MINIMALLY INVASIVE APPROACHES TO CHEEK TOOTH EXTRACTION
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Key points
- Dental extraction should be reserved for treatment in cases of irreversible dental disease.
- Exodontia should be performed with a plan to completely remove the proper tooth without disturbing associated healthy structures.
- A minimally invasive buccal approach to remove fractured teeth or apical tooth fragments has proven to be a safe and effective technique.

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 and/or endodontic therapy have been exhausted to arrest the disease process and preserve the tooth. Most equine dental problems requiring extraction are associated with disease in adjacent structures (paranasal, sinuses, etc.). These problems must be properly addressed to resolve the clinical problem. The objective of exodontia should be to carefully plan and execute the extraction while protecting the alveolus and other oral tissues, thereby minimizing complications. Standing oral extraction should be the first choice in removing most diseased equine teeth. This method of exodontia has been found preferable in most cases to repulsion and/or buccotomy and produces a shorter healing period with fewer complications.

When diseased teeth cannot be extracted through the oral approach, tooth repulsion via trephination or sinusotomy should be considered. However, equine dental repulsion typically requires general anesthesia and has potential of carrying a high complication rate. Repulsion of fractured teeth or root tip fragments in the standing sedated horse using a blind radiographic-controlled approach with a Steinmann pin as a punch, has gained credibility in recent years. Meticulous attention to detail during every phase of surgery will keep complications to a minimum.

A lateral buccotomy technique has been described and has been advocated as the technique of choice for chronically infected cheek teeth with reactive cement or roots that preclude the passage of the affected tooth into the oral cavity through the oral approach. This technique has recently been given a favorable review but is a demanding surgery with associated complications of prolonged general anesthesia.

In addition and more recently, a minimally invasive transbuccal technique to remove a tooth or tooth fragments has been developed. A set of special instruments allows for a clean trocar and cannula approach through the cheek and direct access with straight elevators to the

Figure 1: Set of instruments to perform minimally invasive buccal approach to the cheek teeth
socket (Figure 1). A screw technique to remove fractured dental crowns using this direct approach has also proven successful (Figure 2).\textsuperscript{5,6}

The narrow and cavernous equine oral cavity presents a challenge for visualization of deep dental and oral structures. Access to the cheek teeth is difficult. Long handled dental mirrors help with visualization but are cumbersome and give a reverse or mirror image of the structures on which they are being worked. Indirect viewing via a long borescope or endoscope and camera monitor system improves visualization and aids in working with instruments in the deeper recesses of the oral cavity. Manipulation of long handled right-angled instruments in the mouth often poses problems to even the most skilled operator. A transbuccal approach to the mouth allows the access to instruments and endoscopes directly through the cheek. Straight instruments can be used to gain direct access to dental structures that increases precision and the elevating and luxating forces placed on teeth and supporting structures.

The minimally invasive transbuccal approach can be used in the standing sedated horse or in one under general anesthesia. These techniques require a relaxed patient; therefore, adequate restraint including standing sedation and local and regional nerve blocks are needed. These procedures if done on the standing patient, require a semi-sterile working area, free of traffic and noise, a suitable stocks, head support system, and mouth gag without cheek pieces (Gunther or Stubbs).

The approach through the horse’s cheek is simple, provided the relevant vital anatomical structures are identified and avoided. The are: the facial nerve and its dorsal and ventral branches, the parotid salivary duct, and the facial artery and vein. The nerves are usually visible or can be palpated after the hair has been clipped from the cheeks. These structures should be marked on the skin with indelible ink and used as references during surgery. Staples should be placed in the skin for radiographic markers and the areas of surgery identified.

The parotid duct should be catheterized through the oral papillae with a sovereign catheter (Tyco Healthcare Group, Mansfield, WA), and its course through the cheek identified and avoided. This can be done by gently holding the catheter 1 cm from its tip at a 45-degree angle ventral with a curved 9-11” forceps. The cheek is retracted from the upper cheek teeth and the opening of the parotid duct identified facing dorsal, opposite the upper 2\textsuperscript{nd} and 3\textsuperscript{rd} cheek tooth. The catheter is then held dorsal to the opening and threaded ventral into the duct. It can be felt coursing ventral and caudal through the cheek tissues. The facial artery and vein can be palpated deep to the parotid duct along the anterior border of the masseter, under cover of the facial cutaneous and zygomaticus muscles.

The placement of the buccal approach is dependent on which tooth is to be extracted. The tooth to be removed needs to be approached along the eruption pathway of the tooth. Teeth requiring restorative work may need a more perpendicular approach. This approach was first published using tools purchased at a hardware store.\textsuperscript{5} More recently, a set of instruments has been manufactured to make this a safe and effective way to remove broken teeth and dental fragments. It allows direct access to teeth with a straight elevator. The trocar with cannula allows for a stationary instrument portal, which decreases buccal trauma and contamination.
5-6 mm skin only incision is made horizontal between the vital structures. A blunt trocar is then pushed through the cheek in the direction of the affected tooth. A sharp trocar point is used to puncture the oral mucosa. A short trocar and cannula is used for most rostral approaches. A longer trocar and cannula are needed for more caudal approaches through the masseter muscle.

A screw extraction technique has also been developed for removal of loose dental fragments imbedded deep in the socket and not conducive for forceps extraction. With this technique, a 6 mm hole is drilled in the tooth parallel to the extraction pathway of the tooth. The drill hole is tapped and threaded with a long bolt with an attached washer. A slotted hammer is used to extract the tooth or dental fragment (Figure 3). It is essential that the tooth be relatively loose before extraction. This technique is not difficult but does require special instruments, training, and attention to detail to avoid complications. Root fragments can be elevated with straight elevators and picks and retrieved with fragment forceps. The direct buccal approach for other dental techniques such as crown restorations, infundibular caries or pulp horn evaluation and treatment has been found useful.

The skin incision is closed with a cruciate suture or staples. The skin incisions commonly show mild edema and perioperative antibiotics and anti-inflammatory drugs are indicated.

The minimally invasive transbuccal approach to dental procedures has several advantages over other approaches to remove upper cheek teeth or the lower first 3 cheek teeth. It allows direct access to the dental area with straight instruments. This approach is most commonly indicated for removal of fractured teeth or retained root fragments or a piece of reserve crown. It can also be used to evaluate and treat oral fistulas or perform restorative procedures on disease cheek teeth. This technique can be performed in a standing sedated patient or under general anesthesia. The major risk associated with this procedure is the possibility of damage to a branch of the facial nerve, facial artery, or parotid duct. Therefore, anatomical orientation is critical throughout the course of the procedure.