ANATOMY OF EQUINE CHEEK TEETH: FAST-PACED KNOWLEDGE ADVANCES

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Safia Barakzai, Paddy Dixon provide an overview of basic knowledge needed to identify equine dental pathological processes

KNOWLEDGE of the normal anatomy of equine cheek teeth, as well as the pathophysiology and treatment of disease affecting these teeth, is advancing at a fast pace.

A good knowledge of normal dental anatomy is necessary to correctly identify pathological processes, and assess their significance in the individual horse being examined. The Triadan dental numbering system will be used in this article (Figure 1).

Oral examination

Oral examination of the horse should include a careful and systematic inspection of all teeth surfaces and the soft tissues of the mouth, using a full mouth speculum (gag), after flushing the mouth with a large dental syringe to remove food material.

First, a visual examination should be performed, using a strong headlight and dental mirror, or oral endoscope. A dental pick and/or periodontal probe can then be used to further investigate potential problems noted during the visual inspection. Finally, palpation of the cheek teeth may help to detect the presence and severity of sharp enamel points.

Equine cheek teeth are made up of enamel, cementum and dentine; all three tissues are visible on the occlusal surface.

Enamel is the hardest substance in the body, and appears almost translucent in live horses. In cheek teeth, enamel is arranged in complex folds or ridges, designed to increase the amount of enamel ridges present on the occlusal surface and thus increase the total surface area of enamel available for grinding food. In maxillary cheek teeth only, two additional concentric cup-like infoldings of enamel are present in the middle of the tooth – the infundibular enamel folds. The bulk of the tooth is composed of dentine – a cream coloured, calcified tissue, containing around 30 per cent organic components. Although enamel is hard, it is brittle. The dentine and cement interspersed between the enamel folds act to form a laminated structure, which protects the enamel from cracking by acting like safety glass in a car windscreen. It also creates an irregular occlusal surface, due to the differential wear between the hard enamel and the softer cementum and dentine, and thus creates a greater surface area for grinding food.

Cavities and numbering

Pulp horns (cavities) are present in all the teeth, but there are different numbers of pulp horns in specific teeth ([Table 1]). In cheek teeth, these pulp horns communicate with each other fully in young horses (forming the common pulp chamber), but separate into individual pulp horns as the tooth ages. A variable number of these pulp horns will still communicate with each other, even in older horses (Windlay et al, 2009).

The pulp horns contain the living pulp (that is, nerves, blood vessels, fibroblasts and collagen fibres), and are lined with a thin layer of predentine that contains “odontoblasts” – the cells that produce dentine. The occlusal (oral) aspect of the pulp cavities is filled with secondary dentine to protect the living pulp from insults from the oral cavity. A pulp numbering system has been developed (duToit et al, 2008).

As the teeth progressively erupt and are worn down at their occlusal aspect, more secondary dentine is laid down by the odontoblasts at the occlusal surface of the pulp horn, so that the live pulp is never exposed.

This secondary dentine has a dark colour, and should be hard and “glass-like”, with no pitting; probes should not be able to enter it on the occlusal surface. The thickness of this layer of secondary dentine, which protects the living pulp, is quite variable between individual horses, and even between individual pulps in one cheek tooth (Dixon and White, in press, *EVJ*).

The subocclusal thickness of secondary dentine above the pulp horns of cheek teeth varies from a mean thickness in a four-year-old horse of 12.8mm (range five to 33), to a mean thickness of 7.5mm (range two to 24mm) in a 16-year-old horse – that is, the thickness of secondary dentine reduces with age. This information is particularly important when we consider the reduction of large-sized dental overgrowths to reduce the risk of pulpar exposure.

Infundibular anatomy

The infundibula of the maxillary teeth are lined with cups of enamel and should be completely filled with cementum. However, anatomical variations of cheek teeth infundibular cement are very common and may predispose to the development of infundibular disease.

Infundibular cemental caries, or incomplete filling of the infundibulum with cementum (cemental hypoplasia), have been found in more than 60 per cent of maxillary cheek teeth (Fitzgibbons et al, 2010; Windley et al, 2009). Therefore, defects in the occlusal aspects of the infundibulum should be recognised and, importantly, distinguished from pulpar exposure.

Mild caries, which is localised to the cement only and does not invade the enamel “cup” of the infundibulum, is usually not clinically significant. However, around 10 per cent of cases of periapical infection are caused by abaxial spread of caries, through the infundibular enamel and into the adjacent pulp horns, but caries are not a common cause of periapical infection (Dacre and Dixon, 2008).

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