PRESENTATION NUMBER

the gingival games: the oral tumor challenge

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Overview of the Issue

As we continue to provide optimal care for our patients, including dental care, we are seeing an increase in the senior population of pets. With advancing years comes the increased incidence of oral tumors, though some masses can occur in younger individuals as well. Early detection of oral tumors can be challenging, because they are often not as obvious as more visible tumors. Regular dental care, including home care and professional care, can help increase the potential for detecting any abnormality early in its development, thus improving the chances for treatment.

Objectives of the Presentation

1. Recognize beginning warning signs of potential oral tumors for early detection
2. Learn general categories of oral tumors – developmental, benign, malignant
3. Be able to evaluate type and extent of tumor for optimal treatment plans
4. Understand the basic concepts of oral surgery for tumor management

**Detection and Identification**

Recognition of a lesion prior to any clinical symptoms or signs become apparent is unusual. Typically a patient may present with problems that range from discomfort with eating, swelling, bleeding, changes in the color of the gingival or mucosa, displacement of teeth, or a decrease in grooming (cats). Gross appearance of a mass may offer some clues, but additional diagnostics are needed for accurate identification. Most oral lesions don’t exfoliate well, and surface impressions may just contain contaminants. Fine needle aspiration or core needle biopsy may be employed on soft tissue lesions, as long as a representative sample is taken. Often some degree of surgical biopsy must be used, such as an incisional biopsy if the mass is large, or if initial identification is needed prior to staging the disease. An Excisional biopsy may be performed if the practitioner feels the lesion is well enough defined by visual assessment and imaging to be able to remove it all at once.

**Juvenile Tumors – Dog**

While many masses are seen in mature or senior patients, there are a few masses that are known to be found primarily in younger animals

*Papillomatosis*

This virally induced disease typically consists of multiple, peduncalated, tan to pink wart-like masses of the cutaneous and mucous membranes. Its appearance in younger dogs is somewhat diagnostic, though biopsy of a lesion will show fronds of epithelium. Most cases regress spontaneously, but if they are excessive in number and interfere with eating or cause extensive bleeding, some de-bulking may be necessary. It is thought that the self-limitation occurs due to the animal ‘self-innoculating’ itself by consuming some of the tissue. Heat-activated autogenous vaccines have been considered, but their use is controversial.

*Oral Papillary Squamous Cell Carcinoma (OPSCC)*

Once thought to be found in dogs less than 9 months of age, additional studies have found this invasive tumor in adults as well. A subtype of squamous cell carcinoma, this tumor can have a variety of appearances, with either a cavitating or non-cavitating appearance. It is found in the maxilla 80% of the time, and frequently in the rostral portion. Treatment is excision with wide surgical margins of 1-2 cm, though in humans, 1 cm has been documented. For those with unresectable tumors, piroxicam has been used palliately, with 46% of patients showing some degree of remission or stabilization of disease.

*Odontoma (see odontogenic tumors below)*

This group of tumors arise from odontogenic cell lines, either epithelium or mesenchyme. The more classical forms include the complex and compound odontoma, with each containing fully differentiated dental components. The complex odontoma will have tissues found in teeth, but no tooth-like structures, while the compound variety has everything from denticles present to fully formed teeth (sometimes multiples).

The ameloblastic fibro-odontoma (AFO) also arises from odontogenic cell lines, but presents more as osteolysis with mineralization. It requires more aggressive surgical removal, while the complex or compound masses can often be managed with enucleation and intracapsular excision with aggressive debridement of the cyst walls.

**Common Masses**

**Odontogenic**

*“Epulis” – current terminology changes*

The term ‘epulis’ refers to a gingival mass of any type, and previous classifications included fibrous (FE), ossifying (OE) and acanthomatous (AE) epulides, all thought to arise from the periodontal ligament tissues. The fibrous and ossifying types have now been grouped in a fibromatous group (some with mineralization) that contain PDL-like stroma and are considered benign. Recent conjecture theorizes that these possibly develop in response to chronic stimuli or inflammation.

When the mass contains rests of odontogenic epithelium, is highly cellular with fibroblastic connective tissue and variable amount of bone and collagen, it is now identified as a peripheral odontogenic fibroma (POF). Similar in components to POFs found in humans, these are most likely to be found in the rostral maxilla, with a higher prevalence in males. They may not have well-defined borders radiographically, and teeth may be displaced. Mineralization within the proliferative portion of the mass is not uncommon. With surgical excision of 1 cm margins and clean borders, this carries a good prognosis. Recurrence is likely, however if not completely excised.

The canine acanthomatous ameloblastoma (CAA) is also considered ‘benign’ with cords of squamous epithelium in connective tissue and minimal cell atypia with few mitotic figures. However, it demonstrates aggressive infiltrative growth and can be locally very infiltrative, most frequently found in the rostral mandible. Radiographs can show significant osseous changes and expansion into adjacent spaces, and advanced imaging (CT) would be preferred to detail the extent of the invasiveness of the tumor. With the goal of at least 2cm margins for resection, partial mandibulectomy or maxillectomy should be performed. With non-resectable tumors, options for radiation therapy or intralesional bleomycin injections may provide some management.

Other, less common odontogenic tumors may include ameloblastoma, amyloid-producing ameloblastoma, ameloblastic fibro-odontoma, Feline inductive odontogenic tumor (FIOT) and odontoma (see juvenile, above).

**Non-odontogenic – benign**

Gingival enlargement encompasses many clinical presentations, from minor gingival margin changes due to periodontal inflammation to extensive generalized thickening and enlargement as is seen in Boxers, but other breeds as well. Note – this are not necessarily hyperplastic changes, which is a histopathologic designation. Getting histopatholgic evaluation of any excised tissue is advisable. Within this group, focal fibrous hyperplasia (FFH) is an inflammatory, non-neoplastic hyperplastic change without the presence of odontogenic epithelium.

Plasmacytomas are not common in dogs and cats but can be found; less common are their malignant variants.

**Non-odontogenic - malignant**

*Melanocytic tumors*

Considered the most common malignancy in the dog, these very aggressive tumors are considered to already have micro-metastases by the time the tumor is detected. Up to 1/3 of these are poorly pigmented, so the presence or absence of black tissues is not diagnostic in itself. Early detection is critical to have any chance at tumor management with aggressive surgery with complete clinical staging, lymph node removal and other options of radiation therapy, chemotherapy and even consideration of the vaccine in Stage II and III tumors.

*Fibrosarcoma (FSA)*

As the third most common tumor in dogs and the second most common in cats, these tumors contain mesenchymal cells, malignant spindle cells and collagen, and are typically gingival in origin. In dogs, these are typically found in large male dogs (sometimes younger) as aggressive local disease with about 20-30% metastasizing. Particularly in golden retrievers, these tumors can appears low grade histologically, yet act high grade biologically with very aggressive local behavior, invasion into bone and metastasis to lymph nodes.

Survey skull radiographs can be helpful to show larger areas of local invasion while advanced imaging such as CT should be recommended for maxillary masses, larger mandibular ones, or ones in the caudal mandible. Margins of 2-3 cm are recommended, with adjuvant radiation therapy, or radiation therapy alone if the mass is inoperable.

*Squamous Cell Carcinoma (SCC)*

The second most common tumors in dogs, and the first most common tumors in cats (with three variants), the malignant tumor of the squamous epithelium tends to have more impact locally, with only 10-20% metastasizing in dogs (less if rostral SCC). In cats, the three types are gingival, lingual and tonsillar.

Gingival SCC in cats can be very locally invasive, and while metastasis is less likely, full stagin of the thorax with radiographs and lymph node assessment is recommended. With recommended margins of at least 2 cm, in cats with mandibular masses, mandibulectomy is recommended. Prognosis is better with rostrally occurring tumors. Combinations with radiotherapy, chemotherapy (dogs have more options) and even photodynamic therapy have all been reported.

Lingual SCC is the most common lingual tumor in cats and is often hidden in the sublingual tissues. Cats that have dysphagia, anorexia and are not grooming should always have the tongue examined, particularly the ventral portions. Most are inoperable, as they would require aggressive excision, and most cats would not do well with loss of a substantial portion of their tongue, whether it is rostral or longitudinal. Dogs respond better to near total glossectomy, learning how to eat and drink in a new manner. There are no effective agents for lingual SCC, though piroxicam can provide some palliation.

Tonsillar SCC is more common in dogs than cats, with rapid invasion from the tonsillar fossa into regional lymphoid tissue. This is typically unilateral, but with early metastasis. It is thought that toxins from urban environments may increase the incidence. Full staging is necessary with this tumor and while likely unresectable (with clean margins), excision may alleviate airway obstruction. Chemotherapeutic drugs used in dogs include cisplatin, carboplatin and piroxicam with regional radiotherapy for partial response or palliative management. A recent study in cats with radiation and carboplatin provided more favorable prognosis than previously thought.

*Other Malignant Masses*

While less common, other malignancies may include osteosarcoma, chondrosarcoma, mast cell tumor, hemangiosarcoma and malignant peripheral nerve sheath tumor. Epithelial T-cell lymphoma (ETCL), previously termed mycosis fungoides will have diffuse pigmentary changes, looking like diffusely red gingiva with punctate areas of increased redness and/or petechiation. This needs to be biopsied to be differentiated from erythema multiforme or other inflammatory processes.

**Treatment Planning**

The possibility for early detection provides the best chance for a reasonable success with oral tumors. Intraoral radiographs and skull radiographs can outline where osseous changes have begun, while advanced imaging provides much better analysis of all tissues involved. Biopsy can be used as part of the diagnostic process, whether incisional for initial identification or excisional for a combination treatment and diagnosis.

Incisional biopsy of a larger mass, or one that aggressive surgical decisions are needed, can provide valuable information as to the tumor type in order to determine margin placement. These biopsies should be obtained from the central portion of the lesion, not disrupting any margins, and deep enough to include bone, if it appears to be involved. In lesions that are possibly FFH POF or cysts, excision of the present mass without attempts at wider margins may be all that is needed. With proliferation in the oral cavity, an incisional biopsy may not be representative of deeper tissues, so non-diagnostic histolopathology reports are possible: always consider what the mass looks and acts like and consider additional attempts.

Excisional biopsy may be performed, with anticipated margins based on physical and radiographic signs. This will not be as accurate as in cases with previous histopathology or advanced imaging, but in many cases, pet owners prefer one surgical procedure. Choosing 1, 2, or 3 cm margins is based on the anticipated tumor type and is often dictated by the relative size of the patient as well.

**‘Ectomies**

When the decision for excisional biopsy has been made, there are a number of considerations to consider when planning the surgical approach. If advanced imaging is not available, over-estimate the extent of the lesion seen radiographically. Since margins are planned on distance away from the tumor edge, larger dog have the advantage of being able to lose more structures before critical areas are reached. Once the extent of excision has been determined, evaluating the area closely for closure options is also important. Adequate release of surrounding soft tissue must be afforded, and at times, (rostral mandibulectomy), sections of soft tissue (lips, skin) might need to be resected to provide a cosmetic closure.

If the tumor is located in the mandibular body, full thickness segmental removal can contribute to instability and drift, and this should be considered in long term management, both for self-induced trauma from the opposite side drifting, as well as TMJ stress. If the mass is on the dorsal portion of the mandible, and the bone is large enough, a rim excision could be considered, removing that portion of mandible dorsal to the mandibular canal. With any cut, the edges should be rounded – for better stability in the rim excision and closure for full segmental removal. Rostral mandibulectomies should always address the extent of the symphysis that may need removal. The structures in the mandibular canal, including the large mandibular artery, should be addressed whether encountered distally or rostrally at the mental foramina.

Hemimandibulectomy may be used for masses that encompass most of the mandible, or the caudal portion, particularly in cats and small dogs. While fairly uncomplicated in cats, TMJ resection in dogs is more challenging. Again, considerations of mandibular drift and contralateral TMJ degeneration should be evaluated.

Maxillectomies can provide a number of challenges, based on the depth of excision required. The palatal artery should be taken into account, from its distal aspect to the rostral branches at the level of the palatine foramina. Any excision that exposes the nasal cavity may have challenges in closure, and with significant rostral maxillectomies, soft tissue reconstruction around the nares can be very difficult. Mid- or caudal en-bloc resections also need to manage the infraorbital canal and structures, as well as the palatal artery and nasal or sinus cavity exposure. Margin delineations need to consider the structures of the zygomatic region, ptyergoid fossa (caudal aspect of the infraorbital canal) and the orbital region.

**Summary**

Like with other regions of the body, monitoring for any unusually masses is recommended; however, many oral tumors remain hidden until they are quite advanced. Being able to identify the mass accurately to make appropriate treatment plans can have a substantial impact on the prognosis for the patient. Most oral surgeries are possible in most practices, though some might be challenging.

Summary including 5 KEY “TAKE HOME” POINTS

1. Early detection is critical
2. Intraoral radiography is a minimal level of imaging needed; advanced methods may be preferred.
3. If a patient is to be referred, appropriate incisional biopsies can be important
4. While advanced diagnostics and procedures are possible, always consider the patient and caregiver’s needs.

References/Suggested Reading

Soukup J. Odontogenic Tumors. In: Lobprise H, ed. Blackwell’s Five-Minute Veterinary Consult Clinical Companion: Small Animal Dentistry, 3rd ed. 2021. Hoboken, NJ; Wiley: 227.