

ANTECH IMAGING NEWS

Topics in Canine Dentistry

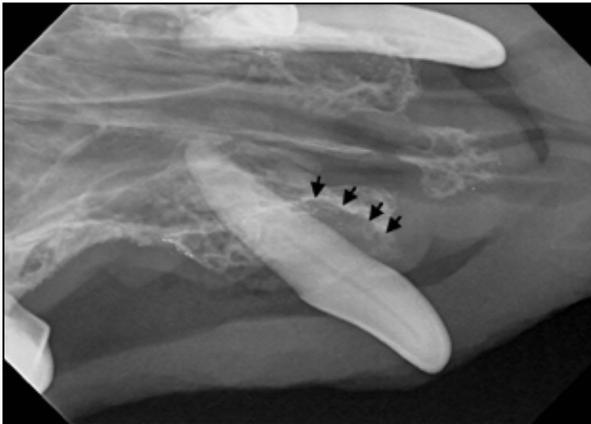


Image 1a

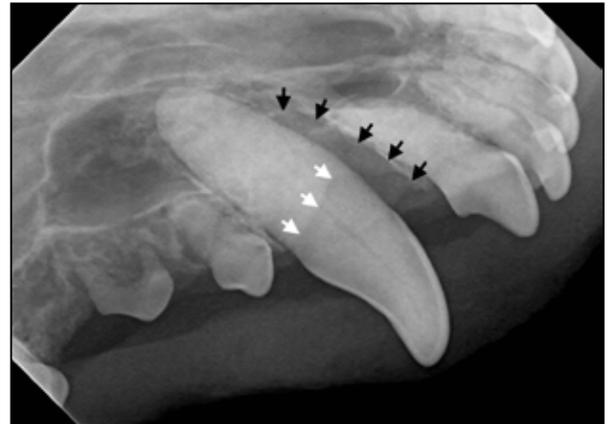


Image 1b

Radiographs of a right maxillary canine tooth (104). Note the vertical bone loss along the mesial aspects of both teeth (arrows) as well as the horizontal bone loss (white arrows).

Acquired Oronasal Fistulas

An oronasal fistula is a defect in the tissues separating the oral and nasal cavities and may be caused by trauma, periodontal disease, or as a complication of maxillectomy, cleft palate repair or maxillary tooth extraction, particularly the maxillary canine tooth (Images 2 & 3). Acquired oronasal fistulas often occur on the palatal aspects of the maxillary canine teeth in small-breed, narrow-muzzled dogs. Small, dolichocephalic breeds appear to be predisposed to severe vertical bone loss at the palatal aspects of the maxillary canine teeth and because of the large root surface area of attachment of the canine teeth, tooth mobility may not be appreciated despite significant periodontal attachment loss. Intraoral radiographs may reveal vertical bone loss along the mesial aspect of the canine tooth, horizontal bone loss, inflammatory root resorption or

intranasal opacities (Image 1). Studies have shown that the radiographic appearance of the maxillary canine tooth may not correlate with the clinical findings and periodontal probing depths are critical in order to identify vertical bone loss on the palatal aspect of the maxillary canine tooth (Image 4). Clinical signs vary with the severity and location of the defect and are related to the lack of separation between the nasal and oral cavities. Clinical signs may include sneezing after eating or drinking, nasal discharge and face rubbing. Chronic or

large oronasal fistulas may lead to rhinitis, destruction of nasal turbinates and pneumonia.

Independent of the etiology of the oronasal fistula, the goal of treatment is to close the defect



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in order to prevent complications associated with communication between the oral and nasal cavities. The location and size of the defect, the amount of available soft tissue to close the defect, and the amount of resultant tension dictate the surgical approach that is utilized. Several techniques have been described for repair of oronasal fistulas. Examples of single layer repair techniques include vestibular flaps, advancement flaps, transposition flaps, greater palatine island axial pattern flaps, and angularis oris axial pattern buccal flaps. Double layer flaps may use a combination of vestibular, perifistula and/or hard palate mucosa. Other techniques that have been described for repair of oronasal defects include tongue flaps, auricular cartilage autografts, temporalis muscle flaps and rectus abdominus myoperitoneal flaps. In cases where repeated attempts to close large oronasal fistulas are unsuccessful, obturators have been used to cover the defects.

The type of surgical technique selected for closure of an oronasal fistula depends on numerous factors, including the size and location of the defect, viability and availability of surrounding soft tissue and vasculature, and whether or not surgical failure has occurred previously. The bony defect may involve the incisive, maxilla and/or palatine bones and overlying mucoperiosteum. The soft tissue defect may involve the gingival, alveolar, labial/buccal, and palatal mucosa and submucosa. Branches of the external carotid artery supply the head and associated soft tissue structures and preservation of this blood supply is critical during reconstructive surgery. The various axial pattern flap surgical techniques utilize major branches of the external carotid artery, such as the major palatine artery which is the main blood supply to the mucoperiosteum,

submucosa and mucosa of the hard palate, or the angularis oris artery which supplies the orbicularis oris and buccinator muscles of the cheek, as well as the adjacent skin and mucosa. Free tissue transfer flaps are also dependent on the donor blood supply especially when the recipient site blood supply has been compromised. With random pattern flaps, blood supply is derived randomly from the network of vessels in the area rather than from a single longitudinal artery as in an axial pattern flap.

The vestibular mucosal flap illustrated in these photographs (Images 2 & 3) is a random pattern flap. When creating a random pattern oral mucosal flap, care must be taken to preserve the branches of the facial and maxillary arteries. The superior labial artery and angularis oris arteries arise from the facial artery, whereas the major and minor palatine and infraorbital arteries arise from the maxillary artery. The vestibular mucosal flap relies on blood supply from the lateral nasal artery, a branch of the infraorbital artery, as well as from the superior labial artery, a branch of the facial artery. Care must be taken during elevation of the flap to preserve this underlying vasculature and to create a broad based flap.

In addition to preservation of blood supply, the thickness of the mucosal flap must be considered. In human reconstructive oral



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Patient #1



Image 2a



Image 2b



Image 2c

Photographs showing flap dehiscence of previously repaired oronasal fistulas associated with an extracted left maxillary canine tooth.

Photographs of a vestibular mucosal flap with vertical releasing incisions extended towards the lip margin to allow tension-free closure. Note the preservation of the underlying vasculature.

Photographs of a completed oronasal fistula repair. Note the broad base to the flap with sutures placed 3mm apart.

Patient #2



Image 3a



Image 3b



Image 3c

surgery, myomucosal flaps are often utilized in order to allow the creation of a larger flap with a reliable blood supply, whereas in veterinary medicine, with the exception of lip reconstruction, vestibular mucosal flaps generally incorporate the underlying connective tissue but leave the underlying musculature and vasculature intact. If the flap is too thick, there

is less elasticity associated with the flap even after the oral mucosa and connective tissue are released from the periosteum, which creates excessive tension on the flap. If the flap is too thin, it may have an inadequate blood supply. Both scenarios may result in subsequent failure of the flap and should be avoided.

Following apposition and suturing of

Continued on next page



Image 4a



Image 4b

Photographs (probe out and probe in) of an 11mm periodontal pocket on the palatal aspect of the left maxillary canine tooth resulting in an oronasal fistula.

the flap, the goal is for primary intention healing to occur. Tension-free apposition of the tissue margins is the most important consideration during flap closure. In addition to the features discussed during flap design, locating the suture line over underlying bone can help to reduce tension on the sutures as they are supported by bone. Removing 2-3mm of mucosa around the original defect will expose the underlying bone. Excising the mucosa has the additional benefit of ensuring that the edges of the flap are bordered by healthy, well-vascularized tissue. Also, several millimeters of the ventral, keratinized epithelium of the palatal mucosa may be debrided if there is concern that overlap of the alveolar mucosa over the palatal mucosa may occur. Inverted epithelium should be avoided.

Concerns for surgery include the risk of dehiscence, which is the most common complication associated with oronasal fistula repair (Images 2 & 3). Regardless of the surgical technique utilized, there are several surgical principles that should be followed. These include gentle tissue handling, creating a larger flap than the size of the defect with a broad base, placing sutures over bone instead of over the defect, placing sutures 3mm apart and 2-3mm away from the edges, and most importantly avoiding any tension on the flap.



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Tooth Fractures: When to treat, when to extract?

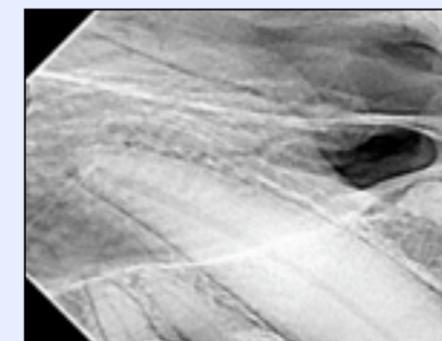
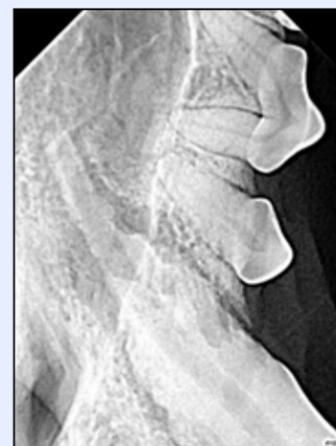
Clinical evaluation of fractured crowns is necessary to determine if there is pulp exposure, which cannot be diagnosed radiographically. For complicated crown fractures (with pulp exposure), or attrition/abrasion that has resulted in pulp exposure, options include either extraction or root canal treatment. Both a clinical examination and an intraoral radiograph is necessary to determine whether or not a tooth is a good candidate for root canal treatment.



Radiograph of a right maxillary canine tooth (104) with a completed root canal treatment.

A dental explorer held perpendicular to the crown surface is used to identify whether or not there pulp exposure. For uncomplicated crown fractures (without pulp exposure) and attrition/abrasion limited to dentin exposure, deposition of tertiary or reparative dentin to seal the dentinal tubules usually appears as a brown or black dot on the surface of the tooth. The dentin is smooth and the dental explorer does not enter the pulp

cavity. For teeth with uncomplicated crown fractures (without pulp exposure) or attrition/abrasion without pulp exposure, an intraoral radiograph to evaluate for the presence of endodontic disease is recommended. If there is no evidence of endodontic disease and there is no pulp exposure, treatment is not indicated.



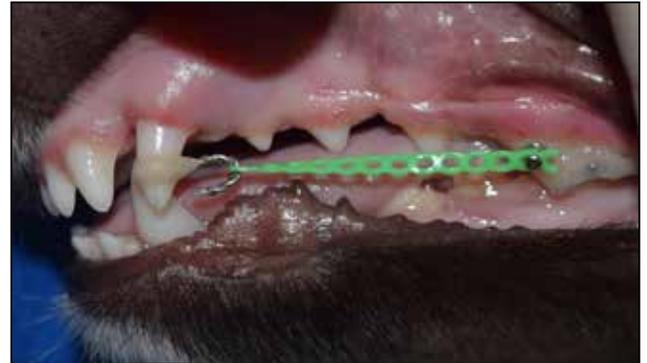
Radiograph of a fractured left maxillary canine tooth (204) with severe endodontic disease. Note the absence of periodontal ligament space, osteolysis of the alveolar bone around the root and severe inflammatory root resorption compared with the normal contralateral canine tooth. The pulp cavity is also wider than the contralateral tooth which indicates that the tooth is non-vital and that normal dentin deposition halted when the patient was younger. This tooth is not a good candidate for root canal treatment. Also shown is a photograph of the extracted left maxillary canine tooth.

gee whiz that's kinda cool... dogs get orthodontics too!

Rostroversion of a maxillary canine tooth, commonly called a lance canine, is when the maxillary canine tooth is abnormally angled in a rostral direction. This is most often seen as an inherited condition in Shetland Sheepdogs although does occur in other breeds.

Because the tooth is abnormally directed, it prevents normal occlusion of the mandibular canine tooth between the maxillary third incisor and maxillary canine tooth, often resulting in either linguoversion or labioversion of the mandibular canine tooth.

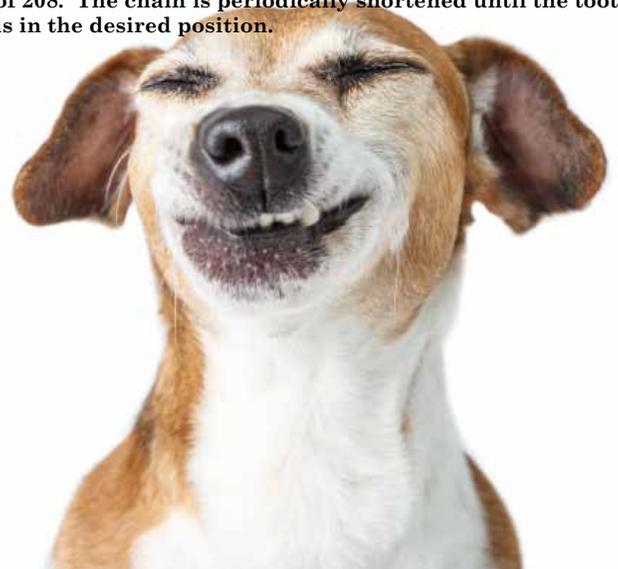
The goal of treatment is to provide the patient with a comfortable occlusion and prevent occlusal trauma to the palate or tooth-to-tooth contact. Options include extraction of the malpositioned canine tooth or active orthodontic movement using an elastic chain.



Photograph of an active orthodontic appliance designed to move the malpositioned maxillary canine tooth (204). An elastic chain is stretched from 204 to a lingual button attached to the maxillary fourth premolar tooth (208). A wire between 208 and the maxillary first molar tooth (209) provides sufficient anchorage to prevent mesial movement of 208. The chain is periodically shortened until the tooth is in the desired position.



Radiograph of a lance canine tooth. Note the wide pulp cavity and open apex consistent with a young dog.



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