

Correction of a Unilateral Base Narrow Canine in a Dog Using an Orthodontic Device

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Abstract: A 1-year-old male German Shepherd dog was brought in because its hard palate had been damaged by the left mandibular canine tooth. On inspection of the oral structure, lingual deviation to the interproximal area between the upper canine and lateral incisor of the left mandibular canine tooth and mild palatal trauma were seen. Under radiographic examination no traumatic root lesion or residue from the extracted deciduous teeth was determined. The mandibular canine tooth was corrected using a metal inclined plane. After 2 months the lower canine was tilted labially by sliding it along the slope as the dog closed its mouth.

Key Words: Dog, canine tooth, orthodontic treatment

Bir Köpekte Unilateral Kanin Diş Kökenli Taban Darlığının Ortodontik Araçla Düzeltilmesi

Özet: Bir yaşlı erkek, Alman çoban köpeği sol mandibular kanin diş sert damağını yaralaması nedeniyle getirildi. Ağız boşluğunun muayenesinde sol mandibular kanin dişin lingual yönde yer değiştirdiği ve sert damağı yaraladığı gözlemlendi ve radyolojik muayenede travmatik kök lezyonu ya da çekilmiş süt dişinin kalıntısına rastlanmadı. Bozukluğun düzeltilmesi amacıyla sol kanin dişi dışı doğru itmek üzere eğim verilmiş bir metal ortodontik araç kullanıldı. Köpeğin ağızını kapatması esnasında metal aracın alt kanin dişi dışarı itmesi suretiyle iki ay sonra düzelme sağlandı.

Anahtar Sözcükler: Köpek, kanin diş, ortodontik tedavi

Introduction

Orthodontics, or dentofacial orthopaedics, is described by American orthodontics associations as the branch of dentistry concerned with the supervision, guidance and correction of growing and mature dentofacial structures, including those conditions which require movement of teeth and correction of abnormal relationships and malformations of related structures by the adjustment of relationships between and among teeth and facial bones by the application of forces and/or the stimulation and redirection of functional forces within the craniofacial complex (1).

The history of veterinary orthodontics as applied to the dog began in the 1960s when Selhorst published his work on orthodontic treatment in the dog. Following his work, expansion screws, removable maxillar and mandibular acrylic plates, the application of orthodontic devices and filling and polishing techniques were adopted to correct orthodontic problems by various researchers (2).

In veterinary orthodontics cheek elastics using brackets and elastic orthodontic chains, cast metal incline planes, lingual arch wires and labial arch wires are used to move the teeth through the alveolar bone (1,3,4).

Base narrow canine conditions are generally considered to be genetic in origin and result when the deciduous mandibular canines fail to exfoliate and the permanent mandibular canines erupt lingually. Other causes of base narrow canine include fractured deciduous mandibular canines, early dental interlock problems and skeletal abnormality (micrognathia) or dental abnormality (linguoversion or linguoposition of the canines), impacted teeth and facial trauma (5-7).

There are various degrees of base narrow canine. The mildest form is seen in dolichocephalic breeds. The narrow mandible does not allow enough space for the canines. Therefore, the mandibular canines make contact with the gingival tissue between the upper canine and lateral incisor. This conformation results in an open bite and can predispose the mandibular incisors to flare

facially, thus causing yet another malocclusion. The moderate form is evident when the mandibular canines erupt lingually but this inclination is not enough to penetrate the hard palate. The contact is just lingual to the interproximal area between the upper canine and lateral incisor (1,3,8-10).

This condition can be the most painful malocclusion as the lower canines induce intense trauma of the palatine mucosa and bone. In the worst cases, an oronasal fistula is created. When orthodontic correction is unethical or difficult, crown height reduction is a very satisfactory alternative procedure (1,3,8,10).

In dogs younger than about 7 months, the canine teeth may not be fully erupted, and an appliance bonded to the upper canines would erupt together with the teeth. In such cases, an active device bonded to the lower canines is preferred. A “w” wire, a modified quad helix or a screw device can be used (1,8).

This malocclusion in dogs older than about 7 months is best corrected with an inclined plane. This functional appliance provides an intermittent force created by the masticatory muscles closing the mouth of the dog. Adjusting the slope of the inclined plane allows correction of asymmetrical defects. If the malocclusion is limited to one canine, an inclined plane is built on one side and a retention plane is built on the other side (1,8,10).

Since our patient was older than 7 months and the problem was unilateral, the use of a metal inclined plane was considered.

Case Report

An 11-month-old male German Shepherd dog was brought to our clinic with complaints of palatal trauma caused by the left mandibular canine tooth. It was learnt from the owner that the retained left deciduous tooth had been removed 2 months previously and that lingual deviation of the permanent tooth had not been corrected.

On inspection of the oral structure, lingual deviation of the left mandibular canine tooth to the interproximal area between the upper canine and lateral incisor and mild palatal trauma were seen (Figures 1 and 2).

In the radiograph of the mandible in open mouth ventro-dorsal position, no traumatic root lesion or residue of the extracted deciduous teeth was determined (Figure 3).

As treatment, the use of a metal inclined plane was considered. A cast model was prepared when planning the treatment. Impressions of both the diseased and opposite dental arches were taken by the use of silicone and polyether-based materials (Express putty- Express hydrophil, 3 M-Germany). These impression materials (one viscous and one non-viscous portion) were mixed with their activators, and first the non-viscous and then viscous portion of the impression materials were transferred to a custom made impression tray with a spatula. The dog was positioned so that the arcade to be impressed was facing upwards (ventral recumbency for the maxilla, dorsal recumbency for the mandible) to prevent the mixture flowing out (Figure 4). The tray was held firmly in place for 60 s. until a fingernail could not



Figure 1. Appearance of incorrect position of the lower canine.

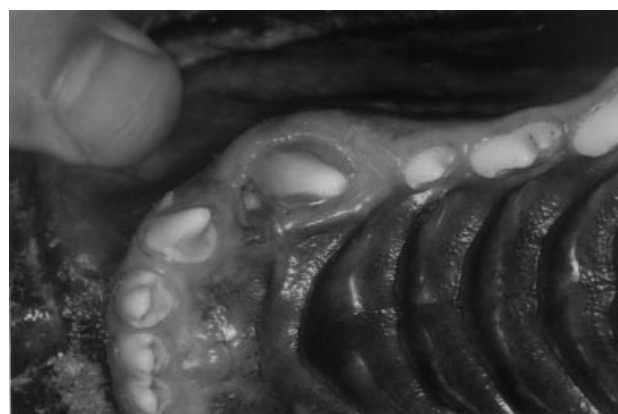


Figure 2. Palatal defect caused by the lingually deviated left mandibular canine.

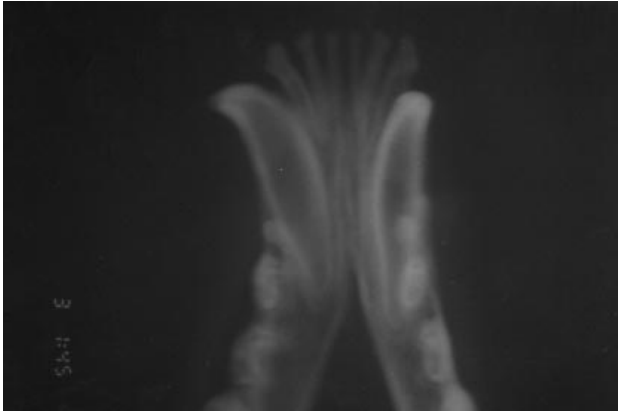


Figure 3. Preoperative radiograph of the mandible.

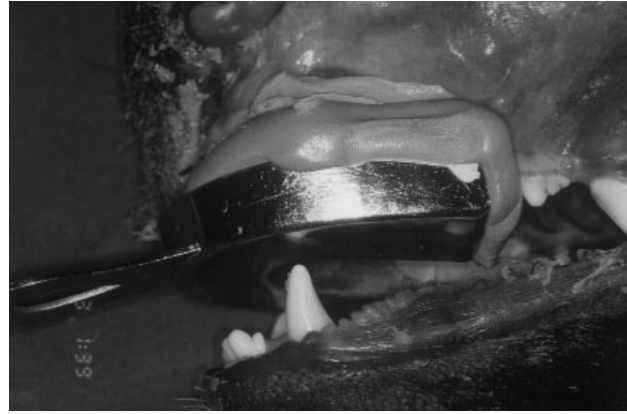


Figure 4. Application of the impression tray to the upper jaw.

make an indentation in the mixture. The impression tray was removed from the mouth with a single firm pulling motion perpendicular to the long axis of the mouth. Thus the silicone impression material was not damaged or deformed.

The impression model was sent to a human orthodontic laboratory. A stone model and then a chrome-cobalt alloy metal inclined plane were prepared by the laboratory according to our requirements (Figures 5 and 6). The maxillar canine tooth was prepared to fix the inclined plane. The first step was to etch the enamel with 37% orthophosphoric acid gel (3 M Ätzgel-3 M - Germany), which creates irregularities in the enamel surface, thus allowing the bonding material to interlock mechanically with the enamel surface. The gel was rinsed with water after 45 s. The tooth surface was dried with an air compressor for about 20 min. Then a bonding

agent (Superlux Dual Bonding - Germany) was applied to the tooth surface to provide bonding between the irregular enamel composite resin. A composite resin (Rebilda Composite Resin, Voco - Germany) was placed between the tooth and metal inclined plane after mixing it with its activator for 30 s. for retention, and the residual composite material was removed from the tooth surface (Figure 7).

The metal inclined plane was kept in place for 2 months until the displaced canine tooth localised in its correct position (Figure 8). Then the orthodontic device was removed from the tooth surface with a dental chisel, and the retained composite resin material was removed from the tooth surfaces with carbide grits and polished with a soft rubber polishing cup (Poltip F, Vivadent - Liechtenstein), and a control radiograph was taken (Figure 9).

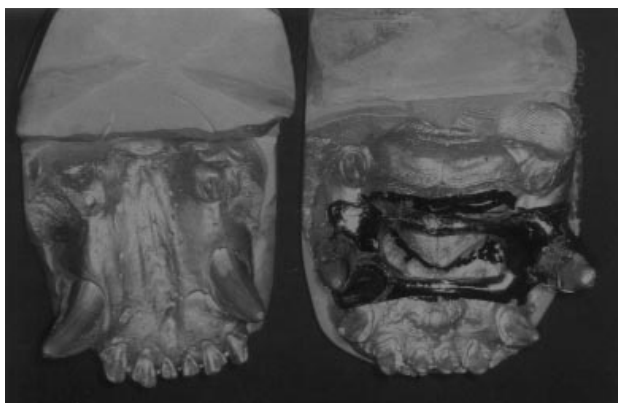


Figure 5. The inclined plane applied stone model.



Figure 6. The inclined plane.



Figure 7. Completion of the inclined plane adoption.



Figure 8. The problem was corrected 2 months later with the inclined plane application.



Figure 9. Radiograph of the same mandible 2 months later.

Discussion

Base narrow canine condition is one of the most commonly encountered orthodontic problems in the dog. It is usually caused by retained deciduous mandibular canine teeth, as in this case. Normally the root of the deciduous tooth is resorbed, making room for a permanent tooth. When this fails, the permanent tooth deviates lingually from its normal position. Therefore, a retained deciduous tooth should be extracted as soon as a permanent tooth is noted in the same area (3,8-10). In our case, dental extraction of the left deciduous mandibular canine tooth had been performed by a private veterinarian after base narrow condition occurred.

When extracting the deciduous teeth, care and patience must be taken and fracturing of the tooth root or damage to the permanent tooth bud must be avoided.

A fractured deciduous tooth root must be removed carefully without any damage to the thin layer of epithelial tissue which surrounds the permanent tooth bud, because such damage can cause enamel hypoplasia or discoloration in the enamel (5).

The first technique in treating base narrow canines is extraction of the lower canine which is striking the palate. This will relieve the tissue damage. However the lower canine tooth is important aesthetically because it helps to keep the tongue in place in the mouth and because it is visible when the mouth is open during panting for example. Second, the canine length can be reduced so that soft tissue trauma to the palate can be relieved. The third techniques is orthodontic movement (7).

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Alginate impressions are used in most orthodontic studies, but these are not suitable for being stored for

more than 1 h. because of dehydration and deformation. We preferred to use a silicone and polyether-based material for taking impressions. Stone models and a chrome-cobalt alloy inclined plane were prepared without any difficulty by a human laboratory according to our specifications (1,3,11).

In this case, the problem was on the left side, and with the one sided inclined plane correction of the lower canine tooth was achieved after 2 months. A limited decubital area occurred over the hard palate due to the inclined plane, and this lesion healed in 10 days without any treatment.

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