Advanced Oral Surgery Topics

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There are many challenging conditions that can arise involving the oral cavity of dogs and cats. Some conditions are noted immediately at birth, others develop as a result of malocclusion, trauma or neoplasia. The world around us is becoming increasingly litigious. As veterinarians we need to be as aware as our clients of the various treatment options and we need to know the "standard of care." Many states are emphasizing informed consent laws that require us to offer clients all various treatment options and potential complications. The conditions discussed in this lecture represent a wide range of surgical skills necessary for treatment. The information in this lecture is designed to stress treatment options. Various surgical descriptions can be found in most surgery textbooks.

Developmental conditions

Cleft palates: Animals suffering from cleft palates typically present as "runts" or "poor doers." Because of the oronasal communication they have difficulty generating suction necessary to nurse. Any milk they do manage to draw into the oral cavity frequently results in coughing/choking and being dispelled out the nose. If left untreated, the aberrant anatomy will continue to result in additional facial asymmetry. Prognosis for these animals is poor to fair until they reach six to eight weeks of age. At about 6-8 weeks the animal becomes a more stable anesthetic candidate and generally enough growth has occurred that results in tissues that are more amendable to surgery. In general, the more caudal the defect, the more severe the clinical signs will be. Rostral clefts usually result in unilateral nasal discharges whereas hard palate or caudal clefts frequently result in oral contents distributing on either side of the nasal septum giving rise to bilateral nasal discharge. All pet owners of animals with clefts should be counseled that this trait is recognized as having genetic inheritability.

Primary cleft palates relate to the failure of fusion of the maxillary process with the nasal process. This generates a failure of bone and soft tissue closure between the third incisor and canine tooth. Secondary cleft palates relate to failure for closure of the right and left maxillary shelves. Until a repair is performed supportive nutrition should be provided with bottle feeding or an early weaning and change to solid food. Because these defects have developed naturally, the blood supply of these tissues nearing the cleft result in a great deal of transitioning to smaller vessels. Without the robust blood supply, clients should be told that serial revisions might be necessary to achieve complete closure. Primary cleft palates may be closed with various soft tissue and rotational flaps. If a primary cleft palate involves the lip as well, staging the procedure by treating the lip first may help ensure the surgery site has does not release and open up. In all cases flaps should result in tissue edges being supported by bone. Extracting neighboring teeth may be necessary to create a suitable donor site and healthy recipient site. Various hinge flaps and rotation flaps exist for secondary cleft palates. If a secondary cleft palate technique results in exposed periosteum from the donor site, these areas granulate quickly. Palatal obturators may serve as a last resort to eliminate the communication between the mouth and nasal cavity. These devices may be removable or be semi permanent and placed under anesthesia/heavy sedation. Obturators typically are self-retaining and accumulate food and debris underneath which results in mucositis.

Acquired conditions

Included in the list of common benign dental tumors are the compound and complex odontomas. Complex odontomas refer to a disorganized mass of all the cellular components needed to form teeth: cementum, dentin, enamel and pulp. These masses usually have a mixed radiodensity and with a confirmatory biopsy, may be cured with local excision. Compound odontomas contain all the ingredients necessary to make up tooth, but these masses are commonly found to consist of many small teeth called "denticles." Enucleation of the entire mass is usually curative. Both manifestations of these masses are typically seen in young animals and arise as asymptomatic swellings. Radiography is key to differentiating between the two different types of odontomas. The removed tissue should be submitted for histologic evaluation.

Epulides is a term that is gradually phasing out of the veterinary literature. Classically there were the fibromatous epulis, the ossifying epulis and the acanthomatous epulis. The fibromatous epulis has been reclassified in veterinary medicine to the "peripheral odontogenic fibroma." The ossifying epulis has been renamed to the "peripheral odontogenic fibroma-ossifying type." The acanthomatous epulis is now known as the acanthomatous ameloblastoma. All three tumors are benign with the peripheral odontogenic fibroma and the –ossfying type being cured with extraction/en bloc resection of the associated tooth or occasionally with superficial biopsy. These two tumors are believed to arise from periodontal ligament origin or gingival connective tissue. Instances where these tumors are cured with biopsy suggest those arise from superficial gingival connective tissues. When these masses are associated with strategic teeth, serial resections to recreate a normal gingival margin may be an acceptable treatment with owner compliance to bring the pet back every 6-12 months. I always discuss the possibility of malignant transformation with the clients in instances where we chose to monitor and repeated trim back the overgrowth. Acanthomatous ameloblastomas, although technically benign, are locally invasive into bone. The aggressiveness of this tumor type necessitates wider margins. One to two centimeter

margins are usually sufficient. Acanthomatous ameloblastomas have been treated successfully with radiation therapy and with intralesional bleomycin. Both those papers suggest that there was malignant transformation of some tumors to develop into squamous cell carcinoma. The human literature on acanthomatous ameloblastomas suggests that the histologic characteristics of these tumors may be a precancerous form of squamous cell carcinoma. It is worth noting that the peripheral odontogenic fibroma in cats has repeatedly been seen to affect multiple adjacent teeth.

Dentigerous cysts are fluid filled swellings associated with unerupted teeth. Most commonly involving the mandibular or maxillary first premolars of boxers, these unerupted teeth are commonly seen oriented in a horizontal position. If left untreated, the slow cystic expansion resulting from hyperosmolar fluid from epithelial cellular byproducts can result in bone resorption. When and how quickly these lesions become clinically significant varies. Any teeth unerupted at 6 months should be considered for extraction, especially unerupted first premolars since those teeth are some of the first to erupt. Surgical treatment for dentigerous cysts is centered on removing the unerupted tooth and debriding the epithelial cyst lining. With delicate dissection the epithelium can be removed in sheets. Any remaining cyst lining that is left behind maintains the capacity to regenerate. In extreme situations the cystic expansion may cause bone resorption and subsequent death to the blood supply of neighboring teeth. Those teeth require extraction or endodontic therapy. Patients whose cyst results in loss of the ventral cortex and pathologic fracture create a difficult situation for reconstruction. Load bearing reconstruction plates are necessary since Mother Nature has effectively created a segmental mandibulectomy as the cyst expands. A sample of the cystic tissue should be submitted for histologic evaluation to rule out malignant transformation. Some textbooks refer to dentigerous cyst treatment by extraction of the unerupted tooth and marsupialization of the cavity. This seems counter productive since marsupialized cavities risk spontaneous closing, and if the cyst contents and epithelium are enucleated, the bony void would be expected to fill in with new bone.

Oronasal fistulas can arise from many different conditions. Anything from neoplasia to an iatrogenic event during tooth extraction can create a patent communication with the nasal cavity. If left untreated, chronic persistent rhinitis will develop and sneezing will be exacerbated when the patient eats or drinks. As stated above, the further caudal the communication, the more clinical the patients tend to be. The key to surgical repairing these communications is to determine the underlying cause of the pathology, and creating a tension free closure with a suture line that is supported by bone. Similar to the cleft palate repair, there are a variety of hinged, sliding, pedicle and island flaps designed for repair. Descriptions of these repair techniques can be found in veterinary dentistry, veterinary oral surgery or veterinary surgery textbooks. While free flaps have not gained much momentum as a repair technique in veterinary medicine, the use of cartilage from autogenous and allograft sources have shown promise.

Gingival hyperplasia a condition requiring histologic confirmation and is quite common in veterinary medicine. Underlying causes should be identified and modified if possible to prevent recurrence. Causes include genetics, drugs (calcium channel blockers, cyclosporine and phenytoin) and chronic periodontal inflammation. Treatment involves resection of overgrown tissue and reestablishment of a normal gingival margin and normal periodontal sulcus depth. Cold steel, laser, electrocautery and using a diamond bur on a high-speed hand piece have all been shown to be effective. Electrocautery is popular because of the hemostasis created during tissue resection. Many people caution against using the laser for resection because the unknown effects caused on the pulp tissue. Representative samples should be submitted for histopathology at the time of resection to confirm the diagnosis and to rule out conditions of local (peripheral odontogenic fibroma) or generalized neoplasia (oral lymphsarcoma).

Mucoceles and sialoceles are commonly used to refer to conditions of saliva extravasation into soft tissues. Clinically these animals present with dependant soft tissue swellings in the ventral neck immediately caudal to the angle of the mandible, fluctuant swellings below the tongue, or with generalized swellings around the ear. Diagnosis is confirmed by fine needle aspiration and cytology. Conservative treatment (medical management) can be performed, however culture and sensitivity should be performed to rule out sialadentitis. Salivary gland excision is the most reliable treatment despite marsupialization into the oral cavity being prevalent in the textbooks for the treatment of the sublingual sialoceles. With marsupialization, a window is created into the sialocele and the mucosal edges are sewn to the internal walls of the pocket creating a patent area for saliva to drain. Many people report spontaneous closure of the window and recurrence of the sialocele. In humans, the use of botulinum toxin A has shown promise to decreasing saliva production and allowing the acini of the gland to atrophy along with repair of disruptions in the salivary gland duct that may be contributing to sialocele formation.

Major oral tumor resection

The most common oral tumors in the mouth include (1) malignant melanoma, (2) squamous cell carcinoma and (3) fibrosarcoma. Aggressive surgical resection is recommended to achieve local control. Surgical margins commonly recommended include melanoma = 3cm, SCC = 1-2cm, fibrosarcoma = 2-3cm. Surgical resection should only be attempted after a representative biopsy has been collected and appropriate imaging has been performed (CT). Tumors found more rostral in the mouth carry a better prognosis since they are typically easier to completely resect and reconstruct. Tooth roots left in the margin of a resection should be removed and the closure of tissues should include the same principles as stated above involving closure without tension and placing incision lines over bone. Mandibulectomy patients risk the post surgical complication of mandibular drift due to the right and left mandibles no longer being continuous. Muscular pull and gravitational influence pull right and left mandibles toward midline. If the animal does not learn

to self-correct this condition, the mandibular canine teeth should be monitored for their contact to the hard palate. If palatal trauma occurs, extraction or crown reduction and root canal therapy should be performed to alleviate any discomfort and prevent oronasal fistula formation. With both mandibulectomy and maxillectomy patients the focus should be on creating a functional, comfortable bite. Short term, and rarely long term supplemental feeding options may be necessary as the patient learns how to eat. Close collaboration with medical oncologists is always recommended to determine if these cases benefit from adjunctive chemotherapy or radiation. Malignant melanoma is particularly early to metastasize and despite histologic clean margins, these patients are commonly treated with chemotherapy or even a melanoma vaccine.

Tongue tumors and injuries will commonly result in the need for resective surgery. Dogs seem to fair better than cats at modifying their technique for eating and grooming. Like other oral tumors, more rostral lesions carry a better prognosis for resection and cure. Without having the rostral most portion of the tongue, the feeding of softened food formed into meatballs, and fed on an elevated plate may help these patients draw the bolus into their mouth. Any time surgery is performed on the tongue the orientation of the major vessels along midline should be anticipated. Moving from lateral to medial, those structures are vein/artery/nerve. A two-layer closure and the burying of sutures should be considered in attempt to keep these patients comfortable post surgery.

Despite conditions that require large, and sometimes multiple surgeries, veterinary patients usually fair quite well. The goal of major surgery should be to create a functional, comfortable bite. Clients should be educated as to the functional changes in eating created with major resective surgeries as well associated cosmetic changes. Due to the oral environment being a location of constant motion and bathed in enzymes like saliva, revision surgeries are sometimes necessary.

Recommended reading

Verstraete FJ, Lommer MJ. Oral and maxillofacial surgery in dogs and cats. 1st ed. Saunders Elsevier. 2012
Soukup JW, Snyder CJ, Gengler WR. Free auricular cartilige autograft for repair of an oronasal fistula in a dog. J Vet Dent 2009; 26(2):86-95.
Slatter DH. Textbook of small animal surgery. 3rd ed. Saunders. 2002