

Tooth Resorption: It is Not Just Cats Anymore

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Tooth resorption in cats has been characterized over the last decade; although the cause(s) of idiopathic feline tooth resorption has/have not been determined. Based on the different radiographic types of tooth resorption and species comparisons, there are inflammatory and idiopathic forms of feline tooth resorption with different potential treatment options.

Tooth resorption occurring in other species (e.g., dogs, humans), identified with intraoral radiographs, has been known for many years but accurate descriptions in dogs has lacked in the literature despite being frequently identified. Classification of human tooth resorption is documented. Recently, several publications have evaluated tooth resorption in dogs.

1. Peralta, S., Verstraete, FJM, & Kass, PH. Radiographic evaluation of the types of tooth resorption in dogs. AM J Vet Res 2010; 71: 784-793.
2. Peralta, S., Verstraete, FJM, & Kass, PH. Radiographic evaluation of the classification of the extent of tooth resorption in dogs. AM J Vet Res 2010; 71: 794-798.
3. Nemec, A., Arzi, B., et. al. Prevalence and types of tooth resorption in dogs with oral tumors. AM J Vet Res 2012; 73: 1057-1066.

Pathophysiology

Tooth resorption results from increased osteoclastic activity that can be triggered by inflammatory mediators following regional infection, trauma, and/or systemic disease. Significant research in the area of osteoclastic and osteoblastic activity and the RANK (receptor-activated nuclear factor $\kappa\beta$)/RANKL(receptor-activated nuclear factor $\kappa\beta$ ligand)/OPG (Osteoprotegrin) system is beyond the scope of this lecture.

Different types of tooth resorption have been proposed in the human literature. Although intraoral radiographic findings are used to develop a radiographic impression(s), histopathological evaluation is often required to definitively classify a tooth resorption into a category.

Canine tooth resorption

Peralta, et. al. (2010) identified increased frequency of tooth resorption in older and large-breed dogs with no sex predilection. A population of 224 dogs with full mouth intraoral radiographs was evaluated. Tooth resorption was detected in 53.6% of the dogs (11.1% of all teeth evaluated had tooth resorptive lesions: 8.7% External Replacement Resorption and 1.4% External Inflammatory Resorption). The human classification system could be applied to 96.3% of the affected teeth. Canine tooth resorption was a common finding. The majority of tooth resorption was External Replacement Resorption (34.4% of dogs) and External Inflammatory Resorption (25.9% of dogs).

Radiographic and clinical descriptions of types of tooth resorption

- External Replacement Resorption – disappearance of the periodontal ligament space and replacement of tooth structure with alveolar bone
- External Inflammatory Resorption – loss of dental tissues and adjacent alveolar bone secondary to inflammatory conditions such as endodontic and periodontal disease
- External Cervical Root Surface Resorption – resorptive process starting at cemento-enamel junction of the tooth that progresses coronally and apically
- External Surface Resorption – resorptive lacunae involving the cementum and dentin and not the periodontal ligament and lamina dura, the periodontal ligament remains
- Internal Inflammatory Resorption – oval-shaped irregularity within the pulp canal resulting from endodontic inflammation
- Internal Surface Resorption – apical third oval-shaped enlargement that may represent revascularization following a mild traumatic injury
- Internal Replacement Resorption - irregular enlargement with tunnel-like appearance adjacent to pulp canal

AVDC classification of tooth resorption (www.avdc.org)

The diagnosis of tooth resorption requires clinical examination and intraoral radiographs, while the patient is anesthetized. Without intraoral radiographs, diagnosis and treatment plans cannot be accomplished. The current AVDC tooth resorption stage classification system is based on the extent of the lesion and not a proposed etiopathological process. The aforementioned authors (3) concluded the current system, commonly used for cats, is best adapted to external replacement resorption and external cervical root resorption in dogs.

The stage of lesions can be classified by the extent of tooth involvement (Note: Cementum is not visible radiographically)

- Stage 1 (TR1): Mild dental hard tissue loss (cementum or cementum and enamel)
- Stage 2 (TR2): Moderate dental hard tissue loss (cementum or cementum and enamel with loss of dentin that does not extend into the pulp cavity)
- Stage 3 (TR3): Deep dental hard tissue loss (cementum or cementum and enamel with loss of dentin that does extend into the pulp cavity)
- Stage 4 (TR4): Extensive dental hard tissue loss (cementum or cementum and enamel with loss of dentin that does extend into the pulp cavity; most of the tooth has lost its integrity)
 - TR4a (crown = root), TR4b (crown>root), TR4c (crown<root)
- Stage 5 (TR5): Remnants of dental hard tissue are visible only as irregular radiopacities and gingival covering is complete.

The lesions can be further divided into types

- Type 1 is generally associated with periodontal disease or apical periodontitis from endodontic disease. There will be a normal root opacity/density with a surrounding lamina lucida and usually a definable root canal.
- Type 2 (replacement resorption), the teeth have undergone significant resorption and have a different opacity/density. There is loss of the lamina lucida and dentoalveolar ankylosis is present. There may be no discernable root structure present. These teeth are not associated with periodontitis.
- Type 3 occurs when one root is Type 1 and one root is Type 2. It is essential that the surgeon use intraoral dental radiographs and understand Type 1, Type 2, and Type 3 lesions for treatment planning.

Diagnosis requires anesthesia, a clinical exam, the use of a dental probe and explorer, and full mouth intraoral dental radiographs.

Treatment

Treatment is based on the classification of tooth resorption. For example, internal resorption can be treated with endodontic therapy to remove the inflamed pulp and stop the resorption process. External resorption may require exodontic treatment if sublingual lesions are contiguous with supragingival lesions.

References available upon request