teeth through the millennia, canine teeth still represent a part of the dentition worthy of clinical and radiographic examination. Canines erupt between 4 to 6 years of age. The structure of the equine canine tooth is less complex than the incisors and cheek teeth and in outward appearance may seem to be more brachydont in nature. When looked at more closely, though, the crown is superficially covered with peripheral cementum and coronal enamel extends deep into the alveolus, suggesting a tooth more hypsodont in nature. The average length of a canine tooth from crown tip to apex is 5 to 7 cm, and only one-fourth to one-third of this is clinical crown. Canine teeth do not continually erupt as do the incisors and cheek teeth, so the length of the tooth within the alveolus changes minimally. Therefore, extraction of the equine canine tooth, even in the older horse, can be a significant undertaking, requiring a surgical approach if pathology has not already caused significant degradation of the periodontium.

Pathology associated with canine teeth has probably been studied the least of all tooth types within the equine oral cavity, but significant and painful pathology can be found associated with this tooth. Trauma leading to tooth fracture and avulsion are not uncommon. Mandibular fractures spanning the interdental space can involve the canine, necessitating extraction or root canal therapy. Pulp exposure from past overreduction or abrasion may be found on
oral examination. All of the above may necessitate extraction of the canine tooth.

Tooth resorption associated with equine odontoclastic tooth resorption and hypercementosis (EOTRH) is well documented to be associated with the canine and incisor teeth.\(^3\) Therefore, in cases of EOTRH, radiographs of both the incisors and canines should be obtained. Severe cases of EOTRH require staged or complete extraction of the affected incisor and canine teeth to alleviate infection and pain caused by this disease. Resorptive lesions in older horses can be found under excessive tartar deposition on the mandibular (more common) and maxillary canine teeth. Exposing these lesions after removal of tartar will cause discomfort for the horse, and the practitioner should be prepared to address the problem either through extraction under primary care or referral to an equine veterinary dental specialist.

Incisor extraction can be accomplished in two ways, depending on the nature and severity of the pathology associated with the tooth/teeth. Singular incisor extraction not involving EOTRH can be accomplished simply by elevation and avulsion.\(^4\) In cases of multiple incisor tooth extraction and particularly EOTRH cases that require extraction of all incisors, a surgical approach allows for improved visualization, debridement, and closure. In addition, a surgical approach increases the surgeon’s ability to deal with complicated extractions in which reserve crowns and roots have fractured as the result of initial trauma and resorption.

2. Materials and Methods

Before starting any extraction technique, the patient must be properly restrained and sedated with regional or local anesthesia of the extraction site. Preoperative radiographs to determine the condition of reserve crown, root, and periodontal ligament are highly recommended. Flushing of the extraction site and surrounding tissue with antimicrobial rinse to remove major debris and decrease bacterial populations produces a clean working site with decreased chance for residual feed and serious contamination after extraction.

Equipment List

- Basic surgery tray (scalpel, forceps, Metzenbaum and Mayo scissors, needle driver, etc).
- Dental elevators.
- Lane’s bone-holding forceps.
- Wolf tooth extraction forceps.
- Periosteal elevator.
- High-speed dental unit.
- Round carbide bur.
- Round diamond bur.
- Antimicrobial flush (0.12% chlorhexidine solution).
- Suture material (2–0) on a cutting needle.

Incisor Extraction

Simple extraction of incisor teeth can be accomplished by using dental elevators to slowly break down the periodontal ligament. Once the tooth is moderately mobile, extraction forceps (wolf tooth or small animal) can be used to elevate the tooth. The Lane’s bone-holding forceps can be particularly useful for grasping onto the triangular-shaped incisor. These forceps tightly grasp the tooth to allow the practitioner to exert rotational and avulsion forces. Once the tooth is extracted, the site is debrided and flushed. Some practitioners may elect to pack the open alveolus with gauze, but, with daily flushing by the owner, incisor extraction sites usually heal quickly without packing. Impression material packing is not routinely used because it will readily fall from the alveolus because of its shape and depth.

A surgical approach to incisor extraction involves the creation of a mucogingival flap to reveal underlying tooth and bone. Bone removal with a high-speed drill and a cutting bur decreases supporting structures and allows for cleaner and quicker extraction of the tooth/teeth. Elevation and extraction are performed after bone removal, and the area is debrided, flushed, and smoothed. The mucogingival flap can be partially or completely closed, depending on the nature of the extraction and pathology.

Canine Tooth Extraction

Because of the length of the reserve crown and root situated within a curved alveolus, basic principles of surgical dental extraction must be used for removal.\(^5\) In general, a mucogingival flap must be raised to expose the underlying labial bone. Depending on the tooth and the pathology affecting the tooth, 60% to 80% of the labial bone plate must be removed with a high-speed dental drill to allow for elevation. Once the reserve crown and root are uncovered, a dental elevator is used to fatigue the periodontal ligament, and the tooth is removed with extraction forceps. All bone margins should be smoothed with a round diamond bur, and the site should be debrided and flushed clean. The flap will need to be closed in a tension-free manner; therefore, the periosteum underlying the mucosa will need to be cut to allow for free movement of the flap. The flap is sutured closed in a simple interrupted pattern. Endodontic therapy can sometimes be used to salvage some apically infected canine teeth to avoid the trauma of oral surgery.

Postoperative radiographs are recommended for every extraction procedure to ensure that no dental fragments have been left behind and to provide documentation of the procedure and lack of adjacent hard tissue damage. Postoperative pain medication and antibiotics may also be indicated, depending on the extent of the extraction technique.
3. Discussion

Surgical extraction of teeth may sound simple, but experience demonstrates how challenging this procedure can be, especially when first learning all the steps involved. Extensive incisor extractions and canine tooth extraction can be complicated and frustrating for experienced dental surgeons, and a practitioner should evaluate his or her ability to perform this procedure (training, experience, instrumentation, etc) before attempting it. Case referral may be in the best interest of the patient and all parties involved. In the past, canine teeth have been extracted by surgical and nonsurgical procedures with various outcomes. The goal of the surgical procedure outlined above is to maximize success while minimizing uncontrolled collateral damage, frustration, and time. The author does not recommend extraction of a canine tooth in a nonsurgical manner unless the tooth already displays significant mobility and the reserve crown and root are intact. The high-speed drill dramatically increases the practitioner's ability to precisely remove bone and deal with more complicated extractions (fractured reserve crown/root, resorbed teeth, and ankylosis periodontal ligament) in an exacting manner.

It should be noted that mucogingival flaps in horses are notorious for dehiscence, especially on the mandible. The reason for this is not known, but time devoted to mastication, labial and frenulum attachments, gravity, and tongue action have all been thought to contribute to dehiscence. In the author's experience, dehiscence, if present, usually occurs between days 5 to 10, when granulation tissue, partial primary closure, and wound contraction have already started to occur at the surgical margin. Sutures involved with the dehiscence are removed, and the owner is instructed to flush the wound twice daily with an antimicrobial rinse until complete healing has occurred by second intention (usually 2 to 5 weeks).

Sometimes, severely resorbed teeth make complete extraction particularly challenging, and there has been discussion within the dental community as to whether clinical crown amputation is acceptable for these teeth. There is no study documenting the long-term success of this procedure in horses; however, in cats with severe tooth resorption, crown amputation is acceptable and successful if no periodontal ligament or regional pathology is visible on radiographs. Whether horses are similar to cats in this manner is unknown. The author suspects that the degree of regional/dental necrosis, bulbous hypercementosis, and inflammatory tissue reported by Staszky in 2008 would lead to postoperative regional inflammation and infection if portions of an incompletely resorbed tooth were purposefully left in the alveolus. The practitioner and the owner should carefully weigh the pros and cons of this approach if resorption is severe enough for this procedure to be considered.

In conclusion, extraction of equine incisor and canine teeth can be rewarding for both the patient and practitioner when performed in a well thought-out surgical manner.

References and Footnotes


aWinged dental elevators, size 5 to 8 mm, Miltex Inc., York, PA 17402.
bLane bone-holding forceps with ratchet, 13 inch, OrthoMed Inc., Portland, OR 97202.
cWolf tooth forceps, Hartlon’s Equine Specialties, Elmwood, WI 54740.
dSeldin periosteal elevator, I.R.H Surgical Co., Sialkot, Pakistan.
eIM3 GS Dental Unit, IM3, Vancouver, WA 98682.
fSize 023 round diamond finishing bur, Henry Schein, Melville, NY 11747.
gSize 8 round carbide cutting bur, Henry Schein, Melville, NY 11747.
hMonocryl 2–0 cutting needle, Medex Supply, Santa Monica, CA.

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