

JUVENILE DENTISTRY AND DECIDUOUS TEETH IN THE PUPPY DOG

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JUVENILE DENTISTRY DEALS WITH THE DIAGNOSIS AND TREATMENT OF DEVELOPMENTAL, GENETIC AND IATROGENIC FACTORS THAT MAY LEAD TO MISSING TEETH, TOOTH AND JAW FRACTURES, ROOT OR ENAMEL DYSPLASIA AND DENTAL MALOCCLUSIONS. WHILE IN SOME INDIVIDUALS, TEETH MAY EXPERIENCE UNUSUAL JUVENILE SYNDROMES, PERIODONTAL DISEASE IS TYPICALLY NOT A PROBLEM IN YOUNG ANIMALS. WHEN THE YOUNG ANIMAL HAS EMPHASIS PLACED ON ACCURATE DIAGNOSIS AND TREATMENT OF EARLY DENTAL CONDITIONS, A HEALTHY OCCLUSION IS ACHIEVABLE.

ERUPTION DATES

Puppies are born edentulous. The deciduous teeth begin to erupt at two to four weeks of age. The canine teeth have usually erupted by four weeks of age and all deciduous teeth should be in place by six weeks of age. The deciduous teeth number 28 in total. Exfoliation of the deciduous teeth begins and the first permanent maxillary central incisor teeth erupt at about 14 weeks of age. By the end of the sixth month, all the permanent teeth have erupted and are in functional occlusion. The permanent teeth number 42 in total.

NOMENCLATURE

A common terminology is to give the type of tooth a letter from the alphabet, such as I for incisor, C for canine, P for premolar and M for molar. The permanent teeth are designated by only the capital letter and the deciduous teeth are designated a lower case 'd' to follow the capital letter. This is termed anatomical nomenclature. The tooth is then assigned a number that corresponds to its position from the midline. The number and letter are written so the number is positioned adjacent to the letter, in a relationship, which corresponds to the arcade the tooth is positioned in. The number is placed above or below and on the right or left of the letter, eg upper right canine is designated C1, the lower left third premolar

is designated 3P. An alternative numbering system, termed the Modified Triadan system assigns each jaw quadrant a number: 1 = right maxilla, 2 = left maxilla, 3 = left mandible and 4 = right mandible in the adult dog, and numbers 5 thru 8 in the puppy. The teeth are then number from the front to the back. Therefore the right maxillary adult first incisor tooth is numbered 101, whereas the right maxillary deciduous first incisor tooth is numbered 501. Importantly, all of the canine teeth end in a 4, so 104 thru 404 in adult and 504 thru 804 in a puppy and all 1st molar teeth end in a 9, so 109 thru 409.

Puppy Occlusion

On each side of the mouth the puppy has three deciduous incisors in the front of the maxilla and three incisors in the front of the mandible (Figure 1), followed by one maxillary canine tooth and one mandibular canine tooth (Figure 2), followed by three premolars in both jaws (Figure 3 and 4), making a total of 28 deciduous teeth.

In the adult dog, on each side of the mouth there are three incisor teeth in the front of the maxilla and three incisors in the front of the mandible, followed by one maxillary canine tooth and one mandibular canine tooth, followed by four premolars in both jaws, followed by two molar teeth in the maxilla and three molar teeth in the mandible, making a total of 42 permanent teeth.



Figure 1. On each side of the mouth the puppy has three incisor teeth in the maxilla and three incisor teeth in the mandible.



Figure 2. On each side of the mouth the puppy has one canine in the maxilla and one canine in the mandible. The mandibular canine tooth is positioned between the maxillary canine and 3rd incisor teeth when the mouth is closed.



Figure 3. On each side of the mouth the puppy has three premolar teeth in the maxilla. The canine tooth can be seen on the left of the picture.

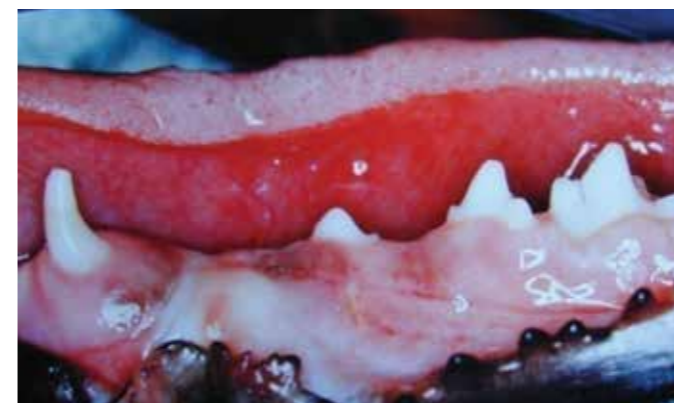


Figure 4. On each side of the mouth the puppy has three premolar teeth in the mandible. The canine tooth can be seen on the left of the picture.

CONDITIONS AND PATHOLOGY

Causal Factors

During the development of deciduous teeth, various factors can greatly alter normal crown and root formation. Systemic and local inflammation or infection, sometimes accompanied with fever, at the time of tooth bud maturation can commonly alter the appearance and structure of the enamel and root.

Trauma, whether accidental or iatrogenic, during extraction of deciduous teeth, can also cause deciduous root fractures, as well as, significant pathology to the developing permanent tooth. The position of the permanent tooth bud lingual to most of the deciduous teeth, except the maxillary canines which are mesial, makes it extremely susceptible to stimuli from its predecessor.

Missing Deciduous Teeth

Missing deciduous teeth in itself does not present a serious physical problem, but may be an indication of missing permanent analogs. By eight to 12 weeks of age, radiographs can be taken to confirm the presence or absence of permanent tooth buds. A single missing tooth typically does not indicate a major abnormality, but multiple missing teeth, especially bilaterally, may increase the probability of genetic predisposition.

Fractured Deciduous Teeth

The deciduous teeth have very thin walls (Figure 5) and may be fractured during play or trauma (Figure 6). Fractured deciduous teeth should generally be extracted, as endodontic therapy is typically unwarranted. Infection may gain access through the open pulp canal and any potential source of infection to nearby permanent tooth buds and alveolar bone should be removed. Once fractured, infection/inflammation or both increase the temperature of the surrounding tissues, potentially affecting the ameloblast, resulting in enamel hypoplasia or hypomineralisation of the developing permanent tooth crown. Because the root of a deciduous tooth is thin, it can easily fracture on extraction, so the tooth needs to be luxated until it is loose before forceps are used to remove it.



Figure 5. Radiograph of the right rostral mandible demonstrating the thin walls and wide pulp canal of the deciduous teeth.



Figure 6. Right deciduous maxillary canine tooth demonstrating a crown-root fracture exposing the pulp tissue.

Technique for extraction of the deciduous canine teeth. The epithelial attachment of the canine teeth is initially severed using a Molt 2/4 periosteal elevator (Figure 7) and curved deciduous elevator (Figure 8). The Molt 2/4 elevator is advanced apically on the lingual/palatal and buccal canine tooth root surfaces to approximately 75% of the length of the root to sever the periodontal ligament with firm but controlled force. The curved deciduous elevator is introduced into the gingival sulcus to sever the mesial and distal periodontal ligament using the concave surface against the mesial root and convex surface against the distal root to approximately 50% of the length of the root. Once the tooth is mobile, the Molt is reintroduced along each surface. Once the tooth is mobile, it is grasped with the small animal extraction forceps and gently removed from the socket with gentle rotation. The tooth should be examined to ensure complete removal, which is also confirmed visually and by radiography.



Figure 7. Molt 2/4 periosteal elevator.



Figure 8. Curved deciduous elevator.

CASE STUDY

The case study can be viewed at: <https://www.vdec.com.au/wp-content/uploads/2018/07/Malocclusion-and-Extraction-of-Mandibular-Deciduous-Canine-and-Incisor-Teeth-may18.pdf>

Malocclusions

Dental and skeletal malocclusions are considered to be multi-variant conditions due to many factors and the exact aetiology has not been definitively confirmed. Regulation of bone growth and bite anatomy is a complex phenomenon dependent on genetic factors, development of the teeth, size and movement of different muscle and soft tissues (lips, cheeks, tongue and masticatory muscles), shape of the jaws, constant pressure from external objects, trauma to the teeth or to the bone, persistent deciduous teeth and nutritional factors. There may be a breed predisposition, though the specific gene or genes as in the DNA responsible has not been confirmed nor determined. There are no definitive tests or procedures that can be used to determine jaw growth and tooth position.

Deciduous teeth may be extracted in cases of early malocclusions. If the primary dentition shows abnormal positioning, such as base narrow or lingually displaced mandibular canine teeth, retention of these canine teeth may not only cause a detrimental interlock of teeth into the hard palate (Figure 9), resulting in ulceration and interfering with mandibular growth, but they may also influence their permanent counterparts to erupt even further lingually, except the maxillary canines which erupt mesially.

Since maturation of each jaw quadrant (right and left mandibulae and maxillae) is relatively independent of each other, slight variations in growth may also cause a malevolent interlock of deciduous incisors and canines, again potentially influencing jaw

growth, in an otherwise genetically normal individual. In these cases, selective extraction of deciduous teeth may be attempted, termed interceptive orthodontics, realising that extractions of this kind will not be effective if malocclusion is of genetic origin. One simple rule is to extract the canines and/or incisors of the shorter jaw to prevent further interference. It should be remembered, however, that interlocks are occasionally advantageous, especially when the lower canines are tight against the upper lateral incisors in an animal experiencing a mandibular growth spurt.



Figure 9. Malocclusion demonstrating a short mandible with the deciduous canine and incisor tooth positioned caudal to its normal position causing a dental interlock.

The practice of interceptive orthodontics should ideally be performed between six to eight weeks of age, after which time the permanent teeth eruptions are imminent, and often take the abnormal place of their predecessors. The actual process of exodontia should be carried out with extreme caution to minimise potential damage to the permanent tooth bud under the gingival surface. If the crown breaks off, attempts should be made to completely retrieve the remaining roots, but again with care. If necessary, a moderate gingival flap and alveoplasty may be performed to expose the root tip. If infection is present, oral antibiotics should be continued post-operatively.

Persistent Deciduous Teeth

One area where primary exodontia is the only choice is in the case of persistent deciduous teeth. Exfoliation can be influenced by many factors, such as nutrition, inflammation, trauma, endocrine disorders such as hypothyroidism and ankylosis of the tooth to alveolar bone. Once the adult tooth starts eruption, unless its way is unimpeded, it will be deflected away from its normal position, lingually for most teeth, except for the maxillary canines, which are displaced mesially. Persistent deciduous teeth may commonly cause malocclusion such as base narrow or lingually displaced mandibular canines, where the lower canine teeth erupt lingually to the deciduous canine teeth, or anterior cross bite, where one or more of the maxillary incisors are positioned lingual to the mandibular incisors. While specific dental malocclusions caused by persistent deciduous teeth have not been proven to be genetic, any orthodontic adjustment should be thoroughly discussed, including breeding counselling.



Figure 10. Persistent deciduous right maxillary canine tooth present with the start of eruption of its permanent counterpart.

Development And Genetic Defects

Other developmental and genetic defects in young animals may be seen associated with the soft tissues and bony structures of the head. Primary (cleft lip) and secondary (cleft palate) defects can lead to serious complications if not managed correctly.

Fractured Jaws

Puppies are both adventurous and foolish, so common traumatic conditions seen in small animal practice such as being struck by an object like a bat, automobile, and bites from other animals commonly result in mandible fractures (Figure 11). Treatment involves assessing the type of fracture, use of minimal hardware in order to avoid damage to permanent tooth buds (Figure 12), and ensuring normal occlusion is maintained during healing. The use of inter-dental wiring and acrylic splints is preferable to pins, plates and external fixation. A soft tape muzzle can also be used to stabilise the bones, followed by a soft diet. As the

jaws are in their rapid growth phase, any solid fixation should be removed after 3-4 weeks, once radiographic confirmation of healing is obtained. If the fracture site is open, antibiotics should be prescribed, and in all fractures, analgesia using a combination of opioids and NSAIDs is a must.



Figure 11. A complicated fracture of the mandible in a 10 week old puppy due to a bite from the neighbour's dog.



Figure 12. Radiograph demonstrating the close proximity of the permanent tooth buds and developing tooth crowns to the fracture site.

VACCINATION OF HORSES IS THE MOST EFFECTIVE WAY TO MANAGE HENDRA VIRUS

With the latest horse death from the Hendra virus, the Australian Veterinary Association (AVA) is reminding horse owners of the importance of Hendra virus vaccination to help prevent this deadly virus in their horses.

President of AVA's Equine Veterinarians Australia group, Dr Cristy Secombe, said that this latest death is extremely alarming, with it being the furthest south that a Hendra case has been recorded in Australia, near Scone, Australia's Horse capital, in the upper Hunter Valley of New South Wales.

"Hendra virus is a deadly virus. For the benefit of horses and their owners, it is essential that horses located in, around or travelling to high-risk Hendra areas along the east coast, are vaccinated against Hendra virus," she said.

From 1994, when the virus was identified, to now there have over 60 known Hendra incidents in Queensland and New South Wales, resulting in the death of over 100 horses.

"Every one of these horses that has died because of Hendra represents one more compelling reason for horse owners to vaccinate their horses."

"The risk this disease poses to human health is also very real with seven confirmed cases in people leading to four deaths. So, it's important that the horse community remains vigilant in protecting both horses and people from Hendra," she said.

Dr Secombe said that the vaccine, introduced in 2012, remains the most effective way to help manage the Hendra virus and is fully registered with the Australian Pesticides and Veterinary Medicines Authority.

"Vaccination of horses provides a public health and workplace health and safety benefit by reducing the risk of Hendra virus transmission to humans and other susceptible animals and helps to ensure high standards of animal health and welfare."

Horse owners should contact their local veterinarian immediately for more information about Hendra virus vaccination which is a very important part of their horse health and welfare strategy.

