Recent Advances in Dental Health Management

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Puppy and Kitten Dental Care and Concerns

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INTRODUCTION

It is never too early to start a patient on a good oral and dental health care regimen. With all the rapid changes that puppies and kittens experience during the first year of life, development of the teeth and oral cavity should be monitored closely and frequently. Descriptions of developmental anatomy and physiology can get very detailed, so only the basic information as it pertains to normal structure and variations will be covered here. Once you know the normal progression, you will be able to recognize the variations that might require intervention.

TEETH

Formation

Tooth buds are formed as ectodermal epithelium pushes into a ridge of mesoderm, with the deciduous teeth first to differentiate, followed by the permanent teeth. The permanent tooth buds arise from and lie just below the deciduous teeth, and these developing buds are very susceptible to any stimuli; infection, damage, or even trauma from extraction attempts of the deciduous teeth can cause abnormalities.

Enamel Hypocalcification

Often termed “enamel hypoplasia”, this condition is seen when the developing tooth buds have been exposed to some outside influence — anything from a short-term fever that might cause a few focal lesions, to an extended bout with distemper that can result in generalized discoloration and pitting of the enamel of most teeth. Even aggressive elevation of deciduous teeth or other injury can cause disruption in enamel formation. Genetic abnormalities with a decrease or even lack of enamel deposition (true hypoplasia or even amelogenesis imperfecta) will present with thin to no enamel at all. In enamel hypocalcification, the disease or injury disrupts the normal mineralization process, so while the tooth may look normal at eruption, the soft enamel is easily worn off unevenly and discolored easily. It is very important to also radiograph the roots of affected teeth, as they can be abnormal as well, even nearly non-existent.

Treatment varies according to the extent of the problem. Single areas can be debrided of abnormal enamel, and a sealant or even composite restorative placed. While primarily an esthetic procedure, this does help to protect the tooth from increased sensitivity. If the condition is more generalized, composite restoration of every lesion is not feasible, so gentle removal of the affected areas (enamel “scrubbing” with a scaler or white stone bur on high-speed handpiece with water coolant) and smoothing the rough edges will provide a better appearance. A dentinal bonding agent will help to further smoothen the surface and may help reduce sensitivity as well. The owner should be encouraged to maintain a good home care regimen, as the rougher tooth surfaces will collect plaque more readily, and additional therapy may be needed in the future.

Tooth Abnormalities

Many variations from normal can be seen with teeth, from missing teeth to supernumerary teeth, which can be extracted if causing abnormal tooth positioning or crowding. Always radiograph these areas to make sure there are no additional teeth under the gingival surface. Areas with missing teeth should also be radiographed, because if the...
tooth is present subgingivally, cells around the crown could form significant cystic changes (dentigerous cyst) later on, potentially causing significant osseous damage.

Two adjacent teeth can fuse to each other, looking like one single large tooth, so the “tooth count” may be reduced (the two appear as one). A crown may look large, as well, if it attempted to “twin” itself (gemination tooth), but did not complete the task (correct number of teeth, one abnormal). Additional roots may be present on these, as well as on other teeth, so radiographs are again important for full assessment.

If the layers of enamel and dentin do not form properly, indentation may occur, even into the pulp, and at some times severe (dens-in-dente). If the pulp is not properly protected by the layers, it will be non-vital and the tooth will become abscessed. A similar process can happen with the lower first molars of small breed dogs, where the junction of the crown to the roots is misshaped and a disruption into the canal occurs. Radiographs will often show abnormal, non-vital (large) pulp canals and converging roots, frequently abscessed.

Eruption

The most important thing to remember about tooth eruption (Table 1) is that if there are two teeth (permanent and deciduous) in the same place at the same time, the deciduous tooth needs to be extracted. Not only will persistent deciduous teeth cause crowding, retention of food and plaque and increased periodontal disease, they will also cause the permanent teeth to erupt into an abnormal position.

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The decreased number of premolars in the cat alters the numbering system — the maxillary premolars are the second, third and fourth premolars, while the mandibulars are numbered the third and fourth. All feline molars are numbered as the first.

Disruptions in the multi-factorial events around eruption are possible. Delayed eruption has been seen in some small breeds (eg, Tibetan Terriers). In some patients, the persistence of tough, fibrous gingiva (operculum) will keep the entire tooth covered, either at nearly its full height of eruption, or impeded eruption. The tissue should be gently excised to expose the crown, leaving at least 2–3 mm of attached gingiva.

If the tooth is still underneath the surface of the gingiva, either just under normal soft tissue or completely surrounded by bone, radiographs should be taken to assess the apex. If the apex is not fully closed, and the tissue impediment can be removed, further eruption may be possible. If the apex is closed, or further eruption does not occur, attempts at orthodontic extrusion may be made, but this requires specialized skills and higher levels of owner commitment. Remember that an unerupted tooth may form into a dentigerous cyst, so extraction should always be considered.

Occlusion

While every animal may not have a perfect bite, each should have a comfortable, functional bite. Variations in occlusion can range from minor problems to severe, and if patient health is at stake, some intervention may be necessary.

Deciduous Malocclusions

As a puppy or kitten grows, the jaw length growth can be complex, with growth spurts of individual quadrants that can place the teeth in abnormal positions. If these teeth then interfere with continued jaw growth by hitting soft tissue or other teeth, extraction should be considered to remove this interference (interceptive orthodontics).

Most commonly, base narrow mandibular canines that hit the palate, or anterior cross bite of the incisors (uppers are behind the lowers) are situations where careful extraction of the maloccluded deciduous teeth may allow the jaws to grow to a more proper relationship. Of course, if the genetics for that individual call for an abnormal jaw length, these extractions will do nothing to change the eventual outcome. Of the dogs we have treated with interceptive orthodontics by the age of 8 to 10 weeks, about 40 to 50% of dogs will “improve” and have a relatively normal occlusion. In cats, particularly the “flat-faced” breeds (Persians,
Himalayans), deciduous malocclusions of the canine teeth are occasionally seen, and early intervention with extraction results in a larger percentage (70 to 80%) having a “normal” occlusion as an adult.

The one caution is the method of extraction. Since the permanent tooth buds are just below their deciduous counterparts, extreme care must be used during elevation of the deciduous teeth, so injury will not occur. Small enamel defects may be possible with even the gentlest of elevation, and extreme changes may occur with more aggressive action. Also, while the general rule of thumb with deciduous “anterior crossbite” malocclusions (Class III) is to remove the incisors of the “shorter” jaw, if the lower canines are tight up against the upper third incisors, it is often best to keep them, as the latter may be keeping the lower jaw from growing out even further.

**Immature Permanent Malocclusion**

It is important to monitor pets around the ages of 5 to 7 months, as most of the permanent teeth start to erupt. Remember that any retention of deciduous teeth cause abnormal eruption positioning of the permanent counterparts — the lower canines and incisors will erupt lingual/palatal to the deciduous teeth, while the upper canines will erupt rostral (mesial). Outside of genetic reasons, this is the most common cause for malocclusions, especially base narrow mandibular canines and rostroversion maxillary canines.

Any variations at this age can again lead to a mechanical interference that could impede normal jaw growth. Again, base narrow mandibular canines and anterior cross bites are the most common problems seen, and while an incisor malocclusion will seldom cause major problems, the discomfort with the base narrow canines can be quite significant and often requires intervention. The rostral positioning of maxillary canines can also cause the lower canines to be diverted either lingually or labially, and correction is often necessary there, as well. It is important to look at the diastema in front of the maxillary canines to make sure it is wide enough before attempting any base narrow mandibular canine correction.

When it is first apparent that the mandibular canines appear to be erupting base narrow, owners can sometimes help by applying regular digital pressure outward on the erupting canine, or even use a hard rubber ball (e.g., raquet-ball) to help splay the teeth out. If the tip of the tooth barely hits the gingival margin of the palate, a gingivoplasty procedure may be sufficient to provide release for the tooth. Teeth that are slightly more medial may benefit from a composite restorative extension placed on the tip of the tooth that acts as a type of incline plane to get the tooth to slide out laterally, while at the same time releasing the point of contact with the palate (camouflage orthodontics). If retained deciduous teeth are present, after their extraction, a portion of the root (rinse in sterile saline) may be gently placed in the periodontal ligament space medial (lingual) to the base narrow tooth, to help push it labially. This temporary wedge seldom causes any problems, and is often lost with additional eruption of the mandibular canine. If these simple methods fail to work, a maxillary incline plane (usually bilateral) will need to be placed after full eruption to move the teeth into a more comfortable position, to avoid crown amputation or extraction.

**ACQUIRED PROBLEMS**

**Juvenile Periodontitis**

Though not common, some young individuals will experience moderate to severe problems with periodontal disease and inflammation. In these individuals, the presence of viral infections (FIV, FeLV, calicivirus in cats) must be ruled out. Most of these cats that are virus-negative seem to be hypersensitive to any presence of bacteria in plaque, and sometimes regular dental cleanings and meticulous home care regimens will help keep the mouths as healthy as possible. Some individuals “mature out” of this condition, and if attachment loss can be minimized at this stage, can experience relatively healthy mouths as they get older.

**Fractured Deciduous Teeth**

Since the possibility of a fractured deciduous tooth causing a periapical abscess is high, the best option is careful extraction. Infection at the apex could damage the developing permanent tooth bud, and attempts at pulp capping or endodontics are not worth it in a tooth that will soon be lost.

**Fractured Immature Permanent Teeth**

Injuries to immature permanent teeth may pose special problems, due to the process of maturation these teeth need to experience. At eruption, while the enamel of the crown
may look completely mature, the root and dentinal walls still need development — especially of the wide open apex and thin dentinal walls. As the tooth ages, the apex begins to close and the walls thicken to the inside, due to dentinal deposition by odontoblasts in the pulp tissue.

Even a small amount of tooth fracture can expose the pulp. Typically, with the fracture and canal exposure of a mature tooth with closed apex, a standard root canal therapy (endodontics) can be performed to save the structure of the tooth, even with the non-vital pulp removed. With immature teeth, it is not possible to get a complete seal of the open apex, using typical sealer cements and gutta percha. Therefore, every attempt should be made to keep the pulp vital, hopefully permanently, or at least until the apex closes (apexigenesis) sufficiently for standard endodontics.

The procedure to treat the exposed pulp — a vital pulpotomy (pulpectomy) and direct pulp capping (placing CaOH or MTA directly on the pulp to stimulate dentinal bridging at the exposure site) — must be done as quickly as possible, before the pulp becomes too inflamed or necrotic. In a dog under 18 months of age, attempts at pulp capping may be tried up to 2 weeks after the time of injury, though the sooner, the better the prognosis (mature teeth should be treated within 5 days of injury).

If the pulp capping is not successful, or the pulp is already non-vital, the entire pulp may be removed, and CaOH placed in the pulp cavity to try to stimulate hard tissue closure of the apex (apexification). This material typically has to be replaced every 6 months, until a solid closure is attained. At that point in time, standard endodontics may be performed.

**ORAL LESIONS: DEVELOPMENTAL**

**Clefts**

Disruption in the proper development of the branchial arches of the fetus may result in cleft defects, for which every newborn should be examined. If the paired maxillary processes (from the level of the canine teeth caudally) fail to fuse, a secondary palatal defect will result on the midline. If either maxillary process fails to fuse rostrally with the centrally located incisive bone, then a primary cleft palate will be present on either side of the midline, sometimes extending into the nares. Either of these lesions will interfere with proper nursing, and supportive care is often necessary until the defect can be repaired.

**Microglossia**

An uncommon but lethal defect, microglossia, or bird tongue refers to an abnormal formation of the tongue, with a resulting thin, smooth-edged structure that will not be able to form a proper vacuum for nursing efforts. Even with supportive care, additional systemic abnormalities will often develop in these animals, so they often do not survive.

These cases may be underdiagnosed, falling under the umbrella term “Fading Puppy Syndrome”.

**Tight Lip**

Primarily seen in Shar Peis, the lip structure is compromised to the extent that there is a diminished vestibule (space between lips and teeth), with a shortened area of buccal mucosa. The lip will at times curl up over the lower incisors and canines, potentially causing significant soft tissue damage and even impeding mandibular growth. Stay sutures in younger animals may help, but often specific surgery in the vestibular area is needed to provide sufficient release.

**Craniomandibular Osteopathy**

Seen most frequently in terrier breeds, this condition may appear as a swollen area of the lower jaw, with mandibular enlargement from periosteal proliferation of the body or ramus, sometimes with extension into the temporomandibular joint region. Symptomatic treatment to alleviate discomfort sometimes helps and the condition usually resolves by 11 to 13 months of age when bone maturation and calcification is completed.

**Tumors**

Masses related to developmental structures may at times be seen from ameloblastomas to odontomas (compound or complex), or inductive fibroameloblastomas in cats (up to 18 months of age). Viral-induced oral papillomatosis is also seen in some young animals, with potential for spread, and these are often self-limiting.

**ORAL LESIONS: ACQUIRED**

Injuries, both from external sources (trauma) to chewing on sharp or caustic objects, or even electrical cords, can be seen to some degree in young animals. More conservative means of therapy (splints for fractures, suturing, supportive) are preferred in immature patients, as some forms of therapy or stabilization can interfere with proper growth.

**SUMMARY**

By paying close attention to the dentition of young and growing patients, a practitioner can sometimes prevent more complicated problems in the future by dealing with them as soon as they are recognized. There are special attributes of the growing mouth and tooth that require special considerations, but you have to look to find the problems!