Cast Metal Bilateral Telescoping Inclined Plane for Malocclusion in a Dog

Malocclusion is a common dental problem in dogs. Linguoverted canine teeth occur with greater frequency than other malocclusions.[1] Treatment options for linguoverted canine teeth include exodontia, surgical repositioning, crown reduction followed by vital pulp therapy, and orthodontic movement by fixed or removable appliances.[2,3] The case report presented here demonstrates the use of a fixed orthodontic appliance, a cast metal bilateral telescoping inclined plane, for the correction of linguoverted canine teeth in a dog.

Case Report

A 6-month-old, 21-kg, intact/female Labrador retriever dog presented for evaluation and treatment of linguoverted mandibular canine teeth. The owner reported no dysphagia or clinical discomfort. The dog was fed an over-the-counter, kibble-based puppy diet and no oral or dental home care had been attempted.

During conscious oral examination, a mild class II malocclusion was diagnosed.[4] Mandibular brachygnathism was present, causing the mandibular incisor teeth to occlude approximately 3-mm distal to the cingula of the maxillary incisor teeth.[4] Linguoversion of both mandibular canine teeth was also identified. These teeth were also distally displaced because of the mandibular brachygnathism (Fig.1). An ovariohysterectomy was recommended because of the potential genetic component of this malocclusion.[5] The ovariohysterectomy and impressions of the dentition to plan further treatment options were scheduled.

A 6-chemistry panel (ALT, Alk Phos, glucose, BUN, creatinine, and total protein) was completed prior to presentation and the results were within normal ranges. Conscious oral examination the day of the ovariohysterectomy and impressions identified a normal scissor bite and an apparent self-correction of the class II malocclusion. The mandibular left canine tooth (304) was no longer distally displaced but was still slightly linguoverted and was in contact with the gingiva.[5,6] The mandibular right canine tooth (404) was still linguoverted and distally displaced, contacting the palatal mucosa on the mesiopalatal aspect of the maxillary right canine tooth [104] (Fig. 2).

Based on the conscious oral examination, a class I malocclusion with bilateral linguoverted mandibular canine teeth and distal displacement of 404 was diagnosed.[4] No other oral abnormalities were noted. Orthodontic correction of this malocclusion was recommended due to the high potential for success and the minimally invasive nature of the procedure.[1] Fabrication of a cast metal bilateral telescoping inclined plane was recommended.

The patient was pre-medicated with morphine sulfate[a] (0.48 mg/kg IM) and acepromazine maleate[b] (0.02 mg/kg IM). An indwelling intravenous catheter[c] was placed aseptically into a cephalic vein 15-minutes later. Anesthesia was induced with propofol[d] (4 mg/kg IV) and the patient was intubated with an 8.5-mm cuffed endotracheal tube. General anesthesia was maintained with isoflurane[e] at 1.25-2.5 % and oxygen at 1.5 L/min. Heart rate, respiratory rate, oxygen saturation, and non-invasive blood pressure were monitored continuously and recorded every 5-minutes. A balanced electrolyte solution[f] was administered intravenously at 10 ml/kg/hr throughout the procedure. Body temperature was maintained during the ovariohysterectomy using a warm water circulating blanket[g] placed under the patient. After the

Figure 1

Photographs showing linguoverted mandibular canine teeth in a 6-month-old Labrador retriever dog. The left mandibular canine tooth (304) is linguoverted in reference to the left maxillary canine tooth (204) [A]. The right mandibular canine tooth (404) is directly palatal to the maxillary right canine tooth (104) [B]. The mandibular incisor teeth occlude approximately 3-mm distal to the maxillary incisor teeth. A Class II malocclusion with mandibular brachygnathism was diagnosed.

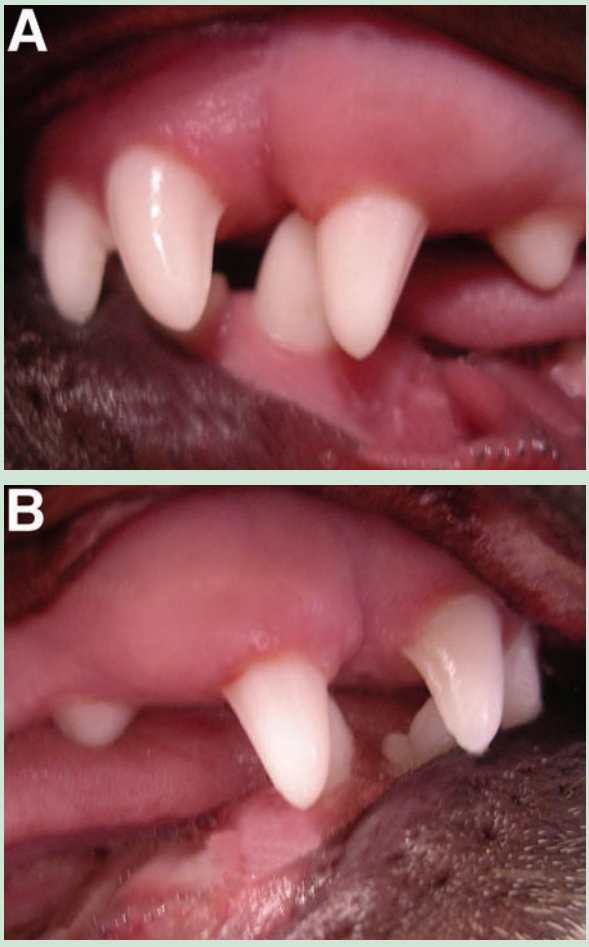
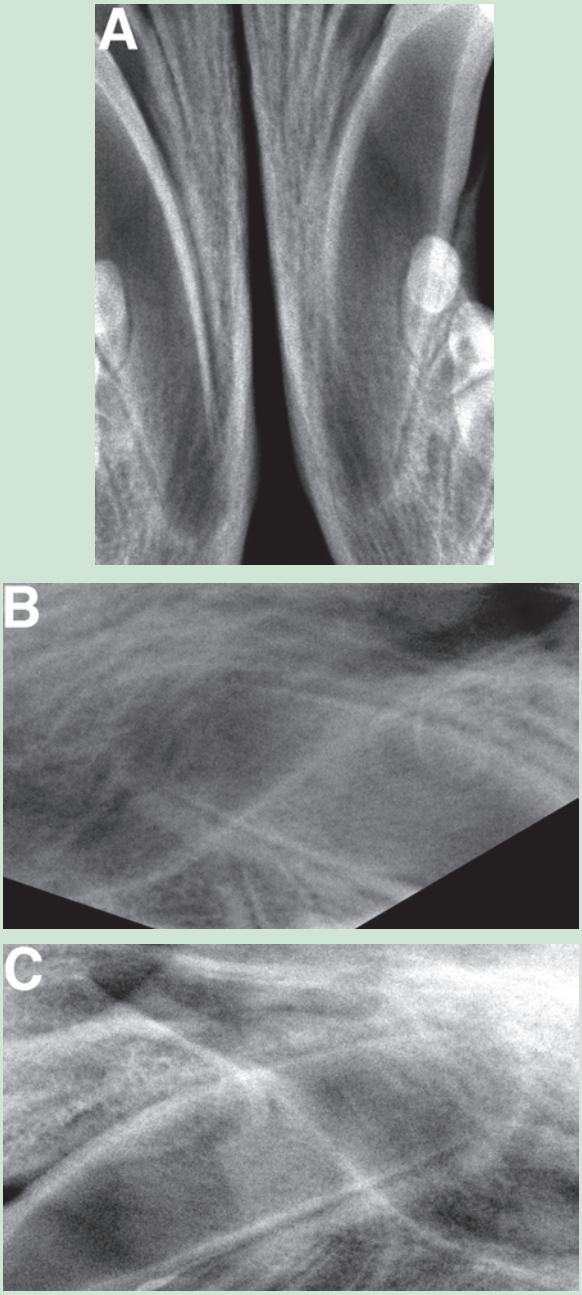


Figure 2

Photographs showing linguoverted mandibular canine teeth in a 6-month-old Labrador retriever dog 3-weeks after initial presentation. The left mandible has grown and the Class II malocclusion has resolved (A). The right mandibular incisor teeth appear to be in normal occlusion but the right mandibular canine tooth (404) remains distally displaced and linguoverted (B).

Figure 3

Intraoral dental radiographs taken in a 6-month-old Labrador retriever dog with linguoverted mandibular canine teeth before orthodontic treatment. The apices of the mandibular canine teeth (304 and 404) are open and the dentin walls are thin, consistent with the age of the dog (A). The apices of the right (B) and left (C) maxillary canine teeth (104 and 204) are also open showing thin dentin walls consistent with the age of the dog.



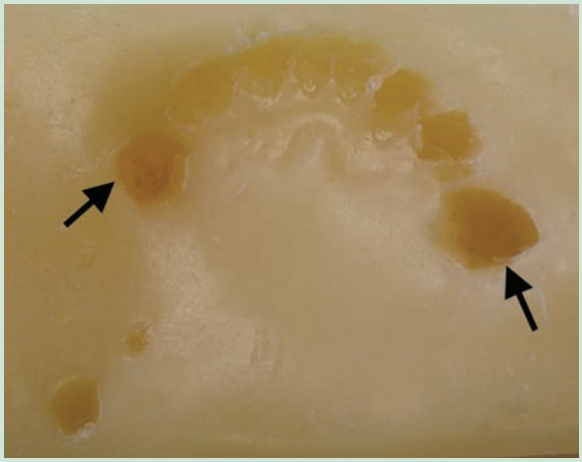
ovariohysterectomy, a forced-air warming blanket[h] was also placed over the patient to continue to maintain thermal support. The eyes were lubricated with artificial tears[i].

The patient was placed in dorsal recumbancy and a routine ovariohysterectomy was performed. The patient was transferred under anesthesia to the dental table and a full intra-oral examination was performed and documented. There was no gingivitis or plaque accumulation. All permanent teeth were present and no deciduous teeth were identified. Intraoral dental radiographs using a #2 digital sensor[j] were taken of the apices of all the canine teeth (Fig. 3). All four canine teeth were confirmed to have open apices and wide, thin-walled canals consistent with the age of the dog.[8]

Impressions of the full dentition were taken using alginate[k] in veterinary impression trays fitted to the size of the maxilla and mandible following the manufacturer's instructions. The impression trays were measured to allow approximately 2-3

Figure 4

Photograph showing the bite wax registration that was taken at the time of the impressions in a 6-month-old Labrador retriever dog with linguoverted mandibular canine teeth. Note the discrepancy of the mandibular canine teeth (arrows).



mm of alginate between the tray and the teeth in order to minimize distortion of the dental structures in the impression material.[9] The impressions were closely examined for bubbles, voids, and flaws that would interfere with evaluation of dental structures.[5] The alginate impressions were then wrapped in moist paper towels to keep them moist until they could be poured into stone to prevent desiccation and distortion of the impressions.[4] The patient was moved into sternal recumbency and quickly extubated. A bite registration was taken using yellow bite wax[l] and the patient was re-intubated for anesthetic recovery (Fig. 4).

The oral cavity was thoroughly rinsed with distilled water and inspected for foreign bodies prior to extubation and recovery. The isoflurane was discontinued, and the patient was maintained on oxygen at 1.0 L/min for 5-minutes. The patient recovered rapidly and uneventfully from the anesthetic and was discharged that evening with carprofen[m] (2 mg/kg BID PO X 5-days) for postoperative analgesia from the ovario-hysterectomy.

After the patient had recovered from anesthesia, the alginate impressions were gently rinsed with distilled water. The alginate impressions were wrapped in boxing wax to create a smooth shape, and poured into stone models using Type IV dental stone on a vibrator[n] according to manufacturer's instructions.[9] The alginate was cut into small pieces to facilitate removal without damage to the dental and oral structures.[9] The stone models were closely evaluated for defects that would interfere with production of the cast metal inclined plane (Fig. 5). The stone models of the maxilla and mandible, as well as the bite registration were submitted to a dental laboratory familiar with veterinary orthodontics for fabrication of a cast metal bilateral telescoping inclined plane.

The patient was presented 2-weeks later for evaluation of the malocclusion and cementation of the fixed orthodontic

Figure 5

Photographs showing stone models of the maxilla (A) and mandible (B) used to fabricate the cast metal bilateral telescoping inclined plane in a 6-month-old Labrador retriever dog with linguoverted mandibular canine teeth. The fractured left maxillary canine tooth (204) occurred during return shipment from the laboratory and did not affect the formation of the inclined plane.

Figure 6

Photographs showing the occlusion prior to cementation of the cast metal bilateral telescoping inclined plane in a 6-month-old Labrador retriever dog with linguoverted mandibular canine teeth. The left mandibular canine tooth (304) is appropriately positioned in the diastema but is embedded in the gingiva (A). A growth surge of the right mandible allowed the right mandibular canine tooth (404) to move into a nearly appropriate position in the diastema (B). The palatal view shows bruised indentations (arrows) in the gingiva between the maxillary third incisor and canine teeth secondary to trauma from the mandibular canine teeth (C).

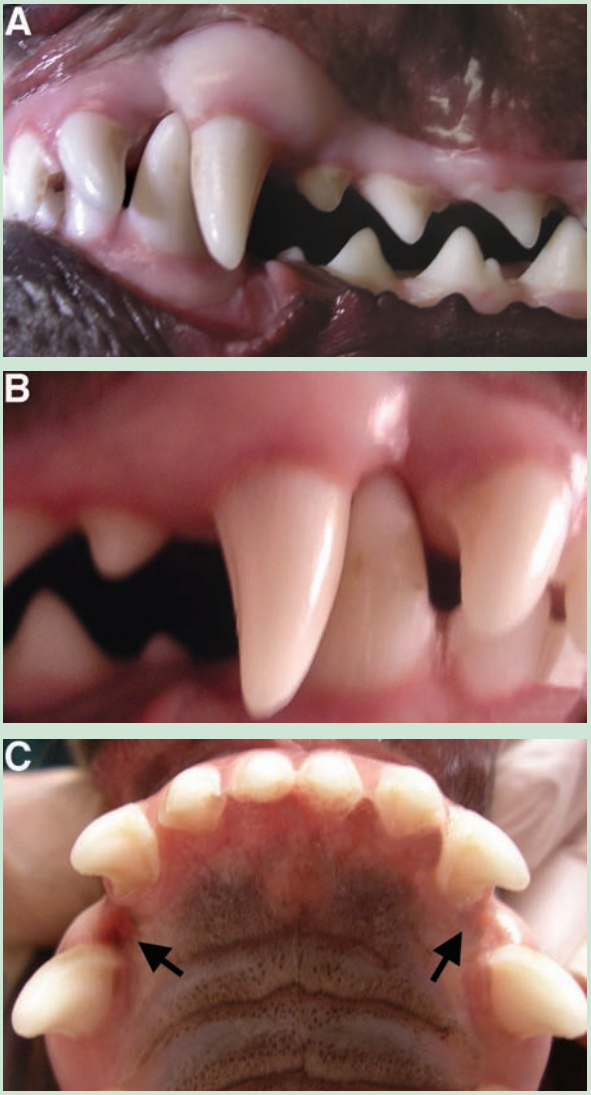
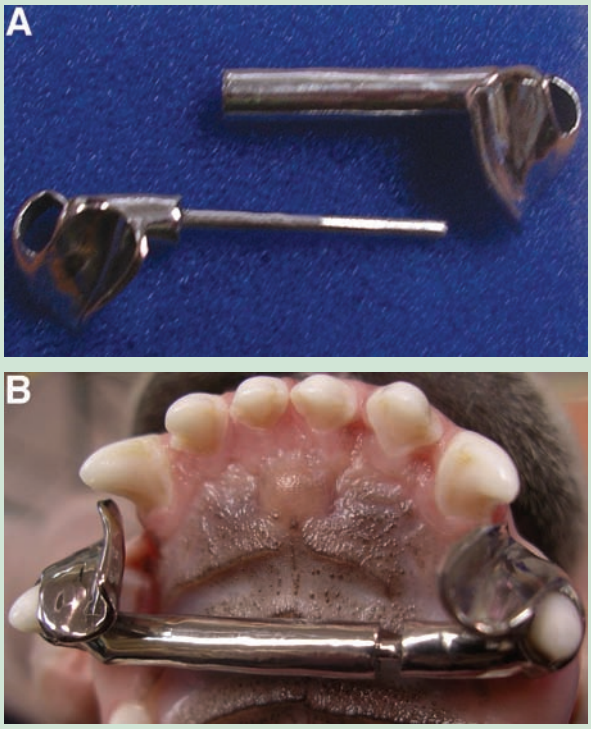


Figure 7

Photographs showing the cast metal bilateral telescoping inclined plane prior to cementation in a 6-month-old Labrador retriever dog with linguoverted mandibular canine teeth (A). The telescoping piece allows for unrestricted lateral growth of the maxilla while the appliance is in place. The palatal view shows the cast metal bilateral telescoping inclined plane in place on the maxillary canine teeth prior to cementation (B).



appliance. On conscious oral examination, 304 and 404 were in proper alignment with the interdental space but abnormally contacting the gingiva (Fig. 6). The malocclusion was confirmed to be a class I malocclusion with linguoverted mandibular canine teeth, and placement of the cast metal bilateral telescoping inclined plane was considered appropriate.

An indwelling intravenous catheter[c] was placed aseptically into a cephalic vein and the patient was sedated with butorphanol[o] (0.2 mg/kg IV) and medetomidine[p] (0.008 mg/kg IV). Blow-by oxygen therapy was provided at 3.0 L/min. A complete intraoral examination was performed and documented. Mild bruising and indentation of the gingiva in the interdental space between the maxillary third incisor and canine teeth was identified from contact with 304 and 404 (Fig. 6).

The cast metal telescoping inclined plane was evaluated for defects or irregularities and loosely placed on the maxillary canine teeth to ensure a good fit (Fig. 7). The mouth was closed and the occlusion was evaluated (Fig. 8). The mandibular canine teeth were confirmed to contact the inclined plane properly based on the laboratory's appropriate design with a sloping angle of approximately 60°.[4]

The maxillary canine teeth were polished with fine flour pumice on a low-speed hand piece to remove any plaque or saliva. The maxillary canine teeth were then etched with a 37 % phosphoric acid gel[q] for 15-seconds. The etchant was rinsed off with distilled water for 45- seconds, and a gauze sponge was used around the maxillary teeth to protect the soft tissues from the phosphoric acid. The teeth were gently dried with moisture and oil-free air until a chalky appearance was noted. A light-cured resin modified glass ionomer adhesive[r] was placed on the inside of the bands of the cast metal appliance. The appliance was then gently placed over the crowns of the maxillary canine teeth and pushed apically, ensuring

Figure 8

Photographs showing occlusal views of the cast metal bilateral telescoping inclined plane following trial fit in a 6-month-old Labrador retriever dog with linguoverted mandibular canine teeth. The left (A) and right (B) mandibular canine teeth are in contact with the ramps. The ramps will guide the teeth labially into proper position as the dog chews and the mouth is closed. The mouth is unable to fully close until the mandibular teeth have tipped labially into the proper position (C).

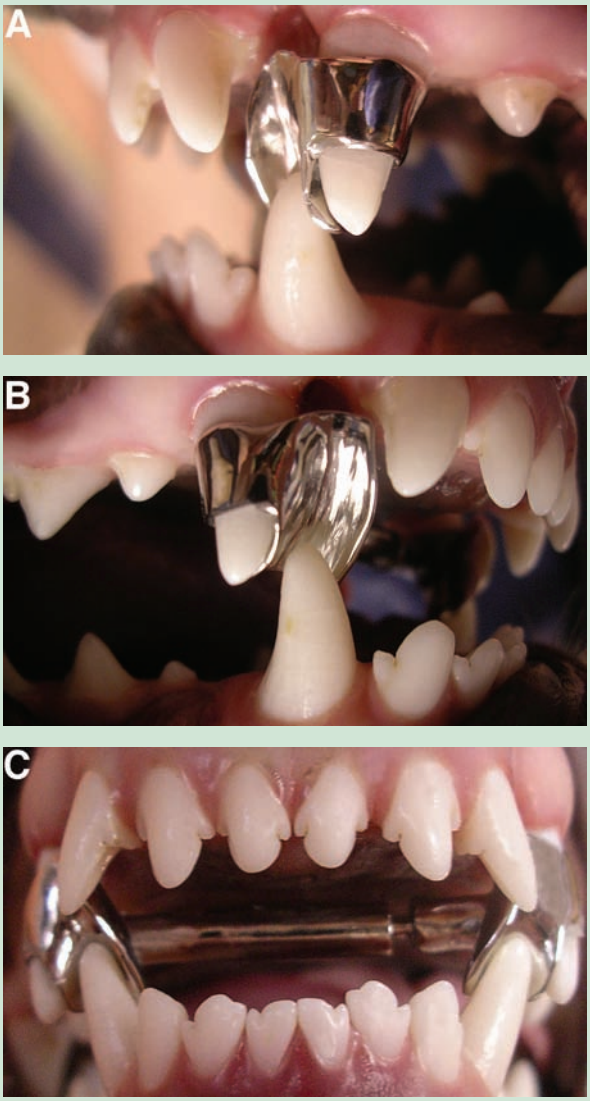
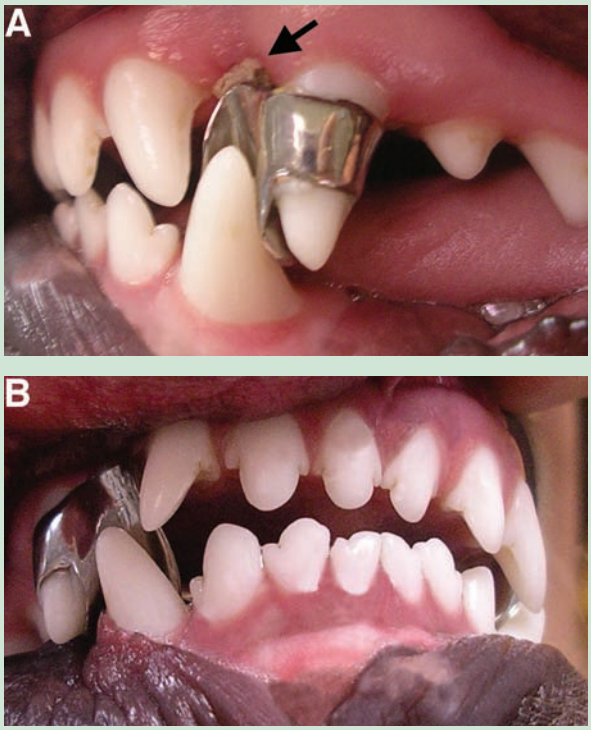


Figure 9

Photographs showing occlusal views of the cast metal bilateral telescoping inclined plane 1-week following cementation in a 6-month-old Labrador retriever dog with linguoverted mandibular canine teeth. Left (A) and right/oblique (B) occlusal views show improved closure of the mouth indicating expected progression of the tipping of the mandibular canine teeth. A small amount of food debris is present (arrow) between the appliance and the gingiva.



a proper fit. The margins of the appliance were treated with a quartz-tungsten halogen light cure lamp for 20-seconds on each surface according to manufacturer instructions.

The oral cavity was thoroughly inspected for foreign bodies prior to recovery. The dog was given atipamezole[s] (0.04 mg/kg IM) to reverse the effects of the medetomidine and was monitored closely until she was able to ambulate without assistance. She was released to the owner the same day. The owner was instructed to feed softened food only and to avoid oral play while the appliance was in place. A 0.12 % chlorhexidine rinse[t] was dispensed for daily use to flush food and debris from around the appliance.[10] The owner was also instructed to return for evaluation of the occlusion weekly. Phone consultation the following day indicated that the patient was doing well and eating normally.

A follow-up evaluation at 1-week found the patient to be bright, alert and in good body condition. The owner reported that the dog was eating well and did not show any adverse effects from the appliance. On conscious oral examination, the appliance was in place with no visible damage. A small amount of food debris was noted under the appliance on the left side, but the right side was clean. The teeth were beginning to tip into the appropriate position, and the mouth was closing significantly more than the starting position (Fig. 9).

An examination in 1-week was recommended with possible removal of the appliance at that time. Typically with orthodontic movement, the appliance should be left in place as a retainer for at least as long as it was required to move the teeth.[1] In this case, the diastema between the maxillary third incisor and canine teeth would act as a natural retainer. The patient returned 12-days later for an examination and removal of the appliance. The patient was in good body condition, weighed 25.3 kg, and the general physical examination was unchanged. The owner had been rinsing the mouth

Figure 10

Photographs showing occlusal views of the cast metal bilateral telescoping inclined plane 3-weeks following cementation in a 6-month-old Labrador retriever dog with linguoverted mandibular canine teeth. The left (A) and right (B) sides of the mouth are in full occlusion with nearly complete closure of the mouth allowing removal of the appliance. The diastema will act as a natural retainer.

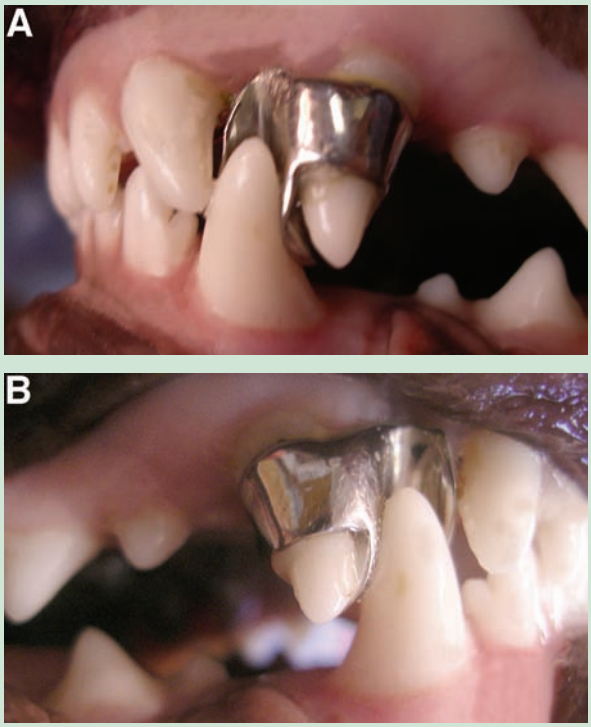
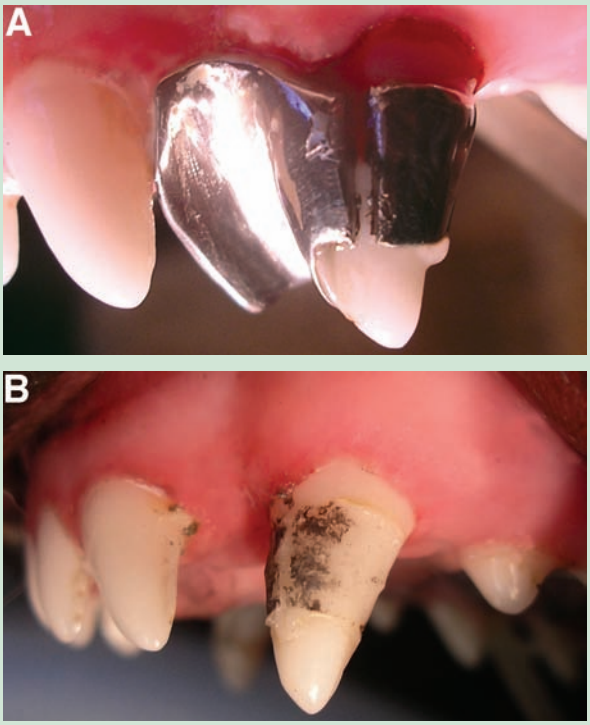


Figure 11

Photographs showing the left maxillary canine tooth (204) and the cast metal bilateral telescoping inclined plane at appliance removal in a 7-month-old Labrador retriever dog with linguoverted mandibular canine teeth. The appliance was cut with a #557 dental bur to facilitate removal (A). Care was taken not to damage the enamel. Band-removing pliers were used to bend the cast metal after the band was cut. The metal-stained glass ionomer adhesive can be seen adhered to the tooth (B).



daily with the oral rinse. On oral examination, mild plaque buildup had occurred around the appliance, but no gingivitis or food debris was noted (Fig. 10).

The dog was pre-medicated, induced, intubated, and maintained on general anesthesia as described previously. The patient was placed in dorsal recumbancy, and a detailed intraoral examination was performed and documented. The appliance was removed by cutting the cast metal band around the canine tooth in a coronal-apical direction with #557 dental bur on a water-cooled, high-speed handpiece. Care was taken not to damage the enamel with the dental bur. The palatal telescoping bar was also completely transected with a #557 dental bur to separate the appliance into two pieces. The bands were then bent away from the tooth and slightly rotated using band-removing pliers. The gentle rotation released the attachment from the glass ionomer adhesive and allowed removal of the band (Fig. 11). The remaining adhesive was then removed from the teeth using an ultrasonic scaler and hand scaling instruments. Mild gingivitis was noted in the diastema but was expected to resolve without treatment (Fig.12). A complete ultrasonic scaling and polishing with fine flour pumice was performed. A 1.23 % acidulated phosphate fluoride foam[u] was applied to all tooth surfaces. The patient recovered from anesthesia without complication. The owner was instructed to continue the oral hygiene rinse and to start daily tooth brushing after 1-week.

The patient presented 13-months later for evaluation. The owners reported that the dog was doing well, and they had been brushing the dog's teeth once or twice weekly. A detailed oral examination was performed and documented. The mandibular canine teeth were confirmed to be fully erupted and in the correct position in the diastema between the maxillary third incisor and the canine teeth (Fig. 13). The incisor relationship was normal, and no malocclusion was identified. Radiographs were obtained of the mandibular and maxillary canine teeth (Fig. 14). All teeth were determined to be vital with a normal periodontal ligament space and closed apices with appropriate dentin production for the age of the patient.[8] No evidence of root resorption, ankylosis, or periapical pathology was noted. Mild plaque build-up and gingivitis were noted, but a complete ultrasonic scaling and polishing treatment was declined. The owner was instructed to start daily tooth brushing and to return the patient in 3 to 6-months for a professional teeth cleaning procedure.

Discussion

Malocclusions of the mandibular canine teeth are common in the canine patient.[1] Linguoverted mandibular canine teeth are also

Figure 12

Photographs showing rostral views of the left (A) and right (B) sides of the maxilla following removal of the inclined plane and adhesive in a 7-month-old Labrador retriever dog with linguoverted mandibular canine teeth. Moderate focal contact gingivitis can be seen where the appliance was in contact with the gingiva. This is expected to resolve without treatment.

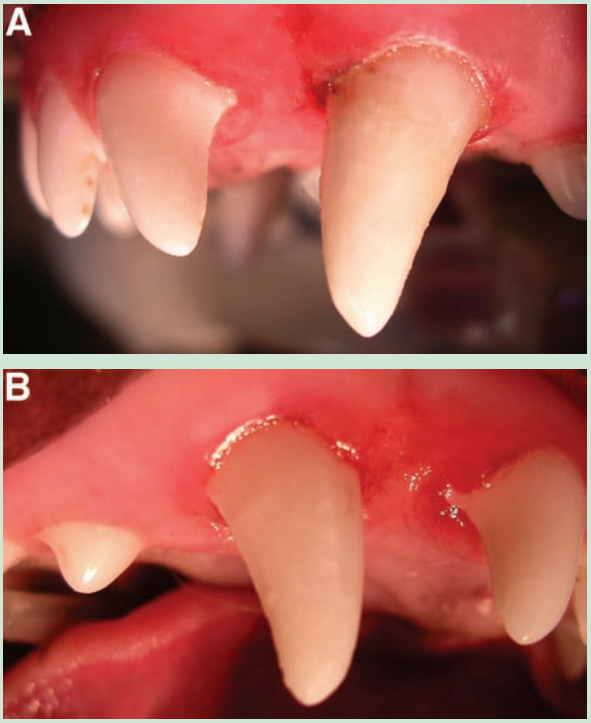
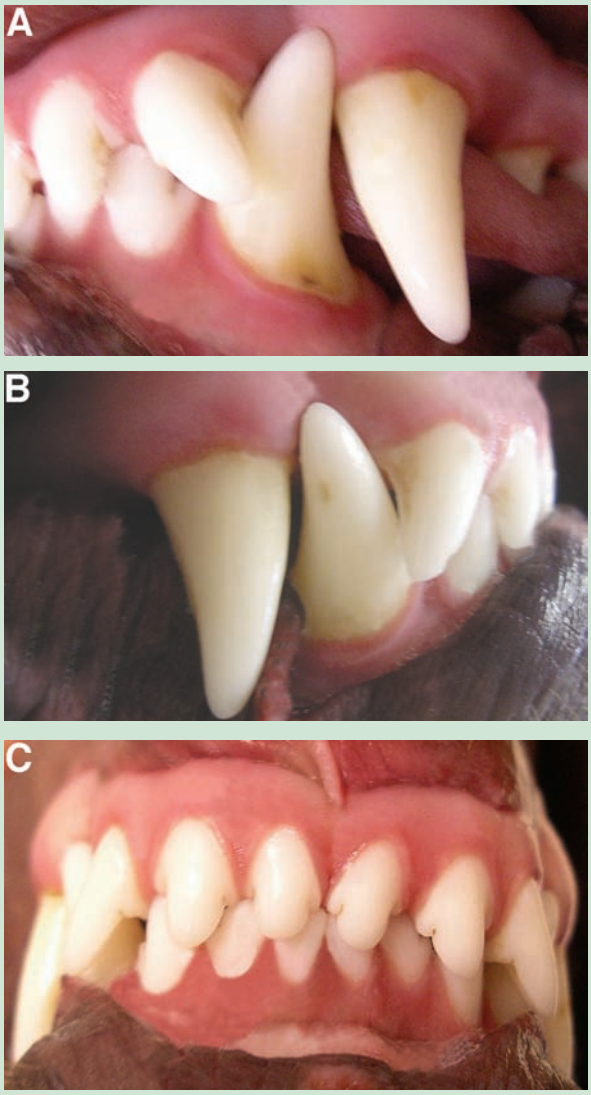


Figure 13

Photographs (A and B) showing views of the occlusion 13-months following orthodontic treatment with a cast metal bilateral telescoping inclined plane for linguoverted mandibular canine teeth in a Labrador retriever dog. Mild plaque accumulation and gingivitis are noted. The teeth are fully erupted, in normal position, with no malocclusion identified. The labial view (C) shows a normal scissors bite (Class 0 occlusion).



known as base narrow, lingually inclined, or lingually displaced.[1-5,10-12] However, linguoverted is the preferred terminology in this case because the apex of the tooth is in the proper location and the crown of the tooth is oriented abnormally toward the tongue.[4] In a lingually displaced tooth, the entire tooth would be malpositioned in the direction of the tongue. Common causes of linguoverted and lingually displaced mandibular canine teeth include retention of the deciduous tooth causing an abnormal eruption location, malpositioned tooth buds, trauma to the tooth bud or tooth during eruption, brachygnathic mandible, and an excessively wide maxilla compared to the mandible (excessive anisognathism).[11]

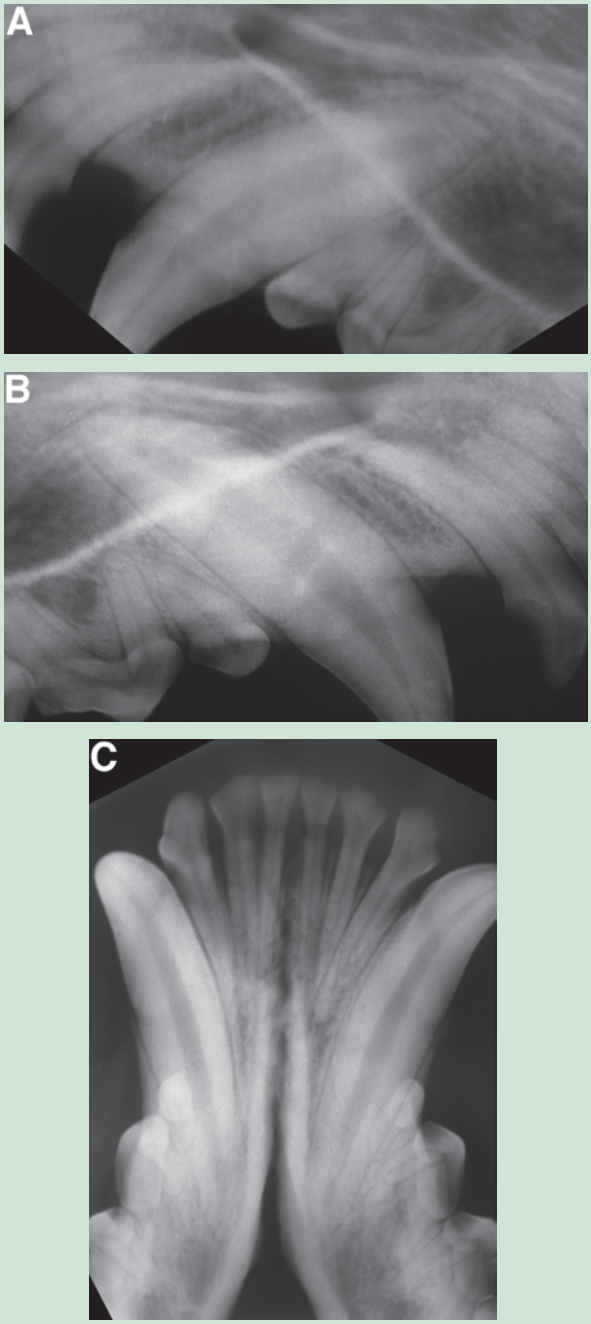
Left untreated, malocclusions can cause serious complications. Some of the possible sequela to untreated malocclusions include difficulty with mastication, temporomandibular joint dysfunction, caries formation, periodontal disease, abnormal dental or facial growth and development, soft tissue trauma, oronasal fistula formation, traumatic dental fractures, dental attrition and behavior issues such as an irritable temperament or head-shyness.[4,5]

Treatment of malocclusions in veterinary patients involves ethical considerations. Although there are no genetic studies available, it is widely believed that many malocclusions are genetic and heritable in origin.[1,4,5,10-12] Therefore, correction of a potentially heritable malocclusion in a show or breeding animal could lead to fraudulent representation. There are many discussions about the ethics of performing orthodontic correction in a show or breeding animal. These revolve around whether it is the responsibility of the veterinarian to require sterilization prior to treatment or the owner to inform the appropriate parties that orthodontic intervention was needed.[4,5,12] In this situation, the owner was informed of the potential heritability of the condition and an ovariohysterectomy was performed. The ovariohysterectomy was performed at the same time as the dental impressions to minimize anesthetic episodes.

Malocclusions in small animal patients are classified into 5 types, based on a modified human malocclusion system.[4] Class 0 is

Figure 14

Intraoral dental radiographs (A, B, and C) taken 13-months following orthodontic treatment with a cast metal bilateral telescoping inclined plane for linguoverted mandibular canine teeth in a Labrador retriever dog. Normal apical closure and dentin development can be seen, consistent with the age of the dog. The coronal aspect of the left mandibular canine tooth (204) had a normal radiographic appearance on a subsequent re-take radiograph.



a normal occlusion for the breed. This can include breed-specific malocclusions, such as in boxers or bulldogs.[4] A Class I malocclusion has normal jaw lengths and the teeth are in their proper mesiodistal location. However, individual teeth may have abnormal positioning in a faciolingual direction, such as rotated teeth, linguoverted mandibular canine teeth, and anterior or posterior cross-bites.[4] Class II malocclusions are classified as either a short mandible or a long maxilla, which causes the mandibular teeth to be distal to their maxillary counterparts.[4] A Class III malocclusion is the reverse of a Class II, such that the maxillary teeth are distal to their mandibular counterparts, usually caused by a short maxilla or a long mandible.[4] This is considered a breed standard in some breeds, such as boxers, bulldogs, and shih tzus. Class IV malocclusions are an unusual form of wry bite.[4]

In the case presented here, the initial examination performed when the dog was 6-months-old indicated bilaterally short mandibles and a Class II malocclusion. During the 3-weeks between the initial examination and the scheduled dental impressions, the left mandible experienced a growth surge which allowed 304 to be correctly centered in the diastema. At the time of the impressions, the right mandible remained short and 404 was distal to the diastema. At the time of cementation 2-weeks later, a growth surge had also occurred in the right mandible and 404 was also correctly centered in the diastema. Because the mandibles grow independently and develop later than the maxilla, this is not an unusual occurrence.[4,13] However, to the authors' knowledge, it has not been documented in this age patient. Without intervention, the mandible developed a normal occlusion except for the linguoverted, or base narrow, mandibular canine teeth. This case highlights the rationale for later intervention whenever possible. In the early examinations, the mandibular canine teeth were directly palatal to the maxillary canine teeth and there was significant concern that orthodontic movement would not be appropriate in this patient.

Treatment of linguoverted or lingually displaced mandibular canine teeth consists of removing the traumatic interlock between the crown of the mandibular canine tooth and the maxilla. Treatment can be accomplished by exodontia of the mandibular canine tooth, crown reduction and vital pulp therapy, or orthodontic movement of the offending tooth or teeth using a fixed or removable orthodontic device.

Exodontia of the mandibular canine is a definitive treatment that requires only one anesthetic. However, this is rarely recommended because extraction of this large tooth can be traumatic, disfiguring, and can lead to serious complications including mandibular fracture, osteomyelitis, hemorrhage, dry socket, trauma to the nearby structures, loss of function including defense, and tongue lolling.[1,12]

Crown reduction with vital pulp therapy is also a definitive treatment that only requires a single treatment episode.[4,5,12,14] This technique has the advantage that the entire root and some of the crown is retained. Therefore, trauma to the mandible and supporting structures is minimal and support of the tongue is not affected. However, some of the function of the tooth is lost due to the reduction of crown height. In this case, total pulpectomy would not have been an option without apexification because of the open apices.[15] With partial pulpectomy, or vital pulp therapy, there is a risk of pulp death due to infection from trauma, restoration leakage or loss, and long-term radiographic follow-up is essential.[2,14,15] In this

patient, crown reduction and vital pulp therapy was considered at the initial examination. There were concerns that orthodontic movement would not be a viable option due to the mandibular brachygnathism. However, as the patient aged and mandibular length increased, orthodontic movement became the recommended treatment.

Based on the oral examination, evaluation of the occlusion, dentition and radiographic findings, orthodontic movement of the linguoverted mandibular canine teeth was recommended using a fixed orthodontic appliance. Tooth movement using a removable orthodontic appliance, such as ball therapy, was not considered because of the need to move 404 in a mesial and labial direction.[3] Fixed orthodontic appliances used for linguoverted mandibular canine teeth include acrylic inclined planes, cast metal telescoping inclined planes, expansion screws, and "W"-wire.[1,2,5]

There are two theories which have been proposed to explain the orthodontic movement of teeth. One theory, the biologic electricity theory, proposes that electricity is produced by the deformation of bone, collagen and fibrous proteins. This electricity is known to affect cellular activity, and may have an effect on bone resorption and production.[16,17] The other theory for tooth movement is the pressure-tension theory. This theory states that as force is applied to a tooth, compression occurs on the periodontal ligament (PDL) in the direction of the force and stretching of the PDL occurs on the opposite side. Remodeling of the bone in response to the pressure is known as "frontal resorption". If the force is too great, necrosis of the PDL occurs which causes "undermining resorption". This process delays tooth movement and can cause ankylosis, resorption, and pain.[16,17]

In orthodontic movement of linguoverted mandibular canine teeth, a tipping motion is needed to shift the position of the coronal tip of the tooth without significant movement of the tooth apex. Tipping involves light forces to move one part of the tooth more than another part, such that the angle of the tooth changes and it tips within the alveolus.[5] This causes the tooth to rotate around its "center of resistance", which is a point about halfway down the root of the tooth.[1,5] Inclined planes provide a light, guided tipping force that is adjusted by the dog and forces applied during mouth closure. This intermittent force minimizes the pain associated with orthodontic movement since the dog "self-regulates" the discomfort on the periodontal tissues.[4,5]

A cast metal telescoping inclined plane was chosen for this patient because of a proven history of effectiveness and ease of use and application.[1,2,4,5] Inclined planes can be fabricated directly on the patient using acrylic, or can be fabricated at a laboratory using cast metal. In this patient, application of an acrylic inclined plane was not considered optimal. The occlusion of 104 with 404 required slight distal movement of 104 as well as mesial movement of 404 in order to tip 404 into the interdental space between the maxillary right third incisor (103) and 104. Because the acrylic inclined plane is placed directly on the teeth, inclusion of other teeth such as the maxillary third incisor and the maxillary first premolar teeth are typically required to form the ramp. This would have prevented distal movement of 104 to accommodate 404, and would have required excessive mesial movement of 404 to fit correctly into the diastema. The cast metal telescoping inclined plane is only attached to the maxillary canine teeth, so it allows for slight distal tipping of the maxillary canine tooth from contact with the mandibular canine tooth.[5]

[a] Morphine sulfate injection, Baxter Healthcare Corp., Deerfield, IL
[b] Acepromazine maleate, Boehringer Ingelheim Vetmedica, St. Joseph, MO
[c] Terumo Surflo intravenous catheter, Terumo Medical Corp., Toyko, Japan
[d] Propoflo, Abbott Laboratories, North Chicago, IL
[e] Isoflo, Abbott Laboratories, North Chicago, IL
[f] Lactated Ringers Solution, Abbott Laboratories, North Chicago, IL
[g] Gaymar, Gaymar Industries, Orchard Park, NY
[h] Bair Hugger, Arizant Inc., Eden Prairie, MN
[i] Artificial Tears Drops, Darby Group Companies, Inc. Westbury, NY
[j] Bio-Ray Digital, Sigma Biomedics Inc., Prospect Heights, IL
[k] Alginate Type II Dustless Regular Set, Henry Schein, Melville, NY
[l] Yellow Bite Wax Registration Material, Corning Waxes, Inc., Ronkonkoma, NY
[m] Rimadyl, Pfizer Animal Health, Exton, PA
[n] Henry Schein Model Vibrator, Henry Schein, Melville, NY
[o] Torbugesic, Fort Dodge Pharmaceutical, Fort Dodge, IA
[p] Domitor, Pfizer Animal Health, Exton, PA
[q] Etch-37™, Bisco Inc., Schaumburg, IL
[r] GC Fuji Ortho LC, GC Corporation, Alsip, IL
[s] Antisedan, Pfizer Animal Health, Exton, PA
[t] C.E.T. Oral Hygiene Rinse, Virbac Animal Health, Fort Worth, TX
[u] FluraFom, Virbac Animal Health, Fort Worth, TX

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