**OROPHARYNGEAL NEOPLASIA IN THE DOG AND CAT**

Richard Walshaw, BVMS, Diplomate ACVS
Member VSSO
Animal Cancer & Imaging Center, Canton, Michigan

**Incidence:**
Oropharyngeal neoplasia accounts for approximately 6% of canine and 3% of feline cancers. The annual incidence is approximately 20 cases per 100,000 dogs and 11 cases per 100,000 cats. It is more common in the dog than any other species. Older animals (8 – 12 years) are more commonly affected. Oropharyngeal neoplasia has a wide distribution among canine breeds, however, it is commonly found in the Golden retriever breed, with its high cancer risk.

**Tumor Type and Location:**
The frequency with which the various types of oropharyngeal tumors occur is different in the dog and cat. Approximate percentages are:

<table>
<thead>
<tr>
<th>Tumor Type</th>
<th>Dog:</th>
<th>Cat:</th>
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</thead>
<tbody>
<tr>
<td>Squamous cell carcinoma:</td>
<td>20 – 30%</td>
<td>70%</td>
</tr>
<tr>
<td>Fibrosarcoma:</td>
<td>10 – 20%</td>
<td>20%</td>
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<tr>
<td>Malignant melanoma:</td>
<td>30 – 40%</td>
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<td>Dental origin:</td>
<td>10%</td>
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The sites of tumor occurrence in the oropharyngeal cavity are (in order of frequency):

<table>
<thead>
<tr>
<th>Dog:</th>
<th>Cat:</th>
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</thead>
<tbody>
<tr>
<td>Gingiva</td>
<td>Gingiva</td>
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<tr>
<td>Dental alveoli</td>
<td>Dental alveoli</td>
</tr>
<tr>
<td>Lips</td>
<td>Tongue</td>
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<tr>
<td>Tongue</td>
<td></td>
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<td>Palate</td>
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**Diagnostic Work-Up of a Dog or Cat with Oropharyngeal Neoplasia:**

**Historical findings:**
Common reported historical findings include:
- Ptyalism, halitosis, hemorrhagic oral discharge, dysphagia, oral pain
As the cancer progresses additional findings may include:
- Nasal discharge, epistaxis, coughing, sneezing, dyspnea
Generalized problems associated with cancer such as anorexia and weight loss may be noted.
There may also be a recent history of dental work being performed (loose teeth, tooth root abscess) in a patient that previously has had good dental health.
Questions that should be asked of the owner include:
- Length of time oral mass has been present
- Assessment of growth rate, ulceration, development of external mass on the face (mandible, maxilla)

**Clinical findings:**
Examination of the patient should include an assessment of:
- The site and extent of the mass
- Gross appearance of the mass
Associated dental problems
Extent of bony involvement
Regional lymph nodes – mandibular, retropharyngeal, prescapular

**Additional work-up should include:**
- Routine laboratory evaluation (CBC, serum chemistry profile, urinalysis) - often older patients that will be undergoing anesthesia and surgery
- Thoracic radiographs - evaluate for the presence of metastatic disease
- Fine-needle aspiration cytology of regional lymph nodes – evaluate for the presence of metastatic disease
- +/- fine-needle aspiration cytology and/or biopsy of the oral mass – if it will affect the overall treatment plan or the owner’s decision to treat the patient. The concern about these procedures is that an accurate diagnosis may not be made if only superficial samples are taken due to the associated necrosis and inflammation

**Diagnostic work-up under general anesthesia:**
- Thorough oropharyngeal examination to evaluate the extent of the disease
- Mandibular lesions – high-detail regional radiographs to evaluate the extent of the disease / bone involvement. Radiographic extent of the disease may be greater than that determined by gross examination. Bone involvement is assumed to be present if the tumor is attached to the bone even though radiographic changes may not be see.
- Maxillary lesions – CT-scan is superior to radiographs as a more accurate determination of extent of disease and involvement of surrounding structures (nasal cavity, orbit, skull, caudal pharynx) can be made. Essential for radiation therapy planning if this is to be part of treatment plan.
- Incisional / excisional biopsy – definitive diagnosis must be obtained

**Tumor Types, Biologic Behavior, Treatment and Prognosis:**

1. **Benign Lesions – Epulides:**
The epulides are hyperplastic lesions that arise from the gingiva. They appear as slow-growing, firm, pedunculated, non-ulcerated masses with an intact epithelial covering and may be single or multiple. Histologically they are classified as either fibrous or ossifying. Epulides occur most commonly in the brachycephalic breeds and in working dogs. Etiologic factors are thought to include oral trauma, malocclusion and chronic dental disease.
A similar lesion is seen in cats. In this species it often affects all the gingival surfaces and is possibly associated with viral infection and chronic periodontal disease.
Treatment for the epulides consists of elective surgical resection and dental prophylaxis. Prevention is based on maintaining good dental health and reducing oral trauma.

2. **Malignant Lesions:**
a. **Malignant Melanoma:**
Malignant melanoma comprises 30 – 40% of canine oral tumors. Characteristically it is a rapidly growing, highly invasive, destructive neoplasm. Grossly it is a proliferative, ulcerative mass that bleeds readily. About 2/3 are pigmented. Common sites of occurrence are the gingiva, buccal mucosa and palate. Malignant melanoma metastasizes early in the course of the disease. Regional lymph node metastasis is present in up to 85% and lung
metastasis is present in up to 15% of dogs at the time of diagnosis. Oral malignant melanoma is very rare in cats.

Treatment consists of:
1. Radical surgical resection to achieve local tumor control
2. Radiation therapy (coarse fractionation) to control local recurrence
3. Palliative radiation therapy if tumor is not amenable to resection (70% complete remission but development of metastasis; survival 20 (PR) – 37 (CR) weeks)
4. Chemotherapy to control metastatic disease:
   - Carboplatin: (37% overall response rate) – platinum-based drugs can be used as sensitizing agents when combined with radiation therapy.
   - Masitinib / Palladia: Alone or as part of metronomic chemotherapy protocol with cyclophosphamide (alternating day schedule).
5. Melanoma Tumor Vaccine: Used in conjunction with surgery and/or radiation therapy to control local disease. Results indicate significant increased survival compared with surgery or radiation therapy alone.

Overall the prognosis for dogs with oral malignant melanoma is poor because of the high metastatic rate of this neoplasm. The one-year survival rate is approximately 25%. The size of the primary neoplasm does affect survival. Dogs with a primary tumor less than 2-cm have a median survival of 511 days; dogs with primary tumor greater than 2 cm or with positive regional lymph nodes have a median survival of 164 days.

b. Squamous Cell Carcinoma:
   - Canine:
     Squamous cell carcinoma (SCC) comprises 20 – 30% of canine oral tumors. It tends occur more commonly in larger breed dogs and the most common sites of occurrence are the gingiva and tongue. SCC grossly presents as a proliferative, ulcerative, raised, cauliflower-like mass. It is an invasive, destructive neoplasm with bone invasion being present in about 80% of cases. The biologic behavior of SCC varies considerably with its location. The metastatic potential (regional and distant) of SCC increases significantly the more caudal it arises in the oropharyngeal cavity (tonsillar SCC —see below).

   Treatment consists of:
   1. Radical surgical resection to achieve local tumor control. The ability to achieve this depends on tumor location:
      - Rostral – good; Caudal – poor
      - Gingiva – good; Tongue – poor
   2. Radiation therapy: good response but is site dependent – rostral versus caudal
      - following surgical resection – due to high local recurrence rate
      - primary mode of therapy
   3. Treatment of metastatic disease - ?????
      - Chemotherapy: Mitoxantrone and Piroxicam (in combination with radiation therapy for local control)
      - Metronomic chemotherapy: Palladia / Masitinib +/- cyclophosphamide

   The prognosis for dogs with oral SCC is dependent on the location of the tumor. Rostral gingival lesions have a generally good prognosis with a 70% one-year survival rate.
Tongue/sublingual and pharyngeal lesions are often not treatable or have a very high rate of local recurrence and metastasis.

- **Feline:**
  SCC comprises 70 – 80% of feline oral tumors and is therefore the most common oral malignancy of cats. It is an aggressive, locally invasive neoplasm but metastasis is rare. It commonly arises in the bone of the mandible or maxilla along the gingival line. Often there is minimal disease visible in the oral cavity but a firm swelling is noted in the surrounding bone. It tends to be more of a proliferative lesion in the pharynx.

  Treatment of oral SCC in cats is difficult as the disease is frequently advanced by the time that the diagnosis is made and therefore not easily resectable. Cats do not generally tolerate radical oral resections, as do dogs. Palliative radiation therapy +/- intralesional or systemic chemotherapy can be tried but results are poor. Chemotherapy (mitoxantrone + piroxicam) may help in combination with radiation therapy to reduce tumor size and ease discomfort. Nutritional supportive care (PEG tube) is required for most cats if treatment is to be attempted.

  The prognosis for cats with oral SCC is very poor, as it is usually impossible to control the local disease. Reported one-year survival is less than 10%. Reported mean survival with radiation treatment +/- surgical resection ranges from 2 – 14 months.

- **Tonsillar SCC – Dog:**
  Tonsillar SCC occurs 10 times more frequently in urban than in rural dogs. It is an extremely aggressive, invasive, metastatic neoplasm. Most dogs have regional node metastasis at the time of diagnosis and 10 – 20% have evidence of lung metastasis. It is considered to be a systemic disease in >90% of patients at the time of diagnosis. There is no effective therapy for this tumor. Palliative radiation +/- surgical resection can be attempted. There is <10% one-year survival reported.

c. **Acanthomatous Ameloblastoma (Low Grade Squamous Cell Carcinoma):**
Acanthomatous ameloblastoma is a commonly seen oral neoplasm in dogs that presents as a proliferative, cauliflower-like, firm mass surrounding teeth. It is a locally invasive tumor – it always invades the underlying bone – but has no metastatic potential. It needs to be differentiated from the benign epulides.

  Treatment consists of:
  1. Radical surgical resection which can be curative if clean margins are obtained.
  2. Radiation therapy:
     - following surgical if margins are dirty or questionable
     - primary treatment modality – there may be some concern about the potential for SCC to develop at the radiation site 2+ years post-radiation particularly if orthovoltage radiation is used

  The prognosis for dogs with acanthomatous epulis is excellent. After complete surgical resection with clean margins there is <5% recurrence rate. When radiation therapy is used as the primary treatment modality an >90% control rate can be expected.

d. **Fibrosarcoma:**

- **Canine:**
  Fibrosarcoma comprises 10 – 20% of oral neoplasms seen in the dog. It tends to occur more in larger breeds and has a variable degree of malignancy. Fibrosarcoma generally presents as
a firm mass with an intact mucosal covering, particularly in the maxillary area. It is locally invasive but metastasis to regional lymph nodes and lungs (<20%) is rare. Two “types” of fibrosarcoma are seen in the dog:

1. Histologically low grade but biologically high grade:
   - diffuse, firm mass attached to and invading the underlying bone (maxilla)
   - low potential for development of metastasis except late in the course of the disease
   - high rate of local recurrence following treatment
   - difficult to treat as mass is poorly defined and has a poor response to radiation therapy

2. High grade:
   - invasive, destructive neoplasm
   - high potential for development of metastasis

Treatment:

1. Histologically low grade but biologically high grade:
   - radical surgical resection but this is often difficult due to poorly defined margins and site of the lesion
   - radiation therapy is a necessary adjunct to surgical resection as clean resections are generally impossible to achieve. Poor response when used as primary treatment modality

2. High grade:
   - radical surgical resection
   - adjunct radiation therapy due to high rate of local recurrence
   - metastatic disease - ??

The prognosis for dogs with oral fibrosarcoma is fair because of the high risk of local recurrence. With surgery alone local recurrence exceeds 50%. With postoperative radiation therapy 1-survival rates can be increased to ~75%. Poor response is seen if radiation therapy is used as a primary treatment modality.

Feline:

Fibrosarcoma comprises about 20% of feline oral neoplasms and is the second most common oral neoplasm seen in the cat. It arises on the gingiva presenting as a firm mass with a mucosal covering. It is an aggressive, invasive neoplasm with potential to metastasize.

Surgical resection may be difficult due to advanced disease at the time of diagnosis and the problems with radical oral resections in cats. It generally is poorly responsive to radiation therapy.

e. Osteosarcoma:

Osteosarcoma of the oropharyngeal cavity is a locally aggressive, invasive neoplasm that has a high local recurrence rate if not adequately treated and a metastatic potentially similar to osteosarcoma arising at other sites (appendicular). Treatment consists of:

1. Radical surgical resection to achieve clean margins if possible
2. Radiation therapy:
   - as an adjunct to surgical resection – local recurrence
   - as a primary mode of therapy
3. Chemotherapy:
   - Carboplatin – as for appendicular osteosarcoma
   - Palladia / Masitinib +/- cyclophosphamide

The prognosis for dogs with oral osteosarcoma can be good depending on its site of occurrence. A 71% one-year survival following surgical resection alone of mandibular osteosarcoma in the dog has been reported. Metastatic disease appears to be an increasing concern.

f. Dental Origin Neoplasms:
The dental origin neoplasms comprise about 5% of canine oral tumors. They can occur in a wide age range of dogs. Dental origin neoplasms tend to be expansile, firm, cystic masses within the bone of the jaw and can have a raised, cauliflower-like appearance. The surrounding bone is affected but not generally invaded. These neoplasms have no metastatic potential. Therefore clean margin radical resection can be curative. Radiation therapy can be used either in the primary or adjunct setting.