Nasopharyngeal Disorders of Dogs and Cats: A Review and Retrospective Study

University of Sydney
Geraldine B. Hunt, BVSc, MVetClinStud, PhD, FACVSc
Martine C. Perkins, BVSc
Susan F. Foster, BVSc, MVetClinStud, FACVSc
Vanessa R. Barrs, BVSc, MVetClinStud, FACVSc
Graham R. Swinney, BVSc, FACVSc
Richard Malik, BVSc, DipVetAn, MVetClinStud, PhD, FACVSc

ABSTRACT: Nasopharyngeal disease was diagnosed in 38 dogs and 24 cats at the University Veterinary Centre, Sydney, Australia, between 1990 and 2001. Most of the animals were presented for stertor and/or difficult breathing. Evaluation of animals with suspected nasopharyngeal disease includes physical examination (particularly of local lymph nodes), digital palpation of the soft palate while the animal is under sedation or anesthesia, and visualization of the nasopharynx using retraction of the soft palate or flexible retrograde endoscopy. The nasopharynx may be approached surgically by incision of the soft palate when manipulation of catheters, nasal flushing, or endoscopic biopsy fails to dislodge obstructing material or yield a diagnostic sample.

Various conditions affecting the nasopharynx have been reported in small animals.1–11 The nasopharynx is situated dorsal to the soft palate and delineated rostrally by the choanae and caudally by the larynx. The dorsocaudal compartment of the nasopharynx lies dorsal to the palatine arches and surrounds the opening to the esophagus. The anatomy of the nasopharynx in cats has been described recently.10 Diseases affecting the nasopharynx may originate in any structure comprising its walls or boundaries, including the base of the skull, eustachian tubes, soft and hard palate, caudal nasal turbinates, and pharyngeal mucosa.

Traditionally, diagnosis of nasopharyngeal disease has been hampered by difficulties in visualizing the area as well as awkward access for surgery or other manipulations. Consequently, some potentially treatable diseases may be missed or treatment not instituted because of perceived or actual technical difficulties.

Using a flexible endoscope to perform retrograde rhinoscopy has greatly assisted in the treatment of nasopharyngeal disease.8,9,11–13 A wide range of

---

KEY FACTS

- Nasopharyngeal disorders are usually characterized by stertor.
- The nasopharynx may be visualized relatively easily by retraction or surgical incision of the soft palate.
- Flexible retrograde endoscopy facilitates visualization of nasopharyngeal lesions.
nasopharyngeal abnormalities are recognized, and diagnosis or treatment using endoscopy or surgery has become routine. This paper discusses the disparate conditions that may involve the nasopharynx as well as aspects of the treatment. Understanding the disease processes that may affect the nasopharynx and animals’ responses to these diseases can assist in the development of a diagnostic strategy and help facilitate treatment when applicable.

**CLINICAL SIGNS OF NASOPHARYNGEAL DISEASE**

Animals with disease limited to the nasopharynx present mainly with stertor (i.e., a snorting noise produced by obstruction rostral to the larynx),6,8,10 whereas slow onset or if the opening to the nasopharynx is occluded.8 In dogs, stertor is usually alleviated by open-mouth breathing. Cats, however, may be dyspneic due to their unwillingness or inability to breathe through their mouth. Some animals show pharyngeal discomfort and make repeated attempts to swallow, and cats with acute nasopharyngeal disease may paw at their mouth.

The duration and severity of signs depend on the disease process. Rapid onset of pharyngeal discomfort and stertor, sometimes accompanied by purulent nasal discharge or fetid breath, can suggest obstruction by a nasopharyngeal foreign body,6,8,10 whereas slow onset of stertor and attempted mouth breathing may be more suggestive of a slow-growing tumor or nasopharyngeal polyp.16 Age of onset of signs may reflect the disease process. In a recent report,8 for example, cats with inflammatory nasopharyngeal polyps were substantially younger than those with lymphosarcoma.

Nasal discharge may or may not be a feature of nasopharyngeal disease, depending on its etiology. In many cases, however, nasal discharge is mild or absent because secretions that accumulate in the nasopharynx tend to be swallowed. Sneezing is not typical but may occur if the caudal nasal turbinates are irritated or if disease also affects the rostral nasal cavity. Signs of otitis media and vestibular disease may occur in animals with extension of disease from the nasopharynx into the tympanic bulla or vice versa,17 or if the opening to the eustachian tube is occluded.18

Although animals often present with signs predominately referable to nasopharyngeal obstruction or hemorrhage, the first sign of disease with neoplasia of the nasopharyngeal structures may be enlargement of regional lymph nodes, particularly the mandibular and retropharyngeal nodes. In our experience and in other reports,8 neoplasms encountered in the nasopharynx include lymphosarcoma, various forms of carcinoma, mast cell tumor, fibrosarcoma, and osteosarcoma (see Clinical Retrospective Study section). Other clinical signs may result from the systemic spread of disease originating in the nasopharynx, such as lymphosarcoma or cryptococcosis.5

**DIAGNOSIS OF NASOPHARYNGEAL DISEASE**

**Physical Examination**

Because of its relatively inaccessible location and complex anatomy, diagnosis of nasopharyngeal disease has in the past often been limited to examination using dental mirrors and spay hooks (while the animal is under anesthesia) and digital palpation of the soft palate. In tractable animals, palpation through the soft palate may reveal masses in the nasopharynx. Regional lymph nodes should always be palpated because they sometimes provide a more convenient source of diagnostic material.

Animals with suspected respiratory disease should be carefully assessed prior to sedation or anesthesia, including evaluation of mucous membrane color, cardiopulmonary function, and thoracic radiography to rule out the possibility of intrathoracic disease. Likewise, an attempt should be made to differentiate stertor (usually arising from the nose or nasopharynx) from stridor (a high-pitched noise usually arising due to disturbance of airflow through the larynx or trachea) prior to physical or chemical restraint. If possible, the effect of opening the mouth should be determined.

In our hospital, once nasopharyngeal or caudal nasal disease has been tentatively diagnosed, the animal is evaluated further while under general anesthesia. Anesthesia is induced using an intravenous drug (e.g., 5 mg/kg propofol) and maintained by inhalation of halothane or isoflurane. The oropharynx, laryngopharynx, and larynx are then inspected. Laryngeal function should be carefully evaluated while the animal is under light anesthesia to rule out the possibility of laryngeal paralysis or collapse prior to placement of a cuffed endotracheal tube. The length of the soft palate is also assessed. When performing manipulations that may cause blood or other fluid to accumulate in the pharynx, it is critical that the cuff is inflated to ensure a leak-proof seal and the laryngopharynx is packed with gauze. The animal is best positioned in dorsal recumbency, with the maxilla held firmly with tape applied over the upper canine teeth. Anesthesia of the nasopharynx is instituted with a small amount of topical lidocaine (4% Xylocaine®, AstraZeneca LP, Wilmington, DE) at approximately 1 mg/kg instilled using a syringe attached to a 20-gauge intravenous catheter. This avoids the necessity of deepening the plane of anesthesia excessively to abolish reflexes resulting from mechanical stimulation of sensitive nasopharyngeal structures. The nasopharynx is examined by palpation through the soft palate, followed by rostral retraction of the soft palate using a spay hook (Figure 1).

**Clinical Retrospective Study**

In dogs, whereas slow onset of signs may reflect the disease process, other clinical signs may result from the systemic spread of disease originating in the nasopharynx, such as lymphosarcoma or cryptococcosis.5
This allows the caudal part of the nasopharynx to be relatively well exposed. However, the cranial nasopharynx, choanae, and caudal nasal turbinates are usually not well visualized in dogs. In larger patients, it is possible to palpate this area digitally, and the use of a heated dental mirror can improve visualization.

**Adjunctive Tests**

Routine hematology and biochemistry have not proven diagnostic in nasopharyngeal disease. Cytologic examination and culture of nasal swabs may detect infection with such organisms as *Cryptococcus*; however, *Cryptococcus neoformans* and *Aspergillus* species may be encountered occasionally as normal flora or colonizers of abnormal sites. Animals with cryptococcosis (rather than cryptococcal colonization of nasopharyngeal lesions) usually demonstrate positive results when tested using the latex cryptococcal antigen test, and this simple blood test may be performed prior to more invasive diagnostic procedures. Interestingly, cryptococcosis has not been identified as a common cause of nasopharyngeal disease in previous reports from North America but is diagnosed frequently in our hospital (see Clinical Retrospective Study section). Other primary infectious diseases reported by Willard and Radlinsky (in one case each) included aspergillosis and pythiosis.

**Endoscopy**

Depending on the results of the physical examination, a flexible retroflexed endoscope (appropriate to the size of the animal) is introduced into the pharynx, hooked above the soft palate, and then retracted rostrally to enable retrograde visualization of the rostral nasopharynx, choanae, and caudal nasal cavities. Mass lesions are sometimes immediately apparent. In other cases, lesions may be obscured by purulent exudate or excessive mucus. Antegrade passage of a catheter up the left and right ventral nasal meatuses is helpful in dislodging foreign material and mucus. Vigorous flushing with saline through the nares (Figure 2) and nasopharyngeal suction can enhance visualization of many lesions and is most helpful during direct visualization through the endoscope. However, practitioners should be aware that due to hemorrhage and other fluid accumulation any such manipulation is likely to interfere with interpretation of nasal and nasopharyngeal radiography or computed tomography, and these diagnostics should be performed before other manipulations if deemed necessary.

When nasopharyngeal lesions are detected, representative tissue specimens for cytology, histology, and microbial culture must be obtained. It can be difficult to advance a biopsy tool through the retroflexed endoscope, necessitating passage of the forceps prior to retroflexion and insertion. In some animals, vigorous massage of the lesions through the soft palate may dislodge or fragment the mass and antegrade flushing via the nares is then successful in removing part or all of it. In dogs, flushing is best achieved via catheters inserted into the ventral nasal meatus. In cats, however, more effective pressure can be generated by inserting the end of a 10-ml syringe directly into the nares and holding the nares closed with the fingers (Figure 2). Material dislodged from the nasal cavity or nasopharynx by flushing then bounces off the larynx or cuffed endotracheal tube to appear in the oropharynx or mouth.

Fine-needle aspiration biopsy may also be readily performed through the soft palate. Specialized nasopharyngeal forceps (Poppin forceps, V. Mueller Allegiance Healthcare Corp., Deerfield, IL) may be used for blind
biopsy of nasopharyngeal lesions. In animals with large masses or masses occupying the caudal nasopharynx, abnormal tissue may be visualized by cranial retraction of the soft palate and a direct biopsy taken.

**Diagnostic Imaging**

The normal nasopharynx is readily identified on plain lateral radiographs due to the presence of air dorsal to the soft palate. The hyoid apparatus and larynx define its caudal boundary. In some instances, space-occupying lesions of the nasopharynx may be delineated by surrounding air (Figure 3). Objects with abnormal radiodensity may also be apparent. Unfortunately, due to the complex anatomy of the region, the presence of objects (e.g., endotracheal tubes, esophageal stethoscopes) and secretions within the nasopharynx may obscure radiographic details. Positive-contrast studies of the nasal cavity and nasopharynx have been described but have not achieved wide clinical usage.

In our experience, radiography provides little information that cannot be obtained through physical examination (with the animal under anesthesia) and palpation through the soft palate.

Ultrasoundography can be useful in animals with soft tissue or fluid-filled masses in the nasopharynx. In addition, ultrasound-guided needle aspiration or biopsy can assist in the acquisition of diagnostic samples. Large vascular structures may be present in some cases, hence Tru-Cut or incisional biopsies should be performed with care.

Advanced imaging methods, such as computed tomography and magnetic resonance imaging, are potentially useful for detecting nasopharyngeal lesions, determining anatomic relationships more precisely, and determining involvement of nearby structures, such as the middle ear and bones of the skull. Although advanced imaging is expensive and probably unnecessary for diagnosis in most cases, it may provide more detailed information about the pathogenesis and extent of various disease conditions as well as the need for follow-up radiotherapy or chemotherapy following cytoreductive surgery for malignant lesions.

**ACCESS TO THE NASOPHARYNX**

Masses and foreign bodies in the nasopharynx may be dislodged by passing a urinary catheter caudally from the nares, with or without vigorous flushing with saline. Small balloon catheters may also be useful and are positioned via the nares; the balloon is then inflated to dislodge masses and foreign bodies from the choanae and push them caudally for retrieval in the pharynx.

The nasopharynx may be approached surgically via a longitudinal incision in the soft palate in animals in which extraction of lesions, such as inflammatory polyps, cryptococcal granulomas, or foreign bodies, is not possible using palatine retraction or better access is required for obtaining diagnostic samples. In most cases, adequate access is obtained by maximally opening the jaws, placing a mouth gag, and having an assistant hold the endotracheal tube out of the way with a malleable retractor. Although placement of the endotracheal tube via a pharyngostomy incision improves the working area somewhat, we find that it takes longer and results in more postoperative morbidity.

The palate is divided longitudinally from the caudal edge of the hard palate to within 1 cm of its caudal free edge. The caudal edge should be left intact to facilitate...
should be examined at weekly intervals to ensure that no areas of wound dehiscence are developing.

CLINICAL RETROSPECTIVE STUDY

Materials and Methods

Surgical, pathologic, and radiographic records were retrospectively analyzed to identify dogs and cats diagnosed with nasopharyngeal abnormalities at the University Veterinary Centre, Sydney, Australia, between 1990 and 2001. Animals with a disorder of the surrounding structures (such as soft or hard palate, middle ear, or caudal nasal turbinates) were included when signs of extension into the nasopharynx (e.g., respiratory obstruction, bleeding) were prominent. Diagnosis was based on direct visualization by retrograde endoscopy and soft palate retraction at surgery or necropsy. In a few cases, only pathology records were available. In most cases, records were reviewed for such details as species, breed, age, major presenting signs, and associated clinical abnormalities.

Details of additional diagnostic procedures (e.g., radiography or ultrasonography) were recorded, as were methods of obtaining tissue specimens and treatment. Animals presented with stertor resulting from an overlong soft palate were not included in this study. Ages of animals with neoplastic versus nonneoplastic disease were compared using the Mann-Whitney U-test. The proportion of cats versus dogs with neoplastic disease was compared using a Fisher's exact t-test, and significance was set at $P = .05$.

Results

Nasopharyngeal disease was diagnosed in 38 dogs and 24 cats during the study (Tables 1 and 2). Dogs ranged in age from 5 months to 14 years and weighed between 5.6 and 39 kg. Larger-breed dogs tended to be overrepresented. Indeed, only five dogs with an
Table 1. Dogs with Nasopharyngeal Disease Diagnosed at the UVCS

<table>
<thead>
<tr>
<th>Breed</th>
<th>Weight (kg)</th>
<th>Age</th>
<th>Sex</th>
<th>Presenting Sign(s)</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>German shepherd</td>
<td>NA</td>
<td>5 mo</td>
<td>M</td>
<td>Stertor</td>
<td>Cystic Rathke’s cleft</td>
</tr>
<tr>
<td>Kelpie mix</td>
<td>31.3</td>
<td>3 yr</td>
<td>FS</td>
<td>Stertor</td>
<td>Cystic Rathke’s cleft</td>
</tr>
<tr>
<td>Bull mastiff</td>
<td>NA</td>
<td>3 mo</td>
<td>M</td>
<td>Nasal discharge</td>
<td>Congenital cleft soft palate</td>
</tr>
<tr>
<td>Terrier</td>
<td>NA</td>
<td>3 mo</td>
<td>NA</td>
<td>Nasal discharge</td>
<td>Congenital aplasia of the soft palate</td>
</tr>
<tr>
<td>Chihuahua</td>
<td>1.7</td>
<td>18 mo</td>
<td>M</td>
<td>Stertor, choking when eating</td>
<td>Redundant pharyngeal mucosal fold</td>
</tr>
<tr>
<td>Labrador</td>
<td>34</td>
<td>7 yr</td>
<td>FS</td>
<td>Stertor, inspiratory dyspnea</td>
<td>Soft palate cystic mass</td>
</tr>
<tr>
<td>Beagle</td>
<td>17.6</td>
<td>7 yr</td>
<td>FS</td>
<td>Stertor</td>
<td>Soft palate mass (salivary mucocele), thyroid adenocarcinoma</td>
</tr>
<tr>
<td>Mixed breed</td>
<td>NA</td>
<td>14 yr</td>
<td>NA</td>
<td>Stertor, halitosis</td>
<td>Nasopharyngeal foreign body (chicken bone)</td>
</tr>
<tr>
<td>Bichon frise</td>
<td>5.6</td>
<td>8 mo</td>
<td>FS</td>
<td>Stertor, sneezing</td>
<td>Nasopharyngeal foreign body (bone)</td>
</tr>
<tr>
<td>Lhasa apso</td>
<td>6.6</td>
<td>11 yr</td>
<td>FS</td>
<td>Stertor, reduced appetite</td>
<td>Nasopharyngeal foreign body (bone)</td>
</tr>
<tr>
<td>Terrier mix</td>
<td>14</td>
<td>5 yr</td>
<td>FS</td>
<td>Stertor, nasal discharge</td>
<td>Lymphocytic/plasmacytic inflammation</td>
</tr>
<tr>
<td>Dalmation</td>
<td>29</td>
<td>8 yr</td>
<td>MN</td>
<td>Stertor, cough</td>
<td>Edema (retropharyngeal abscess)</td>
</tr>
<tr>
<td>Rhodesian Ridgeback</td>
<td>36</td>
<td>5 yr</td>
<td>M</td>
<td>Vomiting, sneezing, snuffling, reverse sneezing</td>
<td>Severe nasopharyngeal inflammation and punctate lesions (chemical rhinitis)</td>
</tr>
<tr>
<td>Kelpie mix</td>
<td>25</td>
<td>6 yr</td>
<td>MN</td>
<td>Nasal discharge, some blood</td>
<td>Mass (lymphocytic/plasmacytic rhinitis)</td>
</tr>
<tr>
<td>Bulldog</td>
<td>27</td>
<td>4 yr</td>
<td>MN</td>
<td>Stertor, fainting</td>
<td>Nasopharyngeal mass (chronic inflammation)</td>
</tr>
<tr>
<td>Giant schnauzer</td>
<td>34</td>
<td>2 yr</td>
<td>FS</td>
<td>Stertor</td>
<td>Nasopharyngeal mass (lymphocytic/plasmacytic rhinitis)</td>
</tr>
<tr>
<td>Boxer</td>
<td>NA</td>
<td>1 yr</td>
<td>FS</td>
<td>Nasal discharge, stertor</td>
<td>Nasopharyngeal stenosis (webbing)</td>
</tr>
<tr>
<td>Australian cattle dog</td>
<td>27</td>
<td>8 yr</td>
<td>M</td>
<td>Epistaxis</td>
<td>Nasopharyngeal mass (chronic inflammation)</td>
</tr>
<tr>
<td>Gordon setter</td>
<td>NA</td>
<td>8 yr</td>
<td>FS</td>
<td>Drooling blood, gagging, stertor</td>
<td>Nasopharyngeal mass (chronic inflammation)</td>
</tr>
<tr>
<td>Kelpie mix</td>
<td>34</td>
<td>10 yr</td>
<td>FS</td>
<td>Stertor, gagging</td>
<td>Nasopharyngeal mass (chronic inflammation)</td>
</tr>
<tr>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Nasopharyngeal mass (chronic inflammation)</td>
</tr>
<tr>
<td>Rottweiler</td>
<td>NA</td>
<td>8 yr</td>
<td>MN</td>
<td>Soft palate mass</td>
<td>Mast cell tumor</td>
</tr>
<tr>
<td>Corgi</td>
<td>19.3</td>
<td>12 yr</td>
<td>M</td>
<td>Epistaxis</td>
<td>Soft palate mass cell tumor</td>
</tr>
<tr>
<td>Australian cattle dog</td>
<td>22.7</td>
<td>14 yr</td>
<td>MN</td>
<td>Stertor, gagging, sneezing</td>
<td>Squamous cell carcinoma near choanae</td>
</tr>
<tr>
<td>German shepherd</td>
<td>53</td>
<td>8 yr</td>
<td>FS</td>
<td>Nasal discharge, mass in hard palate</td>
<td>Carcinoma of the hard and soft palate</td>
</tr>
<tr>
<td>Kelpie mix</td>
<td>25</td>
<td>14 yr</td>
<td>M</td>
<td>Edema, mass dorsal to larynx</td>
<td>Metastatic carcinoma</td>
</tr>
<tr>
<td>Border collie</td>
<td>23</td>
<td>12 yr</td>
<td>MN</td>
<td>Nasal discharge</td>
<td>Caudal nasal and nasopharyngeal carcinoma</td>
</tr>
<tr>
<td>Chihuahua</td>
<td>2.5</td>
<td>14 yr</td>
<td>FS</td>
<td>Stertor, epistaxis</td>
<td>Nasopharyngeal carcinoma</td>
</tr>
<tr>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Nasopharyngeal carcinoma</td>
</tr>
<tr>
<td>Finnish spitz</td>
<td>13</td>
<td>9 yr</td>
<td>M</td>
<td>Stertor, gagging</td>
<td>Pharyngeal mass, salivary carcinoma</td>
</tr>
</tbody>
</table>

(continues on page 194)
were neoplastic in seven cases (29%) and benign or inflammatory in 16 (71%). This differs significantly from Allen and colleagues' study in which 72% of cats had neoplastic disease ($P < .001$). In our study, no diagnosis was made in one case, but the clinical signs resolved after flushing unidentified material from the nasopharynx. Eight cats (35%) had nasopharyngeal cryptococcomas, three (11%) had nasopharyngeal polyps, and three (11%) had inflammatory or postinflammatory respiratory obstruction. Six cats (25%) had lymphosarcoma and one

expected adult body weight of less than 10 kg were encountered; of these, two had nasopharyngeal foreign bodies. The mean age of animals with neoplastic disease was significantly higher than that of animals with nonneoplastic disease (median age, 120 months [range, 24 to 204 months] versus 60 months [range, 3 to 180 months], respectively; $P = .0006$).

Definitive diagnosis was made in 37 of the 38 dogs. Twenty dogs (54%) had neoplastic diseases, including nine dogs with carcinoma, three with osteosarcoma, three with spindle cell tumor, three with mast cell tumor, and two with lymphosarcoma. The sources of neoplasms were not identified definitively in many animals but were suspected to have arisen primarily from the nasopharynx or adjacent structures in most cases.

The remaining dogs (46%) had nonneoplastic etiologies. Four dogs (11%) had noninfectious inflammatory tissue obstructing the nasopharynx (two of these dogs represented for choanal stenosis after surgical excision of inflammatory tissue [Figure 6]). Benign cystic masses were found in five dogs and were attributed to salivary retention in two, cystic Rathke’s cleft in two, and cystic polypoid lesions of the caudal nasal turbinates in one. Three dogs had bone foreign bodies. One dog had a nasopharyngeal cryptococcoma, and one had partial obstruction of the nasopharynx and laryngopharynx by a fold of redundant mucosa hanging from the dorsal nasopharynx. The fold was removed surgically via a similar approach to resection of an overlong soft palate. The foreign bodies were all removed by flushing and/or manipulation using catheters.

Of the 24 cats with nasopharyngeal disease, lesions were neoplastic in seven cases (29%) and benign or inflammatory in 16 (71%). This differs significantly from Allen and colleagues’ study in which 72% of cats had neoplastic disease ($P < .001$). In our study, no diagnosis was made in one case, but the clinical signs resolved after flushing unidentified material from the nasopharynx. Eight cats (35%) had nasopharyngeal cryptococcomas, three (11%) had nasopharyngeal polyps, and three (11%) had inflammatory or postinflammatory respiratory obstruction. Six cats (25%) had lymphosarcoma and one

<table>
<thead>
<tr>
<th>Breed</th>
<th>Weight (kg)</th>
<th>Age</th>
<th>Sex</th>
<th>Presenting Sign(s)</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Border collie</td>
<td>30</td>
<td>6 yr</td>
<td>MN</td>
<td>Stertor, epistaxis</td>
<td>Nasopharyngeal mass (adenocarcinoma)</td>
</tr>
<tr>
<td>Samoyed</td>
<td>23</td>
<td>11 yr</td>
<td>F</td>
<td>Nasal discharge, seizures</td>
<td>Nasopharyngeal masses (adenocarcinomas)</td>
</tr>
<tr>
<td>Collie mix</td>
<td>19.5</td>
<td>2 yr</td>
<td>FS</td>
<td>Stertor, mild nasal discharge</td>
<td>Spindle cell tumor of the dorsal pharynx</td>
</tr>
<tr>
<td>Miniature poodle</td>
<td>14</td>
<td>10 yr</td>
<td>MN</td>
<td>Sneezing, snuffling, epistaxis</td>
<td>Nasopharyngeal mass (fibrosarcoma)</td>
</tr>
<tr>
<td>Collie</td>
<td>27.8</td>
<td>11 yr</td>
<td>FS</td>
<td>Nasal discharge, mass</td>
<td>Nasopharyngeal mass (fibrosarcoma)</td>
</tr>
<tr>
<td>Labrador</td>
<td>36.2</td>
<td>8 yr</td>
<td>FS</td>
<td>Snoring, Horner’s syndrome</td>
<td>Nasopharyngeal mass (osteosarcoma)</td>
</tr>
<tr>
<td>Labrador mix</td>
<td>39</td>
<td>7 yr</td>
<td>MN</td>
<td>Stertor</td>
<td>Nasopharyngeal mass (well-differentiated osteosarcoma of the hard palate)</td>
</tr>
<tr>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Nasopharyngeal mass (osteosarcoma)</td>
</tr>
</tbody>
</table>

$F$ = female; $M$ = male; $N$ = neutered; $NA$ = not available; $S$ = spayed; $UVCS$ = University Veterinary Centre in Sydney.

Figure 6—Inflammatory nasopharyngeal mass in a schnauzer.
Table 2. Cats with Nasopharyngeal Disease Diagnosed at the UVCS

<table>
<thead>
<tr>
<th>Breed</th>
<th>Weight (kg)</th>
<th>Age</th>
<th>Sex</th>
<th>Presenting Sign(s)</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Siamese</td>
<td>2.5</td>
<td>7</td>
<td>FS</td>
<td>Sneezing, nasal discharge</td>
<td>Nasopharyngeal foreign body (foam rubber)</td>
</tr>
<tr>
<td>Foreign white</td>
<td>4.8</td>
<td>3</td>
<td>M</td>
<td>Stertor, choking</td>
<td>Nasopharyngeal fibrous web (nasopharyngeal stenosis)</td>
</tr>
<tr>
<td>Domestic shorthair</td>
<td>3.7</td>
<td>15</td>
<td>F</td>
<td>Stertor, nasal discharge, inappetence</td>
<td>Proliferative chronic rhinitis</td>
</tr>
<tr>
<td>Oriental</td>
<td>5.3</td>
<td>8</td>
<td>MN</td>
<td>Stertor, sneezing, nasal discharge</td>
<td>Raised area, plasmacytic rhinitis</td>
</tr>
<tr>
<td>Burmese</td>
<td>NA</td>
<td>15</td>
<td>MN</td>
<td>Stertor</td>
<td>Nasopharyngeal mass (glandular hyperplasia)</td>
</tr>
<tr>
<td>Domestic shorthair</td>
<td>0.88</td>
<td>3</td>
<td>F</td>
<td>Stertor, gagging, coughing</td>
<td>Nasopharyngeal polyp</td>
</tr>
<tr>
<td>Domestic shorthair</td>
<td>4.6</td>
<td>12</td>
<td>MN</td>
<td>Stertor, otitis media</td>
<td>Nasopharyngeal polyp</td>
</tr>
<tr>
<td>Domestic shorthair</td>
<td>3.5</td>
<td>7</td>
<td>FS</td>
<td>Stertor, otitis externa</td>
<td>Nasopharyngeal polyp (surgically removed)</td>
</tr>
<tr>
<td>Domestic shorthair</td>
<td>6.8</td>
<td>15</td>
<td>MN</td>
<td>Stertor</td>
<td>Nasopharyngeal mass (no diagnosis, resolved after flushing)</td>
</tr>
<tr>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Nasopharyngeal mass (cryptococcosis)</td>
</tr>
<tr>
<td>Domestic shorthair</td>
<td>NA</td>
<td>3</td>
<td>MN</td>
<td>NA</td>
<td>Nasopharyngeal mass (cryptococcosis)</td>
</tr>
<tr>
<td>Burmese</td>
<td>NA</td>
<td>8</td>
<td>MN</td>
<td>Nasopharyngeal mass detected at vestibular disease necropsy</td>
<td>Caudal nasal cryptococcosis</td>
</tr>
<tr>
<td>Himalayan</td>
<td>4.3</td>
<td>3</td>
<td>FS</td>
<td>Stertor</td>
<td>Nasopharyngeal mass removed by flushing (cryptococcosis)³</td>
</tr>
<tr>
<td>Domestic shorthair</td>
<td>5.5</td>
<td>7</td>
<td>MN</td>
<td>Stertor, inappetence, loss of voice</td>
<td>Soft palate mass (cryptococcosis)³</td>
</tr>
<tr>
<td>Domestic shorthair</td>
<td>8</td>
<td>10</td>
<td>MN</td>
<td>Stertor, inappetence</td>
<td>Nasopharyngeal mass (cryptococcosis)³</td>
</tr>
<tr>
<td>Domestic shorthair</td>
<td>4.2</td>
<td>6</td>
<td>MN</td>
<td>Stertor, coughing, vestibular disease</td>
<td>Nasopharyngeal mass detected at necropsy (cryptococcosis)³</td>
</tr>
<tr>
<td>Domestic shorthair</td>
<td>5.6</td>
<td>10</td>
<td>MN</td>
<td>Vestibular disease</td>
<td>Caudal nasal cryptococcosis</td>
</tr>
<tr>
<td>Domestic shorthair</td>
<td>5.5</td>
<td>10</td>
<td>MN</td>
<td>Stertor</td>
<td>Nasopharyngeal polyp, nasal lymphosarcoma</td>
</tr>
<tr>
<td>Burmese</td>
<td>3.85</td>
<td>9</td>
<td>FS</td>
<td>Palpable masses in neck</td>
<td>Nasopharyngeal and mandibular lymph node lymphosarcoma</td>
</tr>
<tr>
<td>Abyssinian</td>
<td>3.2</td>
<td>17</td>
<td>FS</td>
<td>Stertor, sneezing</td>
<td>Proliferative nasopharyngeal mass (lymphosarcoma)</td>
</tr>
<tr>
<td>Domestic shorthair</td>
<td>3.8</td>
<td>8</td>
<td>FS</td>
<td>Stertor, sneezing</td>
<td>Nasopharyngeal mass (lymphosarcoma)</td>
</tr>
<tr>
<td>Burmese mix</td>
<td>NA</td>
<td>12</td>
<td>MN</td>
<td>Stertor, vomiting</td>
<td>Nasopharyngeal mass (lymphosarcoma)</td>
</tr>
<tr>
<td>Domestic shorthair</td>
<td>5.3</td>
<td>10</td>
<td>M</td>
<td>Stertor, ptyalism, unwell</td>
<td>Nasopharyngeal mass (lymphosarcoma colonized by Cryptococcus)</td>
</tr>
<tr>
<td>Domestic shorthair</td>
<td>6.8</td>
<td>15</td>
<td>MN</td>
<td>Nasal discharge, facial swelling</td>
<td>Nasopharyngeal adenocarcinoma (also affecting frontal sinus)</td>
</tr>
</tbody>
</table>

F = female; M = male; N = neutered; N = neutered; NA = not available; S = spayed; UVCS = University Veterinary Centre in Sydney.
(4%) had adenocarcinoma invading the nasopharynx and frontal sinus. The proportion of cats with neoplastic disease was lower than in dogs (7 of 24 [29%] versus 20 of 38 [53%], respectively; \( P = .06 \)). Anecdotal follow-up information for these cats from one of the authors (R. M.) suggests that nasopharyngeal lymphosarcoma responds well to chemotherapy. The cryptococcomas were removed by a combination of manipulation through the soft palate, nasal flushing, catheterization, and surgery in one case. Animals were then treated with systemic antifungal agents. Treatment and its outcome have previously been reported in six cats of the present series. Five cats survived and were apparently free of cryptococcosis when this paper was written.\(^6,18\) Nasopharyngeal polyps were removed using special extraction forceps (Figure 7) or, in one cat with a small, rostrally located polyp, by way of a palatine incision.

**DISCUSSION**

Previous reports have identified a range of diseases affecting the nasopharynx of dogs and cats,\(^1-18,20-23\) and the results of the present study indicate that these diseases are relatively common. As in previous cases, neoplastic masses and nasopharyngeal polyps were the most important causes of nasopharyngeal obstruction. In contrast to previous reports in which malignant diseases accounted for the majority of cases (72% in cats and 58% in dogs), most of our cats (71%) and dogs (42%) had benign or inflammatory lesions.

In most animals, stertor is the main clinical sign. Diffuse diseases of the nasal cavity may often lead to lesions in the nasopharynx, which may not be recognized unless retroflexion endoscopy is performed. Identification and removal of nasopharyngeal masses can be critical for effective treatment of such diseases as lymphosarcoma and cryptococcosis in which debulking is an important adjunct to systemic treatment and instantly resolves signs of airway obstruction.\(^6,18\) Because cryptococcal granulomas may mimic nasopharyngeal polyps in appearance and location, it is important to obtain a cytologic or histopathologic diagnosis. Some causes of nasopharyngeal obstruction that have been reported in cats but were not seen in our study include grass or plant foreign bodies\(^4\) (presumably vomited into the nasopharynx) and nasopharyngeal stenosis as a sequela of viral disease in young cats.\(^1\) The present case series and previous reports show that in most cats, nasopharyngeal abnormalities are potentially treatable.

The success of diagnosis and relative ease of retrieval of nasopharyngeal

---

**Figure 7**—Extraction forceps (Storz, Tuttlingen, Germany) and polyp. Note the well-defined “stalk,” indicating that the majority of the polyp has been removed. Prognosis is best when the polyp can be removed in its entirety. Note also the shape of the jaws of the extraction forceps; in our experience, these are the most effective type.
foreign bodies demonstrates the utility of retroflexion endoscopy. Although often chronically affected, animals with nasopharyngeal foreign bodies recovered quickly after foreign body removal and displayed few residual signs.

Identification of inflammatory lesions in the caudal nasal cavity and nasopharynx of two dogs serves as a reminder that not all mass lesions in this area are neoplastic. Likewise, the high incidence of nasopharyngeal webbing after surgical debulking of these lesions (two of two cases) illustrates the fact that surgical intervention should be undertaken with caution and, as with other hollow organs (e.g., esophagus, urethra), mucosa is preserved whenever possible to avoid stricture formation. In conclusion, despite the reputation of the nasopharynx for being difficult to access and visualize, endoscopy and surgical exposure via the soft palate have made it possible to diagnose and successfully treat a large number of animals with nasopharyngeal disease.

ACKNOWLEDGMENT

The authors would like to thank the referring veterinarians and hospital colleagues and technical staff from the University Veterinary Centre, Sydney, Australia, who assisted with the endoscopic examinations, in particular Janelle Patton and Georgina Phillips. Patricia Martin and Helen Laurendet were especially helpful in retrieving details of affected cases.

REFERENCES


1. Which of the following statements about nasopharyngeal disease in animals is false?
   a. The majority of animals present with stertor and/or difficult breathing.
   b. Sneezing is typically indicative of an infectious process in the nasopharynx.
   c. Signs of otitis media and vestibular disease may result from obstruction of the eustachian tubes.
   d. Enlargement of mandibular and/or retropharyngeal lymph nodes may be the first sign of a primary nasopharyngeal disorder.
   e. Cats with nasopharyngeal obstruction may become quite dyspneic due to an inability or unwillingness to breathe through the mouth.

2. Which of the following clinical presentations is most useful in diagnosing nasopharyngeal disease?
   a. Stertorous respiration that improves during open-mouth breathing.
   b. Presence of nasal discharge
   c. Sneezing
   d. Coughing
   e. Pain on opening the mouth

3. Which of the following procedures is useful in diagnosing nasopharyngeal disease?
   a. Palpation of suspected masses through the soft palate
   b. Evaluation of the effect of opening the mouth on stertor or stridor
   c. Rostral retraction of the soft palate using a spay hook with the animal under anesthesia
   d. Use of a heated dental mirror to examine the choanae
   e. All of the above

4. Which of the following statements regarding catheterization and flushing of the nasal cavity and nasopharynx is false?
   a. Catheterization of both sides of the nasal cavity via the external nares may be helpful in diagnosing obstructions and dislodging masses or foreign bodies.
   b. Vigorous flushing of the nasal cavity while holding the nostril pinched around a catheter or syringe may dislodge or fragment nasopharyngeal masses, enabling retrieval from the pharynx.
   c. Nasopharyngeal radiographs or computed tomography should be performed prior to nasal flushing to reduce the chance of artifactual lesions being detected.
   d. Catheters inserted through the nares will only reach the nasopharynx if advanced through the dorsal nasal meatus.
   e. Biopsy forceps may be advanced from the nares to the nasopharynx for collection of diagnostic samples.

5. Which of the following statements about diagnostic imaging of the nasopharynx is true?
   a. Computed tomography and magnetic resonance imaging are useful in detecting nasopharyngeal lesions or their anatomic relationships to surrounding structures.
   b. The normal nasopharynx cannot be visualized on radiographs due to the soft tissue density created by the soft palate.
   c. Ultrasonographic examination of nasopharyngeal masses is impossible due to the absence of any soft tissue imaging window.
   d. Positive-contrast studies of the nasopharynx are commonly used for detecting nasopharyngeal masses.
   e. Plain radiography of the nasopharynx is usually more helpful than examination with the animal under anesthesia.

6. Which of the following statements regarding access to the nasopharynx is false?
   a. Urinary catheters or small balloon catheters may assist in manipulating nasopharyngeal masses or foreign bodies.
   b. Longitudinal incision in the soft palate affords simple and effective access to the nasopharynx.
   c. The caudal 1 to 2 cm of the soft palate should be left intact to support the surgical repair and maintain soft palate function.
   d. Two- or three-layer closure of the soft palate using a slowly absorbable suture material (e.g., polydioxanone) in a continuous pattern results in good wound healing and low postoperative morbidity.
e. Temporary occlusion of the carotid arteries is useful to reduce the amount of bleeding from the nasopharynx but has been shown to be safe in cats only.

7. Which of the following tests is rarely useful in determining the etiology of a nasopharyngeal mass?
   a. biopsy of enlarged submandibular or retropharyngeal lymph nodes
   b. hematology and biochemistry
   c. fine-needle aspiration biopsy through the soft palate
   d. nasopharyngeal radiography
   e. b and d

8. Which of the following statements regarding the etiology of nasopharyngeal masses is false?
   a. Cryptococcal granulomas may mimic nasopharyngeal polyps in appearance and location.
   b. Lymphosarcomas, carcinomas, mast cell tumors, fibrosarcomas, and osteosarcomas have all been reported in the nasopharynx of dogs and cats.
   c. Nasopharyngeal disorders are usually an extension of nasal cavity disease.
   d. Nasopharyngeal strictures or stenosis may occur after resolution of inflammatory conditions or nasopharyngeal surgery.
   e. Foreign bodies (e.g., bones, blades of grass) may enter the nasopharynx retrogradely after vomiting.

9. Which of the following statements regarding the retrospective study reported in this paper is true?
   a. Smaller breeds of dog were overrepresented.
   b. There was no difference in age between dogs with neoplastic versus nonneoplastic disease.
   c. In contrast to a previous study in which 72% of cats had neoplastic disease, 71% of our cats had benign or inflammatory lesions.
   d. Neoplastic disease was present in 75% of the dogs.
   e. Removal of foreign bodies required soft palate incision in most cases.

10. Which of the following statements regarding nasopharyngeal disease is true?
    a. Diseases affecting the nasopharynx may originate from any structure comprising its walls or boundaries.
    b. The ability to perform retroflexion endoscopy has greatly assisted diagnosis and treatment of nasopharyngeal disease.
    c. Not all mass lesions of the nasopharynx in dogs and cats are neoplastic.
    d. Various techniques for accessing the nasopharynx, including retraction under anesthesia, passage of nasal catheters, and incision of the soft palate, make biopsy, debulking, or excision of nasopharyngeal masses feasible in most cases.
    e. all of the above