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**Equine Oral Extractions**

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**Take Home Message**

Exodontia should not be performed unless it has been determined beyond a doubt which tooth or teeth are problematic and all methods of medical, periodontic or endodontic therapy have been exhausted to arrest the disease process and preserve the tooth. The objective of exodontia should be to carefully plan and execute the extraction while protecting the alveolus and other oral tissues, thereby minimizing complications.

**Introduction**

Tooth removal should be a last resort after other methods to manage the diseased tooth or dental related problems have failed. Throughout the 20th century, exodontia has classically been the backbone of equine oral surgery.\(^1\) There are a wide range of indications for tooth removal, most of which depend upon which tooth or teeth in the arcade are causing a problem. Some common indications for tooth removal are associated with one of the following:

1. Interceptive orthodontics secondary to retained deciduous teeth
2. Periodontal disease secondary to diastema, dental maleruptions and displacements, supernumerary teeth and malocclusion
3. Endodontic disease or apical infection usually associated with secondary osteomyelitis
4. Surgical consideration in oral bone fractures
5. Disease or fracture to the dental crown or root
6. Occlusal trauma
7. Neoplasia
8. Bitting discomfort
9. Paranasal sinus disease secondary to oral or dental disease

Extraction can be simple or very time consuming. It can also be frustrating and fraught with operative and postoperative complications. The specific tooth involved, dental disease process, age of animal and number of teeth to be removed dictate the surgical technique employed and instruments utilized.\(^2-6\) Thorough treatment planning prior to beginning an extraction procedure will produce realistic expectations and minimize complications.

The earliest known method to remove diseased cheek teeth in the horse was via the oral route. This method has been practiced by veterinary surgeons for centuries on severely diseased or loose teeth. Molar extraction forceps have been available for well over 100 years and until very recently have changed little in design. In the mid-twentieth century with the advent of equine general inhalation anesthesia which makes working in the mouth around a mask or endotracheal
tube difficult, oral extraction lost popularity. For over 50 years, most equine teeth were removed surgically by trephination and retrograde repulsion. Most twentieth century veterinary literature limited oral tooth extraction to teeth that were loose or in older horses with short dental crowns. But in recent years modern sedative analgesic combinations and regional dental anesthesia have allowed veterinarians to safely access the standing horse’s mouth. This has lead to the development of better oral extraction techniques and manufacturing of a wide variety of high quality equine dental instruments.

Oral tooth extraction should be the primary method of tooth removal employed by the veterinarian. Even though a retrograde approach to the sinus or periradicular area may be necessary to reach an existing secondary disease condition, oral extraction should be attempted first. Proper extraction technique based on sound dental surgical principles minimizes postoperative discomfort and encourages rapid healing of associated soft tissues.

The basic principles of tooth removal in humans and small animals involve obtaining adequate access to the periodontium for tooth loosening, creating an unimpeded pathway for removal of the tooth and using controlled force to elevate the tooth without damaging adjacent structures. The interdigitating contours of the long reserve crown and presence of multiple roots on each tooth can make loosening and elevation of the equine tooth more challenging.

Oral extraction can be performed on any tooth but several dental disease processes require special consideration when planning surgery. Teeth with gross pulp horn or infundibular caries have crowns that may disintegrate during extraction. Diseased caudal maxillary teeth often are associated with secondary sinusitis and surgical drainage of the sinuses is required in this situation. The more caudally situated teeth are more difficult to access through the mouth making instrument placement and maneuvering more challenging. In aged animals with short reserved crowns or in the case of advanced periodontal disease that has resulted in loosening of the tooth, extraction may be carried out digitally. In young horses with apically diseased teeth and long reserved crowns firmly attached in the alveolus, extraction will require more effort and expertise. It may be necessary in some juvenile horses to remove permanent dentition prior to eruption which will complicate an oral approach. Young animals with long reserved crowns may present an insurmountable challenge to oral extraction. Extraction procedures range from minor to major surgical procedures and practitioners should critically evaluate their ability (training, experience, instrumentation, etc) before performing an exodontic procedure.

**Extraction Procedure**

*Incisors*

Most incisor extractions can be performed on the standing horse with proper chemical and physical restraint and local or regional anesthesia. Preoperative examination and when indicated, radiographs will define the type of pathology, tooth position and mobility index. Surgical technique can involve a simple gingival elevation and forceps extraction of a loose deciduous tooth or a chronically infected mobile permanent tooth. Solid incisors, whether deciduous or permanent with long reserve crowns, often require a mucoperiosteal flap and complete or partial removal of the labial alveolar plate of bone to be able to safely loosen and
elevate the tooth from its socket. Several surgical techniques are described in the literature. They require special instruments and expertise to achieve a healthy cosmetic result. Many times, these teeth are mistakenly only partially removed leading to continued periapical disease and future surgery. Because of the high potential for complications, referral of these cases to an experienced dental surgeon is often indicated.

Cheek Teeth

Careful preoperative examination of the patient is important, and all aspects of the approach to therapy should be planned before surgery is undertaken on cheek teeth. Special consideration should be given to the age of the horse, type of dental pathology, position and number of root apices, and the structural integrity of the tooth crown. Apically infected cheek teeth in young horses require more surgical support and instrumentation than most practitioners have at their disposal. Referral to an experienced dental surgeon may be in the best interest of the horse and its owner. Radiographic and endoscopic examinations should be carried out pre- and postoperatively to support the clinical findings. When available, additional imaging techniques such as digital radiology, fluoroscopy, scintigraphy, computed tomography and MRI may be indicated.

A basic set of dental extraction instruments includes:

1) molar spreaders or separators with the proper size blade and angle of handle to fit between the mesial and distal margins of the tooth to be removed
2) various molar extraction forceps to fit the crown of the tooth being removed
3) dental fulcrum
4) molar cutter sized to fit the tooth crown
5) set of dental chisels
6) set of dental elevators and curettes
7) general orthopedic instruments
8) material to pack or cover dental socket (iodoform gauze, acrylic, base plate wax or polyvinal siloxane impression material.)

Intraoral tooth extraction is best performed on the standing horse although general anesthesia may be necessary in a nervous or fractious animal. Sedative analgesics are administered, and the horse’s head is restrained in a steel frame, dental halter or head stand. Regional anesthesia is helpful in gaining patient cooperation. Pain management standards of care require regional or local infiltration anesthesia for extraction of permanent teeth. A full mouth speculum is needed to gain adequate access for working in the oral cavity. A headlight or fiberoptic light is essential for good visualization.

A tooth with a healthy crown is loosened by placing a spreader between the mesial and distal interdental spaces of the involved tooth. Special care must be taken when working on the 07 and 10 teeth to spread first on the side with the most support (between 07 and 08 or between 09 and 10) to avoid loosening 06 or 11. The spreader blades are carefully placed between the teeth at the gingival margin and the handles closed, bringing the blades partially together. Just enough force should be placed on the spreader to slightly move the tooth. The blades are held in this position...
placing pressure on the periodontal ligaments, stretching them beyond the elastic limit over a 5 to 10 minute period. The spreader is removed and replaced on the opposite interdental space and the handles again closed, prying the teeth apart. This process is repeated until the spreader blades are easily closed both mesial and distal to the affected tooth. Teeth with split or damaged crowns may not be suitable for spreading and can be loosened with an equine dental osteotome and forceps. Next, the gingival mucosa is separated from the buccal and lingual edges of the tooth crown with a sharp dental elevator or osteotome. This will expose enough tooth surface area to allow forceps to be placed on the crown. It may be advantageous to remove a collar of alveolar plate on the buccal and/or lingual edge of the tooth crown to allow the forceps to be placed more securely. When using the dental forceps or elevator on the palatal side of the upper teeth, care should be taken not to damage the palatine artery.

The proper sized extraction forceps are placed on the tooth crown and secured with a length of rubber or elastic wrapped around the handles. Maximizing the purchase between the head of the forceps to the crown of the tooth is the most important aspect of instrument selection. Sagitally fractured cheek teeth may be able to have the food material flushed/removed to allow the fragments to come back together. This may allow for better placement/purchase of the extraction forceps on the clinical crown. The forceps are then rocked from side to side. The forceps handle should be moved over a very short range of motion to insure that the head of the forceps stay engaged on the tooth crown. This will help avoid abrading or breaking the tooth. Torsion is placed on the tooth until it is felt loosening in its socket. Undue haste or too great a force must be avoided. Care must also be taken to prevent crown damage from sudden movement of the horse’s head. Reaplication of the spreaders at this point can be helpful in loosening the tooth. When the tooth begins to loosen, a sucking sound can be heard, and frothing blood can be seen around the margins of the tooth. Progress can be checked by removing the forceps and palpating the crown to feel how loose the tooth has become. Keep in mind that the tooth is like a post in a hole. A great deal of movement must be placed on the portion of the post above ground to be reflected in a small amount of movement at the bottom of the post. In a young animal with the ratio of exposed crown to reserved crown and root favoring the latter, more movement of the exposed crown is needed to result in movement at the apex of the alveolus. Conversely, in an old horse with almost the entire crown exposed, even a slight movement in the crown would put great pressure on the roots. The tooth is locked in place because of the irregular shape of the reserve crown and roots mirroring the shape of the alveolus. The thin alveolar plate is relatively easy to deform into the spongy surrounding bone of a normal tooth. Diseased teeth may be surrounded by sclerotic bone making tooth loosening difficult. The combined process of disrupting the periodontal ligament and deforming the contour of the alveolus are essential to completely loosen the tooth.

Once the tooth is loose, the forceps should be repositioned to get a firm grip on the crown. A fulcrum or block is placed near the head of the forceps. Gradual, firm traction will readily bring the tooth from its socket. In the caudal recess of the oral cavity in a young horse with a long reserve crown, the tooth may require sectioning with a molar cutter to allow it to be delivered into the oral cavity. The tooth should be examined to make sure it has been removed in its entirety and no root fragments or slivers of crown have been left in the socket. The alveolus should be examined and any bone or tooth fragments removed. Operative radiographs will
confirm that the correct tooth has been removed and the alveolus is free of tooth and bone fragments.

Postoperatively lower cheek tooth sockets that are chronically infected from oral debris may need to be drained ventrally. This can be done with a ¼ inch Steinmann pin or ½ inch trephine hole made in the ventral lateral aspect of the mandible below the affected alveolus. To protect the open alveolus, place several 4 x 4 gauze sponges tied in the center to a length of ¼ inch umbilical tape. The tape ends are passed into the empty alveolus through the oral cavity and out the drainage hole. The gauze roll is wedged firmly into the space between the opposing teeth and secured in the socket with umbilical tape tied around another roll of gauze on the outside of the skin incision. The gauze should be changed every few days and the wound irrigated until the periphery of the dental socket is covered with healthy granulation tissue (five to ten days).

The alveolus should be protected for several weeks from oral contamination with a patch or plug of dental acrylic, dentalbase plate wax, polyvinyl siloxane or polymethylmethacrylate (PMMA). The entire plug should be about ¼ the length of the reserve crown of the removed tooth to allow room for the development of granulation tissue in the dental socket. The plug should extend only slightly above the top of the gingiva so that it is not involved in chewing. After the wax is in place, its surface is molded carefully with a finger to build a slight flange over the gingival line to seal the alveolus. This is different when using PVS, this rubbery material should be kept slightly below the gingiva to prevent it from prematurely coming out of the socket. Bone cement (PMMA) can be combined with radio-opaque contrast media or antibiotics if needed. If a hard setting material like PMMA or dental acrylic is used, the plug will need to be removed 6-8 weeks post extraction. This may require a four pronged extraction forceps.

The objective of exodontia should be to carefully plan and execute the extraction and protect the dental socket, thereby minimizing complications. Detailed descriptions for avoiding and managing surgical and post surgical complications can be found in the literature. 5-9

References
