

Base narrow (linguoverted) canine teeth: What is it and how do I treat it?

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Linguoversion of the mandibular canine tooth/teeth or “base narrow” mandibular canines is where one or both of the lower canines is lingually displaced (displaced towards the tongue) from their normal position in the dental arch. The displaced tooth or teeth can cause anything from indentations into the mucosa up to severe ulceration and trauma to the hard palate (see images). The displaced teeth can also cause accelerated periodontal disease to the maxillary (upper) canine or incisor teeth. The trauma to the hard palate caused by these malpositioned lower canine teeth is not only painful to the pet (leading to head shyness or eating difficulties) but also can lead to an eventual communication or hole into the nasal cavity (oronasal fistula), which can be difficult to treat.

It is a common malocclusion seen in many breeds of dogs, both in puppies and young immature dogs. It can occasionally occur in cats. Certain breeds may be more predisposed to the condition including Poodles and Poodle crosses (Cavoodle, Labradoodle etc.), as well as Labrador and Staffordshire bull terrier breeds. It is also can be common in long nosed (dolichocephalic) head types, such as the Hungarian Vizsla or Weimaraner breeds.

Adverse dental interlock: This is where a base narrow condition exists in the young puppy. It is usually due to abnormal bite (malocclusion) and is considered of genetic origin. During growth and development in puppies, the lower jaw (mandible) and the upper jaw (maxilla) grow independently of each other. However, if the puppy has a class II malocclusion, the “locking” of the maxilla and the mandible by mainly the baby (deciduous) lower canine teeth can occur. This is termed adverse dental interlock. The careful extraction of these deciduous teeth may lessen or prevent the base narrow condition from developing when the canine teeth start to erupt between the 5th and 6th month of life (interceptive orthodontics).

Interceptive orthodontic treatment does not stimulate growth of the jaws, but rather removes any interference to jaw growth, and allows the locked jaw to catch up in growth and reach its full genetic potential. Unfortunately, with an underlying genetic problem, the affected jaw (skeletal base) may still lead to “base narrow” condition when the permanent teeth start to erupt.

Apart from a true skeletal base malocclusion, sometimes dental malocclusions caused by either retained deciduous teeth or malpositioned teeth (i.e., upper third incisor reducing the diastema space between it and the upper canine tooth) can also lead to this “base narrow” condition.

Treatment options in order of increasing complexity/long term management

1. *Rubber ball therapy*
2. *Gingival/bony wedge resection*
3. *Deciduous and or permanent canine tooth extraction*
4. *Crown extensions*
5. *Fixed orthodontic appliance*
6. *Vital pulpotomy*

1. Rubber ball therapy

This is where a FIRM rubber ball is used to apply an intermittent force to the permanent mandibular canine teeth to move them labially. The proviso is that the mandibular canine teeth have to be in favourable positions (mild Class II malocclusion) so as to move them labially (laterally) without any obstruction (usually the obstruction is from the maxillary canine tooth or maxillary third incisor tooth). One study¹ showed that having young dogs with lingually displaced mandibular canine teeth, hold an appropriately sized rubber device (*e.g.*, a hard rubber chew ball, but not a tennis ball) in their mouths, for a minimum of 15 minutes three times a day may correct mild forms of this malocclusion. The ball acts like an inclined plane, causing tipping forces to be placed on the affected teeth every time the dog bites down on the ball. This method is simple because no anaesthesia is required, and the costs involved include the owner's time and purchasing a rubber ball of suitable size (so as to not cause an obstruction or be swallowed). However, in human orthodontic treatment, forces usually need to be applied to a tooth or teeth for several hours per day to prevent rebound of the tooth back to its original position. I rarely consider this removable orthodontic appliance technique unless the owner has financial constraints and wants to try it. However, please remember, that this treatment option can delay the delivery of more predictable treatments.

2. Gingival bony wedge resection

In mild cases, a small wedge of gingival tissue and/or alveolar bone is removed from the upper jaw between the maxillary third incisor and the maxillary canine tooth. The permanent lower "base narrow" canine teeth have to be in a favourable position for this procedure to work. This procedure is relatively simple and requires usually only one general anaesthetic.

3. Deciduous and or permanent canine tooth extraction

If the base narrow condition is diagnosed at an early age (ideally less than 10 weeks of age), sometimes the extraction of the deciduous lower canine teeth (and lower incisors if necessary) MAY prevent "base narrow" condition, when the permanent canines start to erupt (interceptive orthodontic treatment). The term "adverse dental interlock" is used to describe this base narrow condition in puppies. As mentioned before, because base narrow condition usually occurs due to a skeletal base mismatch, extracting the deciduous canines often does not alter the base narrow condition in the permanent dentition (Clients need to know this). However, it may, in a small percentage of mild cases, prevent base narrow condition occurring in the permanent dentition or may sometimes minimise the traumatic consequences of it. However, whether the deciduous canines are extracted with a simple or surgical approach, there is a real risk of damaging the crown of the permanent mandibular canine tooth (owners also need to be made aware of this). The damage to the crown usually manifests as an indentation or defect in the enamel covering the crown of the permanent canine tooth, known as localised enamel hypoplasia.

The extraction of permanent mandibular canine teeth, in young dogs can be challenging. Usually, the roots of these immature canine teeth are very thin walled and prone to fracture. The careful use of luxators can assist in the extraction of the "base narrow" mandibular canine tooth.

Retained (persistent) deciduous canine teeth When the permanent canines start to erupt at around 5 months of age, the extraction of any persistent deciduous canine tooth or teeth, or the extraction of a malpositioned or crowded tooth (*i.e.*, upper third incisor tooth), may be enough in the young animal to prevent or successfully treat "base narrow" condition.

4. Temporary crown extensions (see images below)

Another method used to treat mild cases of linguoversion of the lower canine teeth is the so-called crown extensions. The extensions are often made with coloured composite resin material that covers the erupting permanent canine tooth. The linguoverted canine tooth needs to be in either the diastema between the upper 3rd incisor tooth and the upper canine tooth (mild class II malocclusion) or between the upper canine tooth and the upper first premolar tooth (severe class II malocclusion). The procedure involves building up the height and changing the shape of the mandibular canine tooth with composite resins. This build up allows orthodontic or tipping forces to act on the tooth when the dog closes its mouth causing a tipping of the canine tooth into a more labial position. When the canine tooth is in its correct position, the composite built up crown tip can be removed, but only after a period of retention to prevent the teeth rebounding lingually. This procedure is best performed when the puppy is still around the 6-7 months of age. Usually, two general anaesthetics are required for temporary crown extensions.

5. Fixed orthodontic appliance

Involves the manufacture of a fixed incline plane made of either acrylic or metal. These appliances act as a ramp to position the mandibular canine teeth into a better, non- traumatic position. The incline plane can be manufactured directly in the mouth usually with crown and bridge acrylics. The teeth are etched with 37% phosphoric acid, the acid is rinsed off and then a bonding agent is applied (this step may not be necessary). The self-curing (chemically cured) acrylic is then applied to the teeth (usually the maxillary canine and incisor teeth) in increments. An incline plane is formed with an acrylic bur in a straight handpiece. Usually, the endotracheal tube is required to be removed a number of times until the shape and angulation of the incline plane allows for the mandibular canine tooth to be moved into a labial position (sometimes it may also be needed to move the tooth more mesially or rostrally). The incline plane can also be fabricated in a dental laboratory from a laboratory stone model created from impressions of the dog's occlusion and cemented into place at a subsequent appointment. The only problem with this method is that once fabricated, the incline plane cannot be altered, or material added to it. The benefit of the manufactured incline plane is that it is stronger than direct acrylic incline planes and should be considered in those dogs with strong bites such as bull terrier breeds. Once installed, the inclined plane places tipping forces on the displaced canine tooth in a direction determined by the slope and direction of the fabricated incline. The correction usually occurs within four weeks, at which time the appliance can be carefully removed. Homecare with 0.12% chlorhexidine gluconate is imperative for good oral hygiene and to prevent mucositis.

Manufactured quad helix spring loaded orthodontic devices can also be made in a laboratory and cemented to the mandibular canine teeth, to apply a labial or lateral force to the mandibular canine teeth. This device is usually better accepted by the animal than maxillary devices, but both mandibular canines have to be base narrow and in an acceptable position so that there is no obstruction to the canine tooth movement.

Two or more general anaesthetics are required for this method of treatment.

6. Vital pulpotomy (partial pulpectomy)

Pulpotomy involves the surgical amputation of the coronal pulp when combined with a crown reduction procedure to correct the oral trauma from "base narrow" canines. The wounded surface of the amputated pulp is then treated with medicaments such as mineral trioxide aggregate (MTA);

the high PH of the product stimulates odontoblasts (which line the pulp). These stimulated odontoblasts lay down reparative dentine.

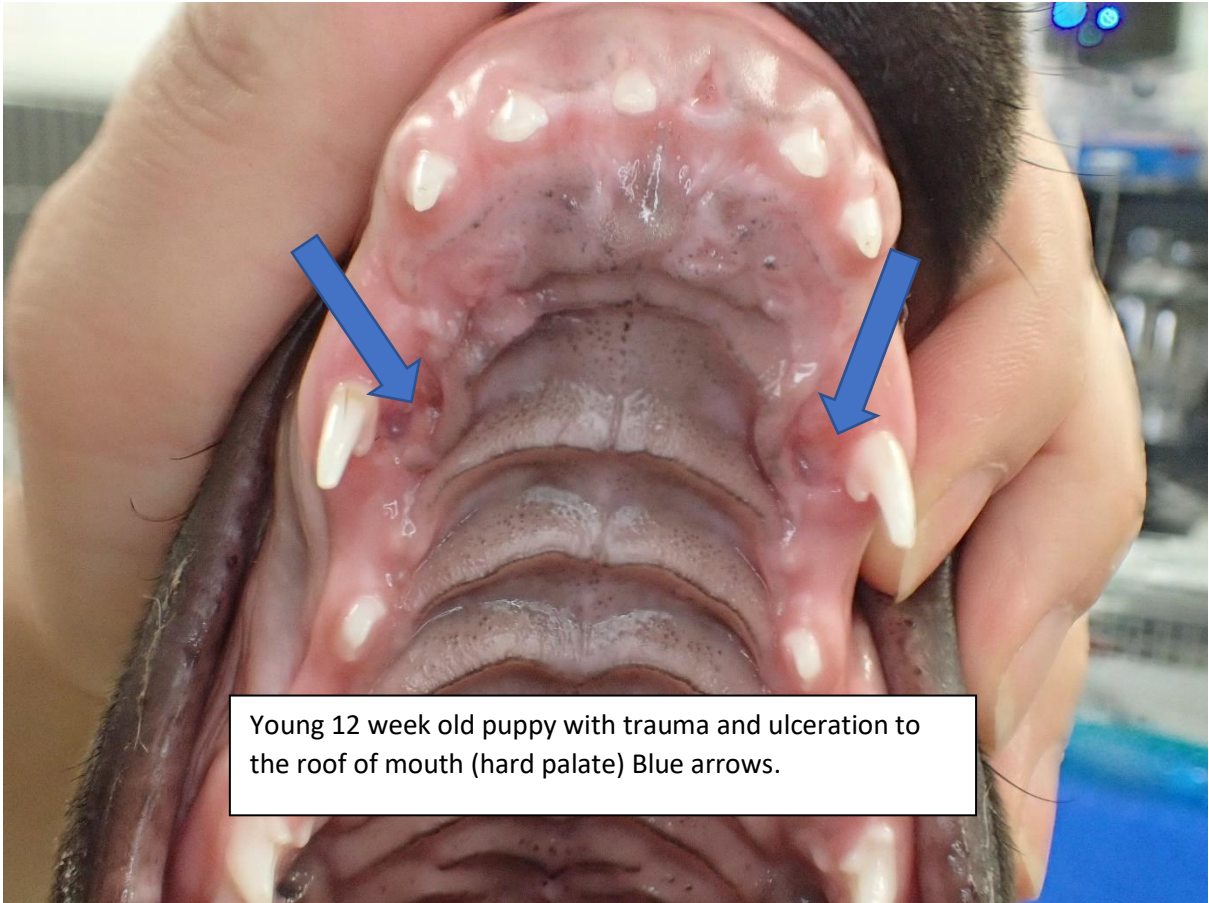
This layer allows the remaining pulp to maintain its vitality and allows for continuing maturation of the tooth and deposition of more dentine with strengthening of the tooth. This is important when dealing with young immature teeth.

It is also important to monitor the vitality and maturation of the treated tooth/teeth by taking dental radiographs between 6 to 9 months post- vital pulpotomy procedure, then ideally, once a year under general anaesthesia. If the tooth/teeth fail to mature, or there is an evidence of infection or restoratives failed, further treatment is required which may include root canal therapy or extraction of affected tooth.

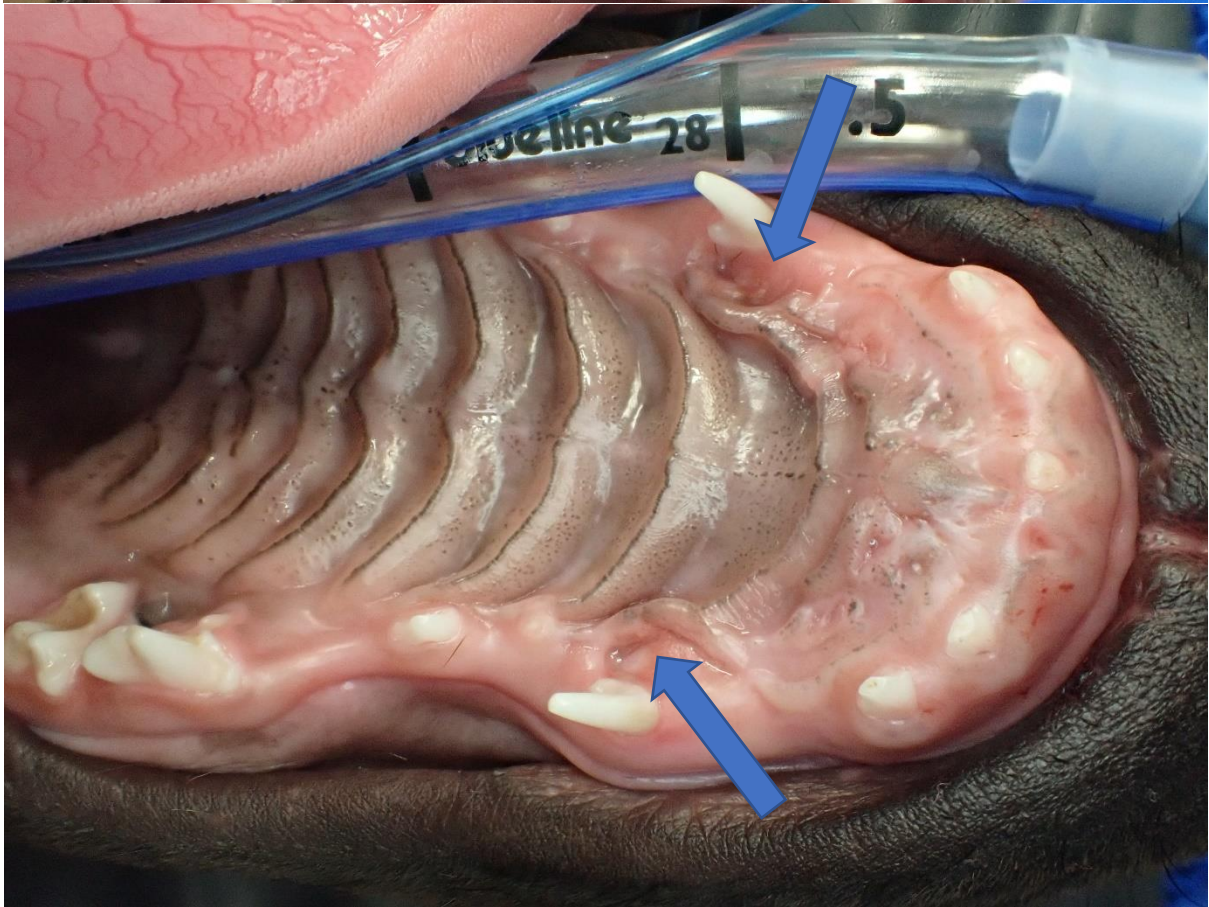
1. Verhaert, L (1999) *A removable orthodontic device for the treatment of lingually displaced mandibular canine teeth in young dogs.* J. Vet. Dent. 16 (2). 69-75

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Young 12 week old puppy with trauma and ulceration to the roof of mouth (hard palate) Blue arrows.



Severe trauma to the roof of the mouth (yellow arrows) due to base narrow lower canines in a standard poodle dog. The holes in the roof of the mouth nearly reached the nasal cavity





Young terrier dog with class II malocclusion and base narrow lower canine teeth

Temporary crown extensions (pink composite resin) placed on the lower canine teeth and after removal of crown extensions

