

Mandibular Canine Tooth Extraction in the Dog: Lingual Approach: Surgical Technique

Köpekte Mandibular Kanin Dişin Çekimi: Lingual Yaklaşım

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ABSTRACT Tooth extraction is the most common oral surgery performed in small animals. The mandibular canine tooth is one of the most difficult teeth to extract in the dog. Surgical techniques are generally required to extract canine teeth because they will often be less traumatic compared to non-surgical techniques. Proper extraction technique minimizes complications, reduces the time the procedure takes, and results in successful extraction with increased satisfaction. Specialized dental instruments are required to successfully perform surgical techniques. Surgical extraction of the mandibular canine tooth can be performed from a buccal or lingual approach. This article describes the lingual approach technique for the extraction of a mandibular canine tooth. The contraindications of the buccal approach technique and the complications associated with extraction of the mandibular canine tooth are also highlighted.

Key Words: Mandible; tooth extraction; dogs

ÖZET Diş çekimi küçük hayvanlarda en sık uygulanan ağız cerrahisi prosedürüdür. Mandibular kanin diş köpekte çekimi en zor olan dişlerden biridir. Cerrahi olmayan tekniklere kıyasla daha az travmatik olmaları nedeniyle kanin dişin çekimi genelde cerrahi teknikleri gerektirir. Uygun diş çekimi tekniği komplikasyonları asgariye indirir, prosedürün aldığı zamanı azaltır ve diş çekiminin başarılı ve tatminkâr olmasını sağlar. Cerrahi teknikleri başarıyla gerçekleştirebilmek için özel diş cerrahisi aletleri gerekir. Mandibular kanin dişin cerrahi çekimi bukkal veya lingual yaklaşımlarla gerçekleştirilebilir. Bu makalede, mandibular kanin dişin lingual yaklaşımla çekimi değerlendirilmiştir. Bukkal yaklaşımla diş çekiminin kontrendikasyonlarına ve mandibular kanin dişin çekimi ile ilişkili komplikasyonlara da değinilmiştir.

Anahtar Kelimeler: Mandibula; diş çekimi; köpekler

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The most commonly performed oral surgery in small animals is tooth extraction.¹ Some of the indications of tooth extraction include periodontal disease, caries, apical abscessation, traumatic malocclusion, tooth root fracture, tooth crown fracture and supernumerary teeth.² The mandibular canine tooth is one of the most difficult teeth to extract in the dog. Extracting a mandibular canine tooth is far from being a trial of strength. It requires a thorough knowledge of the anatomy of the structures in the region, acquaintance with the specialized instruments and techniques, and surgical experience. Surgical techniques are generally required to extract canine teeth affected by endodontic disease or causing malocclusion but are peri-

odontally disease-free. Surgical extractions are preferred because they will often be less traumatic compared to the rigorous use of the dental instruments in non-surgical techniques.³ Principles for surgical extraction include full-thickness mucoperiosteal flap elevation, removal of alveolar bone to partially expose the root, crown-root segment elevation, alveoloplasty to smooth rough bone edges, and suturing the flap over the alveolus.⁴ The specialized dental instruments essential in successful surgical extraction include a high-speed delivery unit, a high-speed handpiece, round or pear-shaped burs, a periosteal elevator, different size periodontal elevators, and an extraction forceps (Figure 1, and 2).⁵ Surgical extraction of the mandibular canine tooth can be performed from a buccal or lingual approach.⁶ In this article, the lingual approach technique for the extraction of a mandibular canine tooth with a complicated crown-root fracture (Figures 3 and 4) is described step-by-step.

Initially, two full-thickness incisions are made in the mucosa on the lingual aspect of the mandibular canine tooth using a #15 scalpel blade. First incision starts at the distal aspect of the canine tooth and extends distally towards the mesiolingual aspect of the mandibular first premolar tooth. The incision should be terminated several millimeters away from the mesiolingual aspect of the first premolar tooth.



FIGURE 1: A high-speed delivery unit equipped with a high-speed handpiece attachment, a slow-speed handpiece, a piezo scaler, and a 3-way air/water syringe.



FIGURE 2: Specialized dental instruments. A: Freer Periosteal Elevator, B: Fiberoptic High-Speed Handpiece, C: Various Dental Burs, D: Winged Periodontal Elevators, E: Extraction Forceps.



FIGURE 3: Complicated crown-root fracture of the left mandibular canine tooth in a dog. Buccal view.

The second incision starts at the lingual aspect of the canine tooth and extends lingually behind the mandibular incisors and ends at the level of the first incisor on the same side (Figure 5). A full-thickness mucoperiosteal flap based on the lingual aspect of the mandibular canine tooth is raised using an appropriate size and shape periosteal elevator, thereby partially exposing the alveolar bone over the root (Figure 6). Elevation of the flap must be performed carefully to avoid tearing of the flap. Lingual alveolar bone is removed using a high-speed handpiece and a round or pear-shaped bur (Figures 7, 8, 9). Removal of the bone from the distolingual wall of the canine tooth gives access to the root and facilitates elevation of the tooth. The remaining gingival attachment of the mandibular canine tooth is severed with a #15 scalpel blade. The blade of the periodon-



FIGURE 4: Complicated crown-root fracture of the left mandibular canine tooth in a dog. Coronal view. Note the exposed and necrotic pulp (black area) in the center of the fractured crown.



FIGURE 5: Full-thickness incisions are made in the mucosa distally and lingually to the mandibular canine tooth (yellow lines outline the incisions).



FIGURE 6: Full-thickness mucoperiosteal flap is elevated on the lingual aspect of the mandibular canine tooth exposing the alveolar bone on this side.



FIGURE 7: Lingual alveolar bone is removed using a high-speed handpiece and a round bur.

tal elevator is inserted into the coronal portion of the periodontal ligament space between the tooth root and alveolar bone. The elevator is then rotated and held in position for 10 seconds to fatigue and sever the periodontal ligament. This maneuver is performed around the circumference of the tooth

(Figures 10, 11, 12 and 13). As the periodontal ligament space widens, the blade is inserted more apically followed by the same rotate-and-hold action. This allows the edge of the periodontal elevator's blade to engage the side of the root and elevate it from the alveolus. Make sure to support the



PICTURE 8: Exposed root surface on the lingual aspect of the mandibular canine tooth.

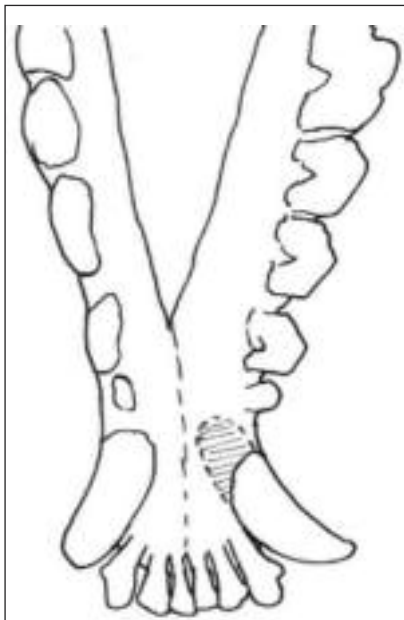


FIGURE 9: The shaded area depicts the extent of lingual alveolar bone removal to facilitate elevation of the root.

mandible with the opposite hand while elevating the root carefully. During this procedure, blood fills in the periodontal ligament space and helps expand this space by hydraulic action. When most of the periodontal ligament attachment is disrupted, the tooth becomes very loose. At this time, an extrac-

tion forceps is used to engage the canine tooth and pull it out of the alveolus (Figure 14). It is important to grab the tooth as far apically as possible to decrease leverage forces on the root that can lead to root fracture. Once the tooth is out of the alveolus, the buccal gingiva may be elevated. If necessary, a



PICTURE 10: Periodontal elevator is inserted into the periodontal ligament space on the mesial aspect of the mandibular canine tooth.



PICTURE 11: Periodontal elevator is inserted into the periodontal ligament space on the lingual aspect of the mandibular canine tooth.

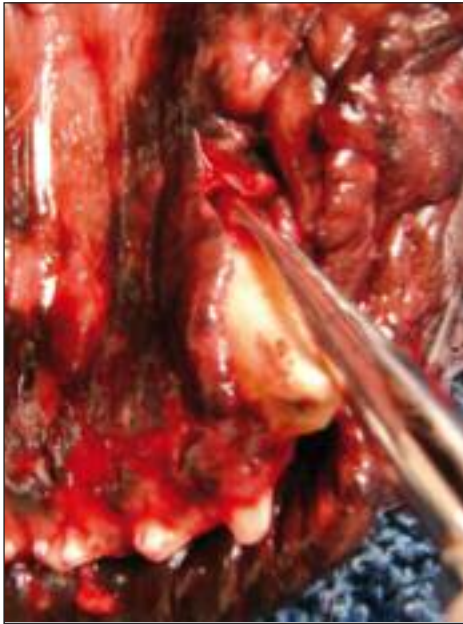


FIGURE 12: Periodontal elevator is inserted into the periodontal ligament space on the distal aspect of the mandibular canine tooth.



FIGURE 13: Periodontal elevator is inserted into the periodontal ligament space on the buccal aspect of the mandibular canine tooth.

vertical releasing incision can be made over the mesial aspect of the buccal gingiva. This allows the buccal gingiva to better approximate the lingual gingiva, thus facilitating tension-free closure of the extraction site. To prevent dehiscence of sutured mucoperiosteal flaps, their design must maintain an adequate blood supply and avoid tension when gingival tissues are sutured. Osteoplasty is performed to contour the sharp bone margins because the presence of sharp points of cortical bone on the alveolar rim can puncture the sutured gingival margins and serve as entrance portals for bacteria. The alveolar socket is debrided from root and bone fragments and any granulosomatous tissue using a small bone curette. The alveolus is then lavaged with dilute chlorhexidine solution. The edges of the lingual and buccal flaps are trimmed using fine scissors and sutured together using 4-0 polyglactin 910 (Figure 15). Closure of empty alveolar socket enhances postoperative patient comfort and decrease healing time.

A buccal approach has also been used for surgical extraction of the mandibular canine tooth but this author does not use or recommended this approach. Because, several crucial anatomic structures such as frenulum of the lip, mental foramen of the mandibular bone, and roots of the first and

second premolar teeth are located on the buccal aspect of the mandibular canine tooth. Any surgical manipulation on this side jeopardizes the integrity of these structures. Considering the linguallly-oriented root of the mandibular canine tooth, lingual approach is actually performed directly over the root avoiding disruption of the lip frenulum, potential hemorrhage from the mandibular artery and vein exiting the mental foramen, and iatrogenic trauma to the adjacent tooth roots.⁴

All surgical interventions carry a risk for complications and tooth extraction procedures are no exception to this rule. The most serious complication associated with surgical extraction of the mandibular canine tooth is fracture of the rostral mandible at the junction of the mandibular body and symphysis.⁷ The risk of mandibular fracture is substantially increased in the presence of advanced periodontal disease and in geriatric toy breed dogs.³ Fracture of the mandibular bone can be avoided by limiting alveolar bone removal to the lingual aspect and using controlled force when manipulating periodontal elevators. Another complication of the mandibular canine tooth extraction is protrusion of the tongue to the side of the mouth. The canine teeth serve as a cage to hold the tongue in the oral



FIGURE 14: Empty alveolar socket after the extraction of the mandibular canine tooth.



FIGURE 15: Lingual and buccal gingiva is sutured together closing the empty alveolar socket. This prevents food particles filling in the alveolar socket.

cavity when it is relaxed. When lower canines are extracted, the tongue may periodically roll out of the oral cavity and hang downward.⁶ An osseous integrated prosthetic implant or cheiloplasty may help contain the tongue in the oral cavity. Root fracture is a complication even the most experienced surgeons face at times. Impatience during surgical handling and incorrect use of the periodontal elevators and extraction forceps contribute to the occurrence of iatrogenic root fracture.³ Removal of all the fractured root pieces is crucial in the success of extraction. Leaving a root piece behind is an invitation for infection and abscessation of the retained root fragment. Another point to al-

ways remember is that insufficient cooling of the dental bur on high-speed handpiece may result in tissue or bone necrosis. Therefore, sufficient water-cooling must be maintained when working with the high-speed handpiece.

Before the extraction is performed, disadvantages and possible complications of extraction along with alternative treatment options applicable to the condition of the tooth (e.g. endodontic treatment for a fractured tooth, orthodontic treatment for malocclusions) must be discussed with the client. This allows the client to make an informed decision and prevents possible misunderstandings between the veterinary surgeon and the client.

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