Managing trauma and disease of the incisors and canines

Equine incisors and canines are generally less affected by primary disease than the cheek teeth but are arguably more prone to external traumatic events and damage from bits and tack. The principles of investigating these teeth are the same as with the cheek teeth, and involve complete and thorough clinical examination usually with diagnostic imaging.

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Tim Barnett BSc(Hons) BVM&S MSc CertAVP DipECVS DipEVDC-Eq MRCVS, RCVS Specialist in Veterinary Dentistry (Equine), RCVS and European Specialist in Equine Surgery, Rossdales Equine Hospital & Diagnostic Centre
tim.barnett@rossdales.com

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Incisor developmental abnormalities

Developmental abnormalities of the incisors are relatively common and appear to be most frequently seen as brachygnathism ('parrot mouth') where the mandible is relatively shorter than the maxilla (*Figure 1*). Overjet usually refers to the milder form of the condition, where the upper incisors protrude rostrally (labially) in the horizontal plane in relation to the mandibular incisors. Overbite is the more severe form of the condition in which the occlusal surface of the maxillary incisors is positioned ventrally to the mandibular incisors (Easley et al, 2016). The condition may be associated with overgrowths of cheek teeth, in particular the upper 06s and lower 11s. Prehension of food is rarely a problem with overjet, but orthodontic surgical correction can be attempted before 6 months of age in cases of overbite as some of these cases may be predisposed to chronic dental problems (Dixon, 2000).

Surgical correction is possible using a variety of methods including tension band wires, bite plates, inclined bite plates and combinations of these techniques (Easley and Schumacher, 2011; Easley et al, 2016). A study of just over 70 foals showed that a combination of tension band wires and an inclined bite plate was effective in reducing the degree of brachygnathism in 95% of foals with overjet and 90% of foals with overbite (Easley et al, 2016), reducing the deficit by a mean of 9.9 and 8.4 mm respectively. Of these foals, 25% had complete correction achieved and required between one and four implants to achieve the correction. This study also concluded that a greater degree of correction is achieved with implants placed in younger foals. Complications were rare, but in the long term did include cheek teeth diastema and incisor maleruption and discolouration (Easley et al, 2016). Prognathism (sow mouth, underbite or undershot jaw) is the opposite developmental condition, with the maxilla being relatively shorter than the mandible — this appears to be rare.

Figure 1. A horse with brachygnathism ('parrot mouth').

Retained deciduous incisors can be found on the labial surface of their permanent counterparts and are deemed retained if present beyond their normal time of exfoliation. They can cause caudal displacement of the permanent teeth with resulting wear disorders (Dixon et al, 1999). Such teeth may require extraction, which can be performed with sedation and local anaesthesia, using elevators and forceps to carefully manipulate them from the surrounding tissues. Supernumerary incisors rarely cause clinical problems; their extraction can be difficult and is rarely necessary. Therefore, if there is any doubt, radiographic assessment should always be undertaken before considering extraction of suspected retained incisors to ensure that they are not mistaken for supernumerary teeth.

Acquired wear abnormalities

Wear disorders of the incisors are relatively common and stable vices are often implicated, as well as sequelae to the previously described developmental abnormalities. A slanted incisor occlusal surface (*Figure 2*) can result from unilateral disorders of cheek teeth and uneven chewing strokes leading to imbalanced wear. Simple

overgrowths, into spaces left by absent teeth, can limit lateral excursion and may require careful and staged reduction (to avoid pulp exposure and thermal damage) often using motorised equipment.

Diastema, often with gingival recession, will frequently lead to accumulation of feed material, especially in the geriatric equine. Treatment to widen diastema may help but does require experience and careful use of motorised burrs. However, simple food impactions in the absence of periodontal disease can usually be managed by owners, with daily lavage and brushing of the interdental space to empty it without the need for any further treatment.

Equine odontoclastic tooth resorption and hypercementosis

Equine odontoclastic tooth resorption and hypercementosis syndrome of the incisors and canines was first described over 10 years ago (Staszyk et al, 2008), but the aetiology has remained elusive. It appears more common in aged equines (Schrock et al, 2013a, b), with a German study documenting all horses over the age of 14 years having radiographic signs of incisor resorption, even when apparently asymptomatic (Rehrl et al, 2018). Radiographic examination is invaluable in diagnosis of the condition (*Figure 3*) and radiographic screening of all equine incisors in patients over the age of 15 years has been suggested (Henry et al, 2017). However, 88.2% of outwardly asymptomatic horses have evidence of incisor resorption on radiographs and 20.7% have signs of hypercementosis (Henry et al, 2017). This suggests that radiographically advanced cases of equine odontoclastic tooth resorption and hypercementosis may go unnoticed for some time. Maxillary incisors appear to be more commonly affected than the mandibular ones, and especially the third incisor, which is frustratingly prone to superimposition by the adjacent teeth on radiographs in many cases (Henry et al, 2017). The use of oblique bisecting-angle radiographic views of these teeth has been suggested to overcome this. As the disease progresses gingival swellings and draining tracts become apparent and the teeth appear painful when prehending feeds or when manipulated. Extraction of painful and loose teeth is warranted at this stage.

Traumatic fractures

Fractures of incisors and canines are relatively common in equine patients and are often the result of kicks, collisions with hard objects, play and crib-biting. These cases often have a history of a traumatic event and usually present with clinical signs of oral haemorrhage, reduced appetite, drooling and possibly halitosis. The fractures can be osseous fractures of the mandible or the maxilla, avulsion fractures of the incisors, often with concomitant fractures of the rostral alveolar bone, and fractures confined solely to one or more individual teeth.

Rostral mandibular fractures appear to be the most common traumatic dental-related jaw fracture sustained by equine patients (Sullins and Turner, 1982), and usually involve avulsion of one or more teeth from the alveolus with fracture of the mandible through the rostral alveolar margins. The fractures are invariably open, with a wound in the oral cavity, which is often contaminated with food and saliva (*Figure 4*). These fractures appear more common in younger horses (Greet and Ramzan, 2011) and so the tooth in question is often deciduous. However, preservation of even deciduous teeth should always be attempted as devitalisation is difficult to determine at this point, and they can act as useful fracture support, may protect and preserve the developing permanent teeth beneath, and maintain a uniform incisor arcade.

Figure 2. A slanted incisor occlusal surface, often caused by unilateral chewing.

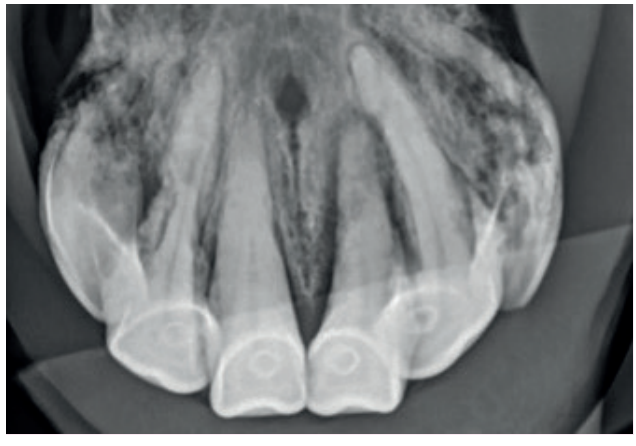

Figure 3. Intraoral radiograph of a horse with equine odontoclastic tooth resorption and hypercementosis.

Figure 4. An open rostral mandibular fracture.

Radiographic assessment is advisable for cases in which there are comminuted or bilateral fractures but may be superfluous in simple avulsion fractures of single teeth. Using a combination of sedation and local anaesthesia the fractures can be carefully debrided, lavaged, and reduced with the patient standing (Tremaine, 1998). Stabilisation with stainless steel wire fixation is then used, with the exact method dependent on the fracture configuration. Common methods can include simple cerclage wires around the affected and adjacent teeth (*Figure 5*), figure-of eight cerclage wires, wires passed though mandibular bone tunnels and around the teeth, fixation around grooves in the caudal aspect of the canine teeth (if present) (*Figure 6*), and more intricate techniques such as the Obwegeser technique (*Figure 7*) used in human dentistry (Auer, 2012).

When a fractured incisor or canine is presented soon after a traumatic event, a vital pulpotomy can be performed to preserve the tooth and limit the likelihood of progression to more severe disease (Simhofer, 2011). The anecdotal concept that traumatic pulp exposure does not need to be dealt with may not always be the case, with subsequent periapical infection always a risk. If present, bleeding from the pulp cavity is a cardinal sign that the sensitive pulp tissues have been exposed and may indicate a tooth that would benefit from such early intervention. In most cases, the bleeding will have stopped by the time the clinician gets to examine the mouth (*Figure 8*). Removal of further dental fragments can be facilitated using elevators and forceps, which may result in fresh haemorrhage from the pulp cavity. If not, probing of an affected pulp cavity with a dental pick should initiate bleeding in cases where the pulp is still vital. Radiographic assessment of the tooth in question is essential to ensure that the full extent of the fracture is determined as well as evaluating the periapical and periodontal tissues. Debridement of foreign or necrotic material from the pulp horn and the remaining occlusal pulp tissue can be undertaken using a sterile technique and a combination of files, burrs and lavage. Once haemostasis is achieved then the empty section of pulp horn can be restored, often using a combination of restorative materials in layers. With recent advances in techniques, surgical equipment

Figure 5. Cerclage wire fixation of an avulsion fracture of the incisors.

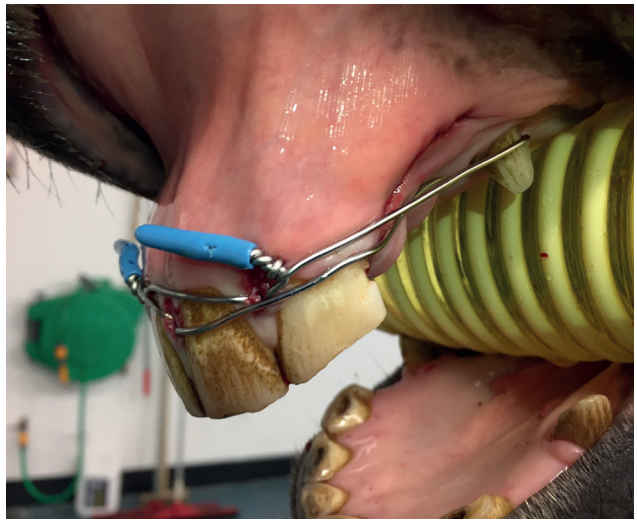

Figure 6. A fixation wire anchored in groove cut into the caudal aspect of the canine teeth.

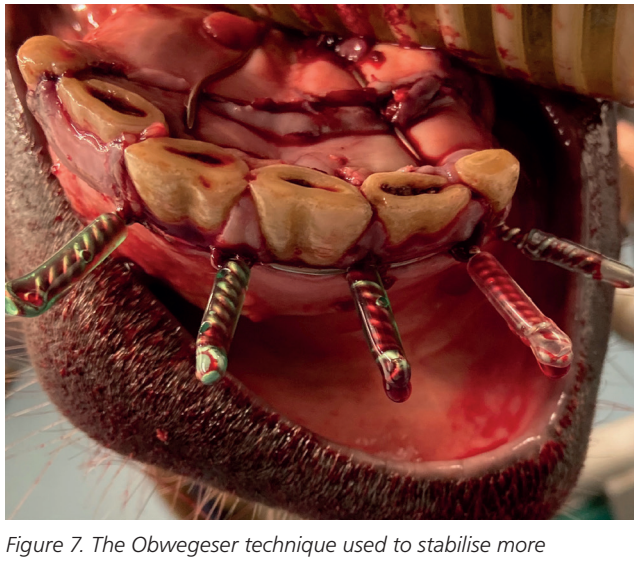

Figure 7. The Obwegeser technique used to stabilise more extensive fractures involving the incisors.

Figure 8. An acute transverse fracture of an incisor.

KEY POINTS

- Developmental abnormalities can be corrected if identified early enough.
- Equine odontoclastic tooth resorption and hypercementosis syndrome is an emerging disease that can be easily identified in the geriatric patient.
- Avulsion fractures can easily be treated using wire-fixation techniques.
- Endodontic therapy is possible in cases of fractured incisions and canines with exposed pulps.

and restorative materials it is also possible to perform a pulpectomy and endodontic filling of the pulpar labyrinth, using methods similar to those used for human root canal therapy.

Extraction of incisors may be necessary in a many cases, for example dental fracture, advanced equine odontoclastic tooth resorption and hypercementosis, or clinical signs of periapical infection. The procedure is readily performed using a combination of sedation and local anaesthetic techniques in the standing patient. Using periodontal elevators, the periodontal attachments are elevated around the circumference of the tooth until it is loose, and it can be extracted using forceps. In some cases, especially younger patients with longer reserve crowns, a section of the labial alveolar bone plate will need to be removed using an osteotome, sterile burr or oscillating saw to facilitate extraction of the tooth.

Canine teeth

Canine teeth are brachydont teeth located in the interdental space between the incisors and the cheek teeth, which are present in males and occasionally in females. They can have long roots which curve caudally, and so radiography is indicated to investigate any suspected disease of the apices. Calculus accumulation is common with underlying gingival ulceration and may be associated with periodontal disease. Unerupted canine teeth may be associated with painful ulcerated overlying gingiva and incising over the tooth may help alleviate the pain and promote eruption.

Canine teeth are afflicted with similar disease processes to those affecting the incisors, including traumatic fractures, periapical disease and equine odontoclastic tooth resorption and hypercementosis. Extraction may be indicated in such cases and can be challenging because of the length of the unerupted teeth. A technique involving a labial alveolar ostectomy may often be required because of the size, shape and position of the reserve crown (*Figure 9*). Fractures and pulp exposure can also be treated with endodontic procedures in a similar way to those possible in the incisor teeth (*Figure 10*). EQ

Figure 9. An alveolar ostectomy to allow extraction of a diseased canine tooth.

Figure 10. Endodontic restoration of a fractured canine tooth.

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