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Equine dental caries

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CLASSIFICATION OF DENTAL CARIES

Caries is defined as disease of calcified dental tissues resulting from the action of microorganisms on carbohydrates within the oral cavity. It is characterised by both demineralisation of the inorganic part, and subsequent destruction of the organic part of the tooth (Shafer *et al.* 1983). Caries may therefore affect any of the calcified dental tissues and the descriptive classification follows the anatomical location and dental tissue involved and therefore includes:

- Cemental caries (peripheral, infundibular).
- Enamel caries (peripheral/infundibular).
- Dentinal caries.

} Incisor/cheek tooth; maxillary/mandibular.

INCIDENCE AND PATHOPHYSIOLOGY

Few studies on the incidence of dental caries have been performed and there is some variation in results, however peripheral cemental caries of the caudal cheek teeth and central infundibular cemental caries of (maxillary) cheek teeth (especially 109, 209) appear to be the most common with incidences of the latter reported as high as 77–100% in selected age groups (Honma *et al.* 1962; Baker 1970).

Caries develops following impaction of organic feed material within dental defects with resultant necrosis, bacterial proliferation and invasion of adjacent tissues. It is likely that this process involves fermentation of organic material by commensal bacteria resulting in acid production, inorganic substance erosion and subsequent organic matrix disease, a theory first suggested in 1891 (Miller 1891). Combinations of cemental, enamel and dentinal caries occur most frequently following extension of disease from the central infundibula of (maxillary) cheek teeth, or more rarely from peripheral cemental caries. Occasionally developmental enamel or dentinal defects are identified in teeth with subsequent caries as described above. Non-vital pulp exposures on the occlusal surface may also follow a similar route with subsequent dentinal caries.

SIGNIFICANCE

Caries of individual dental tissues is of questionable significance as evidenced by studies demonstrating high incidences many with little or no evidence of clinical signs, as cited above. Many of these single tissue caries are not likely to progress to significant dental disease; however, progression of caries in individual cases to multiple dental tissues, or concurrent caries and other developmental disease is much more likely to result in significant dental disease and resultant clinical signs. Such conditions include:

Infundibular (maxillary) cheek teeth cemental hypoplasia/caries

Damage to the dental bud prior to eruption may be the cause of infundibular cemental hypoplasia in maxillary cheek teeth, which is frequently apical in location (Dacre 2005). Such areas of hypoplasia vary considerably in size, and may become exposed occlusally at any age but most frequently at ages 12–15 years onwards, and incidence may be as high as 100% in such age groups (Honma *et al.* 1962). Caries isolated to the cementum rarely results in significant disease, but extension to peripheral dental tissues (enamel then dentine) may result in partial fracture, saggital fracture or apical abscessation.

Maxillary infundibular disease has been graded using the following scale:

- Grade 1: Cemental caries confined to the infundibulum.
- Grade 2: Caries involving cementum and infundibular enamel.
- Grade 3: Caries involving cementum, enamel and adjacent dentine.
- Advanced Grade 3/Grade 4: Caries (Grade 3) of rostral and caudal infundibula often with coalescence of cavities.

Incidence of caries extending from infundibula to involve multiple tissues and therefore presenting risks of fracture or apical disease has not been studied extensively however the author's own data suggests an incidence of around 5–7% (unpublished data).

Treatment of lesions classified as Grade 2 and upwards (i.e. caries of multiple tissues) may be performed by meticulous cleaning and debriding of carious tissue using a water cooled high speed burr or an 'air abrasion' unit or a combination of

both. The resultant cavity may then be 'filled' or restored using one of many standard dental restorative techniques, with the author's choice of material being a flowable dual curing paste-paste microhybrid composite (Starfill 2B)[1] used in human dentistry for posterior restorations (unpublished data). The author has performed 69 such restorations (currently unpublished data) with no fractures or apical disease of any teeth that have been restored. Other practitioners have successfully used other materials such as glass ionomers and core build up products (personal communications). Further publication and study data is required for this technique to gain widespread peer recognition.

Interporoximal and peripheral cemental caries of cheek teeth with diastema formation and periodontal disease

Interproximal cemental caries may initiate diastema formation and periodontal disease. A less frequently reported condition results from feed stasis in the buccal space due to excessively sharp buccal enamel points, slab fractures or displacement of cheek teeth, or from wearing grazing muzzles. The result is peripheral cemental caries, interproximal cemental caries and resultant gingival recession and buccal diastema formation. There is often little or no evidence of diastema at the occlusal surface and such 'buccal periodontopathies' are challenging cases of periodontal disease to treat, made worse by cemental caries.

Cheek tooth fracture

Study data has shown that many cheek tooth fractures follow fracture planes through pulp horns. Individual observations have been that peripheral cemental caries may increase the likelihood of these dental fractures (e.g. buccal slab fractures) by exposing brittle enamel and the loss of the strengthening 'laminate' structure of the tooth. Caries of other structures within the tooth e.g. non-vital pulp exposures with dentinal caries are likely to further increase the risk of fracture by providing cleavage planes within the tooth.

SUMMARY

Dental caries is frequently encountered on routine dental examination in practice. Caries isolated to a single dental tissue is unlikely to be clinically significant unless associated with other abnormalities. Progression of dental caries from one dental tissue to adjacent dental tissues, or concurrent caries of multiple dental tissues of the same tooth (even if unrelated) are much more likely to be clinically significant. The dental practitioner should therefore be vigilant and examine carefully all teeth visually for signs of advanced caries involving multiple dental tissues.

MANUFACTURER'S ADDRESS

[1]Danville Laboratories, San Ramon, California, USA.

REFERENCES AND FURTHER READING

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