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A review of equine developmental disorders

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Craniofacial abnormalities

Foals can develop a number of developmental abnormalities of their craniofacial bones that cause dental malocclusion and dysfunction. Although some of these abnormalities such as over jet and overbite (“parrot mouth”) are often regarded as being primary dental abnormalities, these dental abnormalities are just one manifestation of an underlying craniofacial skeletal abnormality. Consequently, correction of the dental abnormalities, such as reducing dental overgrowths, will not affect the underlying craniofacial abnormality.

Overjet and overbite

Many horses have some degree of overjet, (“overshot jaw”) i.e. where the occlusal aspects of the upper incisors lie rostral to the occlusal aspects of the lower incisors. If very marked and untreated, cases of severe overjet will often develop overbite (“parrot mouth”) where the upper incisors lie rostral to the lower incisors as above but also now lie in front of the erupted crowns lower incisors due to marked overgrowth of the upper incisors and/or to ventral curvature of the premaxillary (incisive) bones due to absence of occlusal contact. Overjet and overbite are aesthetically undesirable but surprisingly, these problems rarely cause difficulty in prehension. As the more rostrally situated incisors (01s) have the least occlusal contact, they overgrow most and so affected horses develop a convex appearance of their upper incisor occlusal surface (“smile”), which should be gradually reduced in stages if it is pronounced. The main clinical significance of incisor overjet or overbite are the concurrent CT disorders usually present, due to the upper CT row being rostrally positioned in relation to the lower CT row as discussed below.

Underjet

Underjet (prognathism, “undershot jaw”, “sow mouth”) is rare in horses (more common in donkeys) and like overjet is usually clinical insignificant unless there is complete absence of occlusion between the incisors. Horses with underjet usually develop focal CT overgrowths on the caudal aspects of the upper 11s and the rostral aspects of the lower 06s. Similar to overjet/overbite, concurrent CT focal overgrowths are the main clinical problem with underjet and such CT overgrowths should be reduced at 6-month intervals.

Rostral positioning of the upper cheek teeth rows

Rostral positioning of the upper CT rows relative to their mandibular counterparts is caused by an imbalance between maxillary/premaxillary and mandibular bone growth and as noted, is nearly always associated with incisor overjet/overbite. Occasionally, this abnormality can be present without incisor malocclusions. Because the upper and lower CT rows are not in full occlusion, localised CT overgrowths (colloquially termed “beaks”, “hooks” and “ramps”) develop on the rostral aspect of the upper 06s. These overgrowths may be pushed against the lips and cheeks by the bit/noseband and so cause mucosal ulceration and bitting problems.
If large, these overgrowths can also restrict the normal, but variable, rostro-caudal mandibular movement, relative to the maxilla, while lowering and raising the head. Feeding affected horses fully from the ground rather than from a height may increase normal rostro-caudal mandibular movement and reduce the development of such overgrowths. Large overgrowths should be removed in stages to prevent pulpar exposure or overheating.

Similar overgrowths may also develop on the caudal aspect the lower 11s that can traumatisce the adjacent oral mucosa, but due to the later eruption of the 11s in comparison to the 06s, the caudal overgrowths may not develop until 5-6 years of age. True lower 11 caudal overgrowths must be differentiated (e.g. by assessing crown height above the gingival margin) from anatomically normal, upward sloping caudal CT occlusal surface (“curve of Spee”), which can be marked in some breeds.

Larger lower 11s overgrowths are best reduced in stages using motorised dental instruments, whilst maintaining the normal high occlusal angulation of caudal mandibular CT. ‘Molar cutters’ or percussion instruments can fracture the overgrown tooth and causing pulpar exposure, that can lead to apical infection or even extensive infection of the mandibular and adjacent areas.

**Wry nose (campylorrhinis lateralis)**
Wry nose is a syndrome involving lateral deviation short and possibly shortening of the premaxillary (incisive) and maxillary bones, and can less commonly involve the nasal and vomer bones. Malocclusions of the incisors and of the CT at the extremities of the CT rows can occur. Milder cases will later develop a diagonal incisor occlusal plane (“diagonal bite”, “slope mouth”, “slant mouth”) with one incisor arcade permanently displaced to one side and unilateral upper 06, and lower 11 CT overgrowths. Surgical correction is possible up to about one year of age. Incisor and CT overgrowths should be reduced 6 monthly.

**Disorders of dental development**

**Hypodontia (anodontia)**
Hypodontia is a failure of differentiation of the dental lamina and tooth germs for the deciduous and/or permanent teeth, in contrast the presence of supernumerary teeth is due to the development of too many dental buds. Developmental hypodontia is relatively uncommon in horses, with absence of equine teeth usually due to traumatic loss, disease or to age-related wear. True hypodontia generally affects the permanent equine dentition. In many species (including the horse) multiple hypodontia is often associated with the presence of other dental abnormalities (such as dysplastic teeth) or even generalised ectodermal disorders involving the hair and hoofs. The development of an overgrowth on the opposing tooth is often the first indication of hypodontia.

**Supernumerary teeth (polydontia)**
The presence of supernumerary (additional) teeth is relatively uncommon in horse, usually developing in the permanent dentition. Single supernumerary teeth can be categorized into three types, i.e. *supplemental* (similar to normal teeth); *Haplodont* (simple conical shape) or *Tuberculate* (complex shape). They also may be composed of more than one tooth joined together (*connate or double tooth*).
Supernumerary incisors
Equine supernumerary incisors may be more common (or possibly more readily identified) than supernumerary CT. Equine supernumerary incisors can vary in number from 1-6 and are usually of normal morphology (supplemental) and so can be confused with retained deciduous incisors, but radiography will usually distinguish between them. Supernumerary incisors may cause overcrowding and displacement of the normal incisors, and diastemata often occur beside displaced incisors. If the supernumerary incisors lie rostral (labial) to the normal incisor arch, it is usually possible to extract them but if interwoven amongst the other incisors, differentiation of supernumerary teeth and safe extraction may be impossible. The incisors should regularly assessed for periodontal disease and protruding overgrowths that may cause soft tissue trauma. Protruding incisors should be reduced biannually, preferably using motorised equipment.

Supernumerary canine and 1st premolar teeth (“wolf teeth”)
Supernumerary canine or first premolar teeth rarely occur. Most suspected supernumerary canines are in fact rostrally displaced, large “wolf teeth”. Radiography will readily differentiate between these types of teeth. Many suspected supernumerary “wolf teeth” are retained fragments of the deciduous 06, that are flattened, superficial structures that are readily removed.

Supernumerary cheek teeth
The most common site for supernumerary CT development in horses is as noted, the caudal aspect of the maxillary 11s and less commonly mandibular 11s. Supernumerary CT may also develop medial, lateral or rostral to the upper or lower CT rows. There is often overcrowding and/or the presence of irregular interdental margins associated with supernumerary CT and the resultant large interdental (interproximal) space (i.e. diastema) lead to food pocketing and often painful periodontal disease. Additionally, continued eruption of unopposed supernumerary CT causes an overgrowth (usually at the caudal aspect of the CT rows). Consequently, it should always be determined if caudal overgrowths are Triadan 11 overgrowths or supernumerary CT. Treatment included oral extraction, widening or filling of diastemata or continuous reduction of overgrowths.

Dental dysplasia
Dysplasia or abnormal development of teeth can involve the crown, roots or all parts of the tooth. Dysplasias in the gross anatomy include dilacerations (abnormal bending of teeth), double teeth, abnormalities of size and concrescence (roots of adjacent teeth joined by cementum) of teeth. Other dysplastic teeth will be of normal morphological structure and of normal shape but will be excessively large i.e. macrodontia or too small, i.e. microdontia. Disturbance in the structure of teeth include dysplasias (disturbances of development) of the individual calcified dental tissues or pulp. In human dentistry, there is now much knowledge of the genetic defects causing some dental dysplasias.

Amelogenesis imperfecta include a range of hereditary disorders affecting enamel formation in both deciduous and permanent teeth and can be divided into two types, i.e. defects in enamel matrix formation or in the mineralisation of enamel. Amelogenesis imperfecta as part of a generalised ectodermal syndrome has been described in a horse.

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