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CORRECTIVE ORTHODONTIC TECHNIQUES
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INTRODUCTION
Orthodontics is probably the least employed of the veterinary dental disciplines, probably because people associate orthodontics only with dental appliances. The discipline is in fact divided into three classes: 1) Preventive orthodontics. 2) Interceptive orthodontics consists of preventing the formation of malocclusion. 3) Corrective orthodontics is the treatment of a malocclusion in the permanent dentition. This is where dental appliances are used to move teeth. Most of the problems dealt with in this category should be dental in nature. It is not recommended to use orthodontics to mask skeletal abnormalities.

PREVENTIVE ORTHODONTICS
Advising the owners to help them provide the right exercises and chew toys to their puppies in order to avoid developing a malocclusion. Genetic counseling to help eliminate poor subjects from the breeding pool is simple but often unsuccessful. It is mostly used with breeders whose prime objective is to produce puppies. The last thing they want to hear is that their “champion” needs to be removed from the gene pool. Compliance, on the part of the owner, is often poor.

INTERCEPTIVE ORTHODONTICS
It is by far the largest part of veterinary orthodontics. Patients brought in for their first vaccinations often have retained teeth. It is easy to explain to the owner that for the succedaneous teeth to erupt in the proper position, the “baby” teeth have to be removed (there should never be 2 teeth of the same type, at the same place, at the same time). Treatment of adverse dental interlocks also falls into the same category. The mandible and maxilla do not grow continuously or simultaneously. Thus a tooth or teeth can interfere with a growth spurt from either jaw. Correction consists of extracting the tooth or teeth causing the lock. Removing the dental interlock allows the mandible of the maxilla to grow to its genetically predetermined length. A patient genetically prognathic or brachygnathic will remain that way. If, on the other hand, it is genetically normal, removing the lock will prevent the formation of a malocclusion. The best results are obtained when dealing with 8 to 12 weeks old patients. Even then, the success rate is around 25%.

CORRECTIVE ORTHODONTICS
Corrective orthodontics is the treatment of a malocclusion. Often seen in conjunction with class II malocclusion. Untreated, this painful condition can cause palatal damage, oronasal fistula, partial eruption or root shortening secondary to external resorption. Performing crown amputation and direct pulp capping (vital pulpotomy) can improve this condition. To correct it, the lower cuspids need to be moved to their normal position. Several appliances are available to accomplish this task (incline plane, telescopic incline plane, W wire, expansion screw etc.).

SPECIFIC ORTHODONTIC CONDITIONS
Retained deciduous canines. The permanent maxillary canine tooth erupts rostrally (mesially) to its deciduous counterpart. In case of retention, the permanent comes to occlude against or on top of the mandibular canine, preventing them from tipping labially. The permanent mandibular canine erupts caudomedially (distolingually) to the deciduous. In case of retention of the deciduous, the permanent teeth end up as base narrow canine. This causes soft tissue trauma to the palate. The retained deciduous teeth need to be removed as soon as possible (as in yesterday).

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W wires and expansion screws are bonded to the mandibular canine teeth. They push one canine against the other, and therefore are used only when both canine teeth are similarly displaced. The incline plane, on the other hand, moves each tooth independently. It also has the advantage of being able to move the teeth in 2 different directions. The telescopic incline plane is best used in young patients because it does not restrict the growth of the palate. Its disadvantage is that it usually needs to be fabricated by a dental laboratory, necessitating an extra anesthesia, impressions, stone models, and thus extra costs. A simple round telescoping bar connects the inclines making it easier to clean thus reducing the chance of a serious infection developing. The regular incline plane is made of resin and can be fabricated directly in the mouth. Several teeth serve as anchors resulting in a large
part of the palate being covered by the appliance. This makes it harder to clean and a severe inflammation of the palate often develops. This inflammation disappears as soon as the incline is removed.

The process of building an incline plane is fairly simple: The margins of the appliance are delineated with sticky wax. The teeth to be incorporated into the appliance are cleaned with flour pumice and etched with phosphoric acid. A self mixed, chemically cured, composite resin is used to build the inclines. It is often necessary to extubate the patient to see exactly where the mandibular canine teeth contact the appliance. Once the resin has set, it can easily be shaped using a “goldie” bur mounted on a slow hand piece. With a little bit of practice, one can also make a telescopic incline: a band of wax is placed in the center to separate the two halves of the appliance. The rod and tube are made of a 22 gauge 1 to 1.5 inch hypodermic needle slid into a 19 gauge 1 to 1.5 inch hypodermic needle. They are cut for measure, bent and embedded in the wax and in the acrylic on either side. Once the appliance is set the wax is removed and the telescope is functional.

Follow up visits should be set at weekly intervals until the teeth have reached their goal. Once the desired position has been reached, a retainer is not needed, as the palate stops the teeth from relapsing to their original position.

**Rostrally displaced maxillary canines.** An extreme form of this abnormality, commonly referred to as a “lance” canine, is often found in Shelties, where the canine erupts horizontally just distal to the lateral incisor. To reposition this tooth, simply place brackets or lingual buttons on the upper fourth premolar and the first molar, to serve as anchor. Then place a wire with a hook around the crown of the canine tooth. Wire and brackets are bonded into place and an elastic chain is run from the canine to the anchor teeth. One can reinforce the anchor by wiring the fourth premolar to the molar. At first the elastic chain is stretched to 80% of its resting length. Fourteen days later and every two weeks thereafter, it is replaced and stretched to 75% of its resting length. An average of eight weeks is necessary to reposition the tooth. During its move the maxillary canine slides on the lingual side of the mandibular canine. In some cases, the mandibular canine is displaced buccally. It normally returns to its original position under the pressure of the lips. In rare occasions this is not enough and another brace must be designed to tip the mandibular canine lingually. This increases the total time of the orthodontic move to 14 to 18 weeks. A retainer is not needed because the mandibular canine stops the maxillary from returning to its former position.

**Rostral cross bite.** Believed to be the result of retained deciduous incisors, this malocclusion shows the largest number of variations. Any one of the incisors can be involved, resulting in numerous presentations. The basic principle remains the same; a bite plane must keep the mouth partly open to allow the maxillary incisors to slide rostrally and the mandibular incisors caudally. A labial bow or a modified Maryland bridge is used to move the maxillary incisors rostrally (labially). Using study models, an appliance is prepared at the laboratory. In the maxillary appliance, a bite shelf is incorporated to prevent the incisors from overlapping. The mandibular incisors are tipped caudally (lingually) with the help of a lingual bar or with various combinations of brackets, wires and elastics. The teeth move into position within 6 to 10 weeks. As soon as they are in scissors bite, the appliances are removed. A retainer is not needed as the incisors overlap, preventing each other from relapsing into cross bite.

**Level bite.** Maxillary and mandibular incisors meet on their incisal edges. The extreme forces can result in broken crowns or the early loss of incisors due to periodontal disease. This condition can be associated with a class III malocclusion. To correct it, one needs to move the upper incisors rostrally and/or to move the lower incisors caudal, as in a case of rostral cross bite.

**Wry bite.** It is the uneven growth of one side of the maxilla or the mandible. In its mild form, one sees a one-sided brachygnathism or prognathism. In a more severe form, one can see a crooked head, deviated midline, and open bite. Orthodontic improvement may result in a functional occlusion but still far from perfect. Some veterinary dentists do not recommend doing any orthodontic work with these cases.

**Rotated maxillary third premolar.** Seen in brachycephalic breeds, where there is no sufficient space for all the teeth. The third premolar can be tightly impacted; its caudal (distal) root often sticks out laterally under the gingiva with very little or no bone support. Untreated, the situation develops rapidly to a case of periodontal disease with gingival inflammation, periodontal pockets, and bone loss. Early extraction prevents the formation of periodontitis by reestablishing a more normal anatomy.

*A few final comments: orthodontics is not for everybody; choose your patients and clients carefully.*

Patients should be amenable to mouth manipulations, and clients should be ready to supervise their pets at home (i.e.: no chewing of toys or hard objects) and to clean their mouth daily (not once in a while). They should also be able to visit regularly; if they live too far, problems with missed follow up appointments can and will arise.