

Equine dentistry

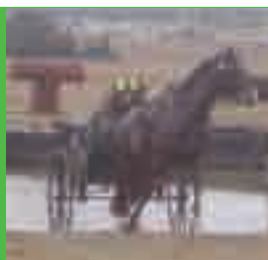
Part 3: Comparison of cheek tooth extraction techniques

by Elizabeth Thompson, BA(Hons), DVM, MACVSc (Eq Dent), Blue Mist Equine Veterinary Centre

In part one of this series, Elizabeth Thompson considered the roles of veterinarians and lay people in equine dentistry. In part two (Vetscript, June 2009) she looked into the origins of dental pathology and discussed preventative techniques and equipment. In this third part of the series she compares techniques for cheek tooth extraction.

Cheek tooth extraction is most commonly indicated in the horse to treat conditions such as severe injury or disease of the dental crown or root, severe periodontal disease, highly mobile teeth, supernumerary teeth, neoplasia, endodontic disease with secondary osteomyelitis, sinus disease secondary to dental disease and as a surgical consideration in the management of oral fractures.

Due to the serious long-term consequences of tooth removal in the horse, the decision to extract incisor or cheek teeth should be made only after an accurate diagnosis is obtained by physical and radiographic examination and only when there is no other reasonable alternative (e.g., severe, non-responsive periodontal disease). Negative consequences of extraction include wear abnormalities from malocclusion of unopposed



About the author

Elizabeth (Liz)

Thompson operates the Blue Mist Equine Veterinary Centre near Waihi, encompassing referral equine dentistry and general equine

practice in the Tauranga through Hauraki Plains areas. She also practices dentistry and postural rehabilitation in the Auckland and Waikato areas. She is photographed here driving “Blue Mist Shemaya” coming out of the water at the North Island Combined Driving Championships at Taupo, April 2009.

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and continually erupting teeth, disruption of the dental arcades, drifting of teeth mesially and distally, diastema formation with periodontal feed pocketing and periodontal disease.

Many veterinarians (including the author) had previously only been exposed to the extraoral repulsion (mallet and punches) method of cheek tooth extraction. Advances in equine dentistry have made less traumatic techniques readily available to the veterinarian in the field, albeit requiring some specialised instruments. Selection of an extraction technique will depend upon the tooth or teeth to be removed as well as the disease involved. This article compares and contrasts three methods, the intraoral, extraoral repulsion and lateral buccotomy techniques.

Anaesthesia

While *repulsion* and *buccotomy* require general anaesthesia with all of its inherent potential complications, especially in the compromised older patient, *intraoral* extractions may be performed quite satisfactorily with only standing sedation and nerve blocks, a distinct advantage to the health of the equine patient.

Instrumentation

Intraoral extraction	<p>requires a minimum of:</p> <ul style="list-style-type: none"> • full mouth speculum • good light • dental mirror • dental halter or stand • gingival/periosteal elevators • molar spreader(s) • many types of molar extraction forceps • rubber tubing to wrap the handles of forceps • dental picks • curettes • forceps • dental bite wax or impression material • power grinding instrument (e.g., Flexi-Float or Powerfloat) or other means of cutting long crowns (e.g., cut-off wheel, molar cutters) as they are extracted or repelled.
Buccotomy	<p>requires same as intraoral (above), plus:</p> <ul style="list-style-type: none"> • general anaesthesia • sterile draping • scalpel blades • suture • retractors • instruments to remove bone (burrs, oscillating saw, osteotome, rongeurs) • nasotracheal tube/s for inhalation anaesthesia, in addition to other general anaesthetic and surgical requirements.
Repulsion	<p>Tooth removal via repulsion requires the above instruments, plus:</p> <ul style="list-style-type: none"> • orthopaedic mallet • dental punches.



Some of the equipment required!

Localisation of correct tooth for extraction

Careful attention to radiographs and radiographing with markers in known locations is essential here. For *intraoral* and *buccotomy* extractions, it is relatively straightforward to select the correct tooth for extraction by palpation, visual oral examination and direct comparison to radiographs. With *repulsion*, there is a much higher potential for extraction of the incorrect tooth due to tooth curvature and sinus localisation.

Methodology and indications

For all three techniques, antibiotics, analgesics and well-labelled radiographs are indicated both pre- and post-operatively. The patient is sedated or anaesthetised and the mouth rinsed with dilute chlorhexidine solution. Post-extraction care is also similar for all three, with a few variations, as indicated below.

Intraoral extraction

Intraoral extraction may be performed in the field with standing sedation and nerve blocks (and preferably a set of stocks), rather than requiring general anaesthesia, as with *buccotomy* or *repulsion*. It has the added advantage of less tissue destruction than either repulsion or buccotomy and is the preference of the author.

If the tooth is set in a socket surrounded by sclerotic bone which won't easily deform or has crowns which are damaged to a degree that they cannot be grasped with forceps, buccotomy or repulsion may become necessary. However, a modified form of repulsion has been shown to be very useful, in which the offending root(s) are intraorally elevated and a 3–4 mm hole is drilled (with radiographic localisation) through the bone overlying

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Steinmann pin. In place with extracted root fragment.



Mare in stocks near completion of surgery.



Extracted tooth with fragment extracted via Steinmann pin technique (MacDonald, 1991).

the tooth and tapped out gently with a Steinmann pin and mallet.

After flushing the mouth with dilute chlorhexidine solution, sedation, appropriate nerve block(s) and mouth speculum placement, molar spreaders are used along the mesial and distal interdental spaces to initiate bleeding and deformation of the alveolar socket. Gingival elevators are used to cut through the periodontal ligament on the lingual/palatine and buccal sides of the tooth, separating the gingival mucosa from the tooth crown and causing more bleeding, which further loosens periodontal attachment.

Caution must be taken, especially in the area of the palatine artery, with *all* techniques. Molar extraction forceps of the correct width for the tooth are applied, secured with rubber tubing and rocked gently from medial to lateral, for 1–3 minutes in each direction. Further bleeding and deformation of the alveolar socket loosen the tooth attachments still more. When the tooth is mobile, alveolarly-directed pressure placed onto the tooth causes further release of the periodontal ligament. One should notice sucking sounds as the tooth moves

around in the alveolus. Hopefully, the tooth can now be pulled from socket by placing a fulcrum near the head of the forceps and levering it out carefully with gentle, firm traction. The tooth may require sectioning with saw or molar cutter.

If the crowns are too long to be fully extracted due to contact with the opposing tooth, they may require shortening with a power dental float, dental saw or molar cutters. The author prefers a power dental float as it is less likely to create fragments and allows tooth to remain whole, which usually makes the tooth easier to hold firmly with extractors

Lateral buccotomy

The *buccotomy* extraction technique is useful for conditions which are poor candidates for *intraoral* extraction, such as damaged crowns or teeth set in socket surrounded by sclerotic bone which won't easily deform. It is considered more tedious and time consuming (according to one author), than *intraoral* or *repulsion*, and more tissue-destructive than *intraoral*. It is contraindicated where general anaesthesia is not recommended due to the health of the patient.

Technique for *buccotomy* includes general anaesthesia with nasotracheal intubation. Surgical skin prep and appropriate surgical draping are followed by creation of a skin incision on the lateral aspect of the head, ventrally curved from the facial crest to the occlusal surface of the tooth. The zygomatic muscle (caution of the dorsal buccal branch of the facial nerve, facial artery and venous plexus, parotid salivary duct, facial vein) is sectioned or retracted. It may be necessary to ligate or transect the masseter muscle and the facial vein to expose the fourth upper cheek tooth (if that was the intended tooth for removal). Vertical incision of oral mucosa exposes the oral cavity. Incise buccal gingiva rostral and caudal to affected tooth and reflect dorsally. Use oscillating saw or osteotome to sever bony alveolar plate along interdentalium along each side of the affected tooth to remove a 2 cm-wide piece of bone. Caution is

required to avoid entering the maxillary sinus. The tooth is loosened through the oral cavity with molar spreaders and elevated with gingival/periosteal elevators. After careful inspection of the alveolus, detailed below, a buccal mucoperiosteal flap is created to encourage primary healing and minimise socket contamination or the base of the socket is packed with sterile roll gauze through a separate stab incision with dental plug. Surgical closure is performed.



One week post-extraction of tooth and root fragment showing little tissue reaction and cessation of discharge.

Repulsion

Repulsion requires general anaesthesia and is highly tissue-destructive, carrying a greater potential for intra- and post-operative complications. This technique is contraindicated where general anaesthesia is not recommended due to the health of the patient and for extraction of the 311 or 411, which presents severe anatomical challenges. Unless the patient is refractory to sedation alone, this method offers few advantages over the other techniques discussed.

General anaesthesia with nasotracheal intubation and surgical skin prep are followed by creation of a skin flap over the end of the affected tooth roots. Caution is required to avoid damage to the nasolacrimal duct/canal, maxillary artery and vein, parotid duct, etc. Radio opaque markers on skin assist with localisation of tooth roots on radiographs. Place trephine holes into the sinus/skull according to location of tooth roots. Intraorally, elevate gingiva/periodontal ligament of the affected tooth and use molar spreaders and extraction forceps to loosen the tooth. Radiograph after placement of the punch (but before striking the punch with the mallet) to ascertain correct tooth as well as correct angulation for repulsion.

Repel the tooth with the mallet and punch. Excessive crown length may require cutting as it is repelled into the mouth (see *intraoral* technique). Examine tooth

carefully to determine if it is complete. Compared to *intraoral* extraction and *buccotomy*, *repulsion* is more likely to create retained tooth and bone fragments and post-operative cementum nodules. After post-extraction care (below), alveolus is packed with dental bite wax and sinus is packed through trephine hole with disinfectant-impregnated gauze. A large defect is created by this technique, which has a relatively high potential for oroantral fistula formation. Hopefully it closes, but it closes slowly compared to the defects created by *intraoral* and *buccotomy* extractions.

Post-extraction care

After tooth removal, the alveolar socket is digitally, visually (with mirror) and radiographically examined for tooth root and bone fragments. This is essential to all three types of extraction to ensure all fragments are removed as well as for proof that a cementoma formed at a later date was not a piece of tooth left in situ!

If no sinus involvement is present, the sulcus may be packed with bite wax or impression material alone. Do not use hoof acrylic due to thermal reaction and the potential need to operate again to remove a heat-induced sequestrum! Paranasal sinusitis requires irrigation and packing with disinfectant-soaked gauze. Remove gauze packing in sections over 72 hours, withdrawing a portion daily as the alveolus fills. In situations where chronic infection exists, drainage must be established. For *intraoral* extractions, 5 days of post-operative antibiotics and anti-inflammatories should be sufficient if no sinus infection is present, while 7 days of antibiotics and anti-inflammatories are recommended

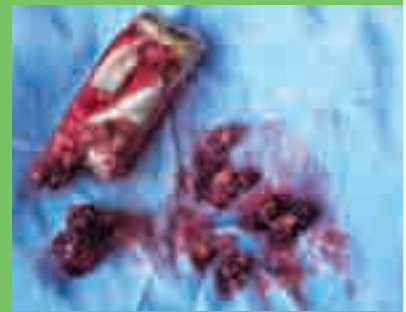
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Five-year-old Stationbred mare with apical infection with cementoma formation.

Pre-operative radiographs.



Post-operative radiographs displaying absence of dental material in alveolus.



The extracted tooth and cementomas.

for *buccotomy* and *repulsion* patients. Plugs may be checked in 5–7 days. The alveolus should be granulated in 14–21 days and epithelialised in about 30 days. Plugs may be removed at 21 days (unless gone by then) if the alveolus is well granulated. Have the owner continue to observe for odour and willingness to eat.

Potential risks

While all techniques may involve the risks and potential complications listed below, there is an increased likelihood of items numbered 1 to 7 below occurring with extraoral repulsion. Dr Paddy Dixon has stated that post-operative complications of extraction occur in more than 50 percent of cases. Some of these risks include:

1. oroantral fistulation with persistent sinusitis
2. incorrect tooth repulsion
3. fracture of tooth
4. damage to adjacent soft tissue (e.g., lacrimal duct)
5. incomplete removal of tooth fragments leading to sequestration
6. fracture of alveolar bone
7. fracture of mandible
8. loss of alveolar plug
9. severe haemorrhage from rupture of palatine artery
10. loosening of adjacent teeth
11. tissue regrowth, e.g., cementoma (post-op radiographs are vital)
12. infection, e.g., osteomyelitis, sinusitis
13. long-term, post-extraction change in angulation or rostral “collapse” of the teeth caudal to the new defect due to normal rostral movement of teeth with no resistance to the crown of the adjacent tooth (this crown moves more rapidly in the bone than the root)
14. long-term, post-extraction abnormal wear patterns including overgrowth of now-unopposed teeth and lack of the arcade’s ability to function as a single unit of tightly packed teeth.

Conclusion

I hope this enhances your understanding of equine cheek tooth extractions, giving you a better idea of the indications, contraindications, potential risks and complications of the various methods discussed.

Glenn Beeman and I are available to tutor the members of your practice in the basics of veterinary equine dentistry to bring your whole practice up to speed. Please feel free to contact us to discuss. I am in the North Island and Glenn is in the South Island.

Enjoy your dentistry!

Further reading

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