Oronasal fistula is one of many possible oral pathologies and abnormalities in dogs and cats. An oronasal fistula is a communication between the oral and nasal cavities. The most common causes of this condition include disease processes (e.g., periodontal disease, fungal infection, osteomyelitis, trauma (e.g., vehicular trauma, maxillary fractures, iatrogenic damage from tooth extractions), surgical procedures (e.g., mass excision, ventral rhinotomy), and congenital deformity (e.g., palatal defects). Although oronasal fistulas are most common in dogs, cats can develop fistulas as a result of periodontal disease or tooth resorption. Endodontic disease of an upper tooth can create periapical disease, which can deteriorate the very thin bone separating the nasal cavity from the tooth root. Improper tooth extraction techniques are common iatrogenic causes of oronasal fistulas. The upper canine teeth are commonly affected by oronasal fistulas; however, any of the maxillary teeth can be involved. Oronasal fistulas can be very small (no wider than a few millimeters) or quite large, as in cases of congenital deformity, disease, or trauma (Figure 1A, Figure 1B).

A thorough understanding of oral anatomy is essential for diagnosing and treating oronasal fistulas. Veterinary technicians can be the first line of defense against oronasal fistulas by thoroughly understanding oral anatomy and visually demonstrating to clients how periodontal disease, deformity, trauma, and/or certain breed characteristics (e.g., dolichocephaly) can predispose pets to oronasal fistulas. Although dolichocephaly alone is not a predisposing factor for oronasal fistulas, it appears to allow fistulas to form more readily than does mesocephaly or brachycephaly. During an initial examination, a technician should look inside a patient’s oral cavity and describe the insidious threat of dental-related disease to the client.

**Diagnosis**
Performing an oral examination on every patient, regardless of the reason for the visit, can hasten diagnosis and treatment of many diseases. It can be challenging to evaluate every patient’s oral health, especially when nonoral diseases or conditions are more obvious. In most veterinary practices, the veterinary technician is the first to assess patients and notify the veterinarian. A technician’s assessment should include the oral cavity, the dentition, and any noticeable abnormalities. The technician should make it clear to the owner that even the most comprehensive oral assessment of a conscious dog or cat is inadequate for detecting many of the dental abnormalities that commonly affect dogs and cats. An oral assessment can be especially difficult to perform in a conscious patient with pain associated with oral disease. Only with the patient under adequate sedation and/or general anesthesia can veterinary staff perform an appropriate oral examination to obtain accurate information for developing a treatment plan.

In addition, a thorough patient history from the owner is essential. Sneezing, intermittent nasal discharge, and pawing at the face are possible signs of oronasal fistula, especially when other dental-related disease processes are suspected. However, as with many other painful diseases or conditions, many patients do not exhibit obvious signs of oronasal fistula. Therefore, every practice
should recommend regular dental cleanings at yearly or biyearly intervals as well as periodontal and radiographic evaluations for every patient.

During dental cleanings, a thorough oral assessment by a veterinary technician can be essential for discovering potential problems. Dogs and cats require general anesthesia for successful diagnosis and treatment of oronasal fistulas. One of the most important diagnostic instruments is a periodontal probe, which is inserted into infrabony pockets. All teeth should be probed and the depths documented. Another diagnostic procedure involves irrigating a periodontal pocket and observing whether blood or fluid is discharged from the nose (FIGURE 2). Dental radiography is also a very important tool. In many cases, clients can better understand the severity of a problem with the help of a visual aid. A radiograph showing a dental probe in a periodontal pocket can illuminate the severity of the condition for clients.

Treatment

In some cases, such as those involving advanced periodontal disease, antibiotic therapy for 10 to 12 days after a tooth extraction may be preferred before surgical repair of an oronasal fistula. Pain management is crucial. Preanesthetic agents such as morphine or fentanyl are widely used and, when combined with a tranquilizer such as acepromazine, can help provide a smooth patient recovery and systemic pain relief. Intubation and gas anesthesia allow the veterinarian to adequately and safely immobilize patients for oronasal fistula repair, which can take a substantial amount of time. One of the most important modalities for pain control is local analgesia through the use of nerve blocks. Veterinary technicians should be familiar with how to implement nerve blocks, including the required drugs and dosages. Maxillary analgesia involves administering a nerve block through the infraorbital foramen, which offers excellent pain management. Bupivacaine is an excellent choice for providing analgesia for 6 to 10 hours; however, its onset of action is usually 15 to 30 minutes. Lidocaine has a more rapid onset of action, but its duration of effectiveness is much shorter, lasting less than 2 hours. In many cases, a 50:50 mixture of bupivacaine and lidocaine is used to help obtain the advantages of both drugs. Oronasal fistulas are generally repaired using the single-flap or the double-flap technique. Patients should be placed in dorsal recumbency for most oronasal fistula repairs, but this depends on the veterinarian’s preference. The main objective of any repair is to establish an epithelial layer between the oral and nasal cavities.

In many situations, the single-flap technique is adequate. This technique is generally used for a fistula with attached gingiva that can provide a sturdy area for suturing. For this technique, the fistula margins are thoroughly debrided and the nasal cavity is irrigated to remove pus or foreign material. Debriding the fistula margins helps to remove necrotic or epithelialized tissue to facilitate healing. After thorough disinfection using an oral chlorhexidine solution, a mucoperiosteal buccal flap is created using a #11 or

**Glossary**

| Apical | pertaining to the apex |
| Brachycephalic | pertaining to the short muzzle length in breeds such as the pug and the Boston terrier |
| Buccal | pertaining to oral tissue nearest to the cheek |
| Caudal | toward the tail in a sagittal plane in nonhuman vertebrates |
| Coronal | toward the crown of a tooth |
| Distal | away from the midline in the dental arches |
| Dolichocephalic | pertaining to the long muzzle length in breeds such as the greyhound and the dachshund |
| Infrabony pocket | an abnormal space or pocket due to periodontal disease or trauma next to a tooth |
| Lingual | pertaining to the tooth surface facing the tongue |
| Maxilla | the bone that forms most of the upper jaw |
| Mesial | toward the midline of the dental arch |
| Mesocephalic | pertaining to the medium or average muzzle length in most canine breeds |
| Palatal | pertaining to the lingual surface of the maxillary teeth |
| Reverse bevel incision | an incision in which the angle between the dental cutting blade and the base of the periodontal pocket or space separates the lower mucosa from the uppermost mucosa |
| Rostral | toward the front of the head in a sagittal plane in nonhuman vertebrates |
#15C scalpel blade to produce releasing incisions. The mesial incision is started at the gingival ridge, mesial to the fistula, and should proceed apically into the elastic buccal mucosa. The distal incision is made in a similar manner but proceeds apically toward the first premolar in the case of an oronasal fistula associated with a canine tooth. The mesial and distal incisions are usually created in one pass and extend to the bone, creating a full-thickness mucogingival flap that includes the periosteum. The buccal edge of the fistula requires a reverse bevel incision that connects the releasing incisions. Elevation of the palatal tissue, which is firm and nonelastic, can help with suturing (FIGURE 3A; FIGURE 3B). The flap is then elevated apically using a periosteal elevator. Tissue tension is the main reason for repair failure, so adequate tissue should be elevated to prevent spontaneous retraction when sutures are placed. In some cases, obtaining adequate tissue release may require mesiodistal incision of the underside of the flap at its base. This technique helps give elasticity to the flap by removing the attachment from the flap’s underside while leaving the topside intact and able to stretch across the defect. For proper flap positioning, the alveolar ridge may require reduction using a small rongeur or a high-speed bur. The flap is then sutured over the defect using a small absorbable suture (i.e., 3-0 or 4-0). Care must be taken to avoid crushing the tissue or tying the sutures too tightly (FIGURE 4A; FIGURE 4B). Gaps due to excess tissue can create dehiscence, so excess tissue should be excised. Successful repair of oronasal fistulae requires a well-supported, airtight, tension-free closure.

The double-flap technique is usually used when there is too little mucogingival tissue to properly cover a defect or when initial use of the single-flap technique results in repair failure. The double-flap technique can be used to create a palatal flap in conjunction with a buccal mucogingival flap. Although this is more complicated than the single-flap technique, it can create an epithelial surface facing the nasal cavity and stronger support for the buccal flap. This is especially useful for (1) repairing oronasal fistulas involving large upper canine teeth or (2) covering an exceptionally large defect. Palatal and gingival tissue can be very vascular, so a hemostatic agent may be required to help control hemorrhage. Making parallel incisions from mesial and distal borders of the fistula near or past the midline of the palate can create a full-thickness palatal flap that, when inverted, covers the entire fistula and, when sutured, has no tension. Elevating this flap using a sharp periosteal elevator exposes palatal bone and, when the flap is inverted to cover the defect, leaves the epithelium of the flap in contact with the nasal passage. A buccal sliding flap is created as described for the single-flap technique. The palatal flap is inverted, covering the defect, and sutured to the mucosa at the edge of the fistula. The buccal flap is then pulled over the palatal flap and its donor site and sutured as described for the single-flap technique (FIGURE 4A, FIGURE 4B). In some cases, if there is not enough tissue to cover the palatal donor site, a labial mucosal rotational flap can be created. If the palatal defect is not covered by mucosa, healing by second intention should take place. Compared with a
single-layer flap, a double-layer flap more thoroughly covers the defect with much more tissue apposition and contact for healing (FIGURE 5A; FIGURE 5B; FIGURE 5C; FIGURE 5D).

One of the main reasons for flap failure is excessive tension on gingival tissue. The risk of failure can be increased by local or systemic infection, metabolic disease, or trauma due to excessive oral activity (e.g., toys, chew items).

Follow-up evaluations are recommended to monitor healing and detect dehiscence. Antibiotic therapy for 14 days is recommended.

**Conclusion**

If left untreated, oronasal fistulas can lead to nasal infection and irritation due to retention of foreign material, reducing an animal’s quality of life. Oronasal fistulas can be surgically repaired using simple but effective flap techniques and by avoiding suture tension.

Veterinary professionals must be vigilant about assessing patients for oronasal fistulas. Routine oral examinations combined with yearly evaluations in which the patient is under general anesthesia are imperative for quality oral health care and disease prevention, regardless of how much dental calculus can be seen. Statements such as “The teeth don't look that bad” should never be used when assessing a patient’s oral health. Palatal abnormalities, periodontal disease, and numerous tooth-root conditions (e.g., apical abscesses, root fractures) can only be properly evaluated by thorough oral assessment with the patient under general anesthesia.

**References**

1. What do all oronasal fistulas have in common?
   a. They only affect young dogs.
   b. They all involve communication between the oral and nasal cavities.
   c. They all have a poor prognosis after surgical repair.
   d. They all result from periodontal disease.

2. Which canine breed characteristic appears to predispose dogs to developing oronasal fistulas due to periodontal disease?
   a. dolichocephaly
   b. mesocephaly
   c. brachycephaly
   d. all of the above

3. The most common reason for failure of surgical repair of oronasal fistulas is
   a. the patient's age.
   b. a poor diet.
   c. excessive suture tension on the flap tissue.
   d. lack of antibiotic therapy.

4. During an initial single-flap repair of an oronasal fistula, the tissue required for covering the defect is obtained from
   a. palatal tissue.
   b. sublingual tissue
   c. buccal mucogingival tissue.
   d. none of the above

5. A cause(s) of oronasal fistulas is/are
   a. a lack of dietary phosphorus.
   b. tooth extraction complications.
   c. vaccination reactions.
   d. a and c

6. For regional analgesia during surgical repair of an oronasal fistula, a local anesthetic should be administered into the
   a. infraorbital foramen.
   b. caudal mandibular foramen.
   c. mental foramen.
   d. none of the above

7. A common clinical sign of oronasal fistula is
   a. lameness.
   b. vomiting.
   c. disorientation.
   d. nasal discharge.

8. Use of the double-flap technique should be considered when
   a. antibiotics have not worked.
   b. the defect is too large for a single flap or there is too little mucogingival tissue to cover the entire defect.
   c. the initial flap procedure resulted in repair failure.
   d. b and c

9. Which statement is most accurate regarding regional analgesia before oronasal fistula repair?
   a. Local infusion into the surrounding tissue is adequate for pain management.
   b. Regional analgesia offers little therapeutic benefit for oronasal fistula repair.
   c. Lidocaine is preferred because one dose can manage pain for 12 hours.
   d. Bupivacaine can be effective for up to 10 hours; however, its onset of action is at least 15 minutes.

10. Which of the following may not consistently be detected by visual examination of the oral cavity?
    a. stage 1 periodontal disease
    b. tooth-root abscessation
    c. tooth resorption lesions
    d. all of the above