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Iams Europe
A division of Procter & Gamble International Operations SA
Route de Saint-Georges 47
1213 Petit-Lancy
Switzerland

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PAEDODONTICS: PUPPY AND KITTEN ORAL HEALTH CARE

Dr. Dr. Peter Fahrenkrug
Dr. med. vet., Dr. med. dent., FAVD, Dipl EVDC

AUTHOR’S PROFILE
Dr. Dr. Fahrenkrug studied at the Law School in Hamburg in 1979-1983 and graduated in 1978 from the Hannover Veterinary School. In 1982 he graduated from the Hamburg Dental School to become a Doctor of Human Dentistry. Since 1978 his main interests have been in animal dentistry and he has authored many books and articles on veterinary dentistry and dental surgery. From 1990 to 1995 he was a lecturer in Veterinary Dentistry at the Veterinary Faculty, Free University, Berlin. He now acts as a lecturer and consultant to private clinics, Universities and medical supply companies and continues to lecture widely on both dentistry and more recently practice management. He has given more than 580 presentations and seminars in 26 countries. Dr. Dr. Fahrenkrug is a Fellow of the Academy of Veterinary Dentistry, Diplomate of the European Veterinary Dental College, and a board certified Specialist in Veterinary Dentistry and Veterinary Equine Dentistry.

DENTAL FORMULA (dog)

<table>
<thead>
<tr>
<th>Deciduous dentition</th>
<th>Permanent dentition</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 M1, 4 C1, 4 P1, 4 I1</td>
<td>3 S1, 3 C1, 3 P1, 1 M1</td>
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DENTAL FORMULA (Cat)

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Introduction

At the first presentation of a new puppy and kitten, the veterinarian is given an opportunity to implement both prophylactic paedodontic programmes as well as any treatment required. This task covers the most common problems affecting puppies and kittens and where applicable species specific problems are indicated.

Eruption and Dentition

The eruption of the deciduous (primary) teeth and their replacement by permanent teeth is a complicated process and the underlying physiology is still poorly understood. The deciduous teeth have a complete root system similar to permanent teeth. During the development of the permanent teeth the roots of the deciduous teeth are resorbed through the activity of odontoclasts, which seem to develop from undifferentiated cells in the pulp of the deciduous teeth.

Deciduous teeth

- M1: First molar
- C1: Canine
- P1: Premolar
- I1: Incisor

Permanent teeth

- S1: First premolar
- C1: Canine
- P1: Second premolar
- M1: First molar
- M2: Second molar
Abnormal eruption of deciduous teeth is often seen, especially in dogs, necessitating their removal. Attempts to remove a persistent deciduous tooth (fig 1) will often result in a fracture of the tooth, with a part of the root remaining in the bone. It was thought that this root would rapidly be resorbed, but this is no longer believed to be the case. Sometimes these retained root tips become infected and may cause a fistulous sinus tract to develop. It is therefore suggested that complete removal of the retained deciduous tooth root should be performed, which often requires a gingival flap to access the root. Care must be taken not to damage the permanent tooth, which lies extremely close to the deciduous root. Enamel of the permanent tooth develops within the first 3 months and damage to the permanent tooth germ within this time may result in enamel hypoplasia.

Eruption defects
The deciduous dentition should have been completely shed in cats and dogs by the end of the 6th month, or slightly later in the smaller breeds of dogs. The most common problem is the persistence of the deciduous canine (fig 1). In order to prevent serious complications (i.e. a cyst, sinus tract, abscess or malalignment of the permanent tooth) removal of the tooth by alveolotomy should be considered. The absence of the permanent tooth must be confirmed radiographically. Occasionally a persistent deciduous tooth will conceal a non-erupted permanent tooth. In this case extraction of the deciduous tooth will normally encourage the permanent tooth to erupt. If after 4 weeks no change is seen, the crown of the permanent tooth should be exposed surgically. The first premolars (P3) and third lower molars (M3) are single-cusped and single-rooted in dogs. Their small size and occasional absence indicates an evolutionary loss. Feline dentition is more widely reduced in number: see the dentition table at the start of this text.

Breeding regulations pertaining to missing P1’s and M3’s in dogs
Many Kennel Clubs demand a full set of teeth including P1 and lower M3 for the pedigree of stud dogs. Odontological studies and biological facts have shown that P1 and lower M3 are the Wisdom teeth of the dog. They are currently undergoing a natural process of phylogenetical reduction and elimination.

Since Kennel Clubs are fighting against Mother Nature in this matter, the clubs should be recommended to cancel this policy and accept dogs with missing P1’s (only P1, and not P2, P3 or P4!!), as well as missing lower M3’s, for a fully licensed stud dogs.

Ectopic teeth / tooth malformations
Teeth that do not develop in the correct axial position, or develop in the wrong place, are called ectopic teeth (fig 3). If they cannot be brought back into the right position with orthodontic methods, extraction is recommended in many cases.

Developmental irregularities in shape, size, and functional morphology of teeth are most likely caused by trauma to tooth buds (“Turner-teeth”). They are often retained and extraction is indicated in most cases.

Retained teeth
If teeth are lying in the jawbone, more or less in their correct anatomical position but unerupted, these are called retained (or embedded) teeth (fig 4). If presented at an early stage of development (5th-7th month) many cases can be treated with a simple surgical procedure: the gingiva is incised over the retained tooth, the tooth crown surgically debrided from bone roots and cellular layers of germ-cells, and the tooth slightly loosened with the help of elevators. This may re-induce the eruption process.

Many cases will nevertheless not result in a perfect final functional and cosmetic position of the tooth, but will make the tooth move into an acceptable position. If the case is presented too late then fixation of periodontal ligament around the tooth will have formed an ankylosis which now prevents the natural growth of the tooth. As in human dentistry, these teeth could be moved out of their socket with the help of orthodontic devices, but since these devices are very delicate and need constant care and regulation, they are impractical in companion animals. Patients will damage them frequently which would result in an unacceptable number of anaesthetic procedures required for repair and readjustment.

Surgical extraction of retained teeth is the recommended treatment, since these teeth can cause developmental cysts. If they are not extracted, radiographic control (once a year) is highly recommended to monitor their progress (fig 4).

Supernumerary teeth / Polyodontia
The term pseudo- (or false) polyodontia refers to the presence of more than 42 teeth or 30 teeth in the mouth of puppies and kittens respectively. This includes some deciduous teeth but mainly it involves permanent teeth (fig 5). Treatment consists of extraction of all deciduous
teeth as soon as possible, since these can alter the correct position of the permanent dentition. Furthermore, the crowding between these teeth disturbs the natural self-cleaning mechanism of the mouth and causes periodontal problems.

Polyodontia means the presence of more than 42 or 30 permanent teeth after total shedding of deciduous teeth in puppies and kittens respectively. In dogs (fig 6) this is mainly seen with the incisors (8 instead of 6), where treatment is often not required, since dogs, such as Bull Terriers, often develop a very harmonic arch of 8 incisors with a near-to-perfect occlusion. Additional premolars can be found in both dogs and cats.

Occasionally the upper 3rd molar is present in puppies, which is an atavism, a phylogenetic regression to the original historical 44-teeth-dentition of all placental mammals.

And, sometimes double canines develop in puppies and kittens (fig 7). As a general rule those permanent canines, which are interdigitating better with the opposite dentition should be kept and the others extracted. In rare cases in both puppies and kittens two crowns and a common root develop (mostly incisors); extraction of a crown would destroy the root of the remaining tooth. Radiological evaluation is highly recommended if in doubt over the number of roots present.

Enamel Hypoplasia

Due to defects of the ameloblasts the enamel layer of developing tooth buds can be damaged. While a general enamel hypoplasia (affecting most or all teeth) is caused by systemic disorders such as distemper (“distemper mouth”), other pathological conditions such as malabsorption syndrome, malnutrition etc. can cause similar pathology. If only one tooth - often the canine tooth (fig 8) - is affected, then trauma to the tooth bud within the first 3 months of life (the end of amelogenesis) is the likely cause. Trauma can be mechanical: i.e. interference with the deciduous canine while it is still in its socket results in irritation of the enamel producing cells (ameloblasts) on the surface of the permanent tooth bud. More common is an infection of the permanent tooth bud after fracture of the deciduous canine. Bacteria will migrate down in the open pulp canal, spread out over the apical delta to the surface of the permanent tooth bud and cause inflammatory destruction of ameloblasts. Therapy: fractured deciduous teeth should carefully be extracted as soon as possible, avoiding mechanical trauma to the permanent tooth bud. Sometimes trauma to tooth buds is iatrogenic: forceful extraction of deciduous teeth (i.e. extraction of base-narrow deciduous canines) may result in mechanical trauma to the ameloblast layer of the permanent tooth buds. The treatments of choice to correct malpositioned deciduous canines in individuals of less than 3 months of age include crown reduction, endodontic therapy (vital pulpotomy) and restoration of the shortened deciduous canines.

Orthodontics

Orthodontics is the branch of dentistry which is concerned with the diagnosis and treatment of malocclusion, and skeletal disorders. It is important to clarify whether the malocclusion is skeletal or dental in origin, or a combination of both.

While different breeds of cats show hardly any deviation in their bite, the different breeds of dogs show marked differences in occlusion due to their diverse skeletal morphology. A common malocclusion of the permanent bite is base narrow (lingually displaced) mandibular canines (fig 9). They can be caused by a misplaced tooth germ often combined with a persistent deciduous canine.

Summary

The development of the two dentitions, and the shedding of the deciduous teeth, are highly complicated biological mechanisms in puppies and kittens. It is recommended to monitor this process carefully and to advise the client to present their pet on a regular basis for examination, especially if anything abnormal is observed. Even minor developmental disturbances of the dentition can result in severe damage to the permanent teeth. Appropriate treatment at the right time can almost always avoid malocclusions and dental malformations.

This is a malocclusion with the worst complications, as the tipped canines bite against the hard palate causing necrosis of the mucous membrane and the bone beneath. In extreme cases a fistula is created into the nasal cavity allowing food particles to be impacted into the nasal cavity causing severe nasal complications. The condition can be treated with an inclined plane or by fixing an expansion screw between the canines with acid-etch composite. The results of this condition are rapid and very rewarding. And, because of the natural dental interlocking of the canines, drifting back is almost impossible.

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