

Test Your Dental IQ!!

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Often the veterinarian is expected by the client to render a diagnosis and a treatment plan solely based on the oral examination findings. Right or wrong, this often occurs during the initial patient visit. The doctor's recommendation for an oral treatment plan of action will either have the client accepting or rejecting the treatment proposal and this will determine their future doctor- patient relationship. Frequently the client is a breeder and the animal a potential "show candidate". Other times, the new patient is from a dissatisfied client of Dr. B of Anywhere Clinic your competitor. An educated, authoritative clinician who is capable of delivering the right oral answers is required for these more demanding pet owners. Some of the following oral problems might confront you. Can you make the correct diagnosis and the appropriate treatment plan?

Occlusion

A Normal occlusion is as follows: a) The upper incisors should be directly in front of the lower incisors so that the lowers rest on the inside enamel ridge of the uppers called the incisal cingulum, b) the lower canines should reside exactly midway between the upper canine and lateral incisor, and c) the lower premolars are directly in front of their upper premolar counterparts. Any discrepancy of the bite needs to be noted in regards to the age of the animal at presentation. Especially if the animals might be used for show or breeding purposes. Since the young animal's jaws are in dynamic growth and like all skeletal bones are regulated by multiple gene expression, changes can occur as the animal continues its development. Usually if there is a wide discrepancy of jaw length of the upper and lower, the animal more than likely will have problems after it is grown with how the jaws and teeth occlude. Jaw growth problems which then subsequently lead to dental malocclusions are all genetic or hereditary disorders.

The most common problem is a shorter than normal lower jaw. This class II malocclusion is called a "Parrot Bite". It will have medical consequences as a sequella. The developing adult lower canines as they erupt will hit into the hard palate creating eventually holes that communicate into the nose. These oro-nasal fistula needs to be closed in addition to caring for the underlying etiology. This is not only a disqualifying breed characteristic but also the ensuing medical problem will cause chronic rhinitis if not treated timely. There are three options to correct this problem: The lower canines can be moved to the outside either in a physiological position or behind the upper canines with either acrylic bite planes or elastic power chains. This will take approximately 4-8 weeks depending on the severity of the malocclusion. The second treatment alternative is to crown reduce both lower canines to the level of the lateral incisors and then perform a vital pulpectomy / pulp capping. This procedure will maintain the vitality of the shortened lower canines. The final treatment for the class II is surgical extractions. This in a young dog can be very challenging since the newly erupted teeth are like eggshells in the dentin wall thickness. Care must be taken on not using the elevators to forcefully and using more a #15 or #11 blade to cut the periodontal ligaments.

A reverse scissor bite is one in which the lower jaw is longer then the upper. It is also called a mandibular prognathism, "overshot", "underbite" or a class III malocclusion. This is seen in the brachycephalic breeds. Often this traumatic occlusion causes enamel attrition of the canines and lateral incisors. This leads often to a devitalization of the teeth, significant

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periodontal disease and substantial weakening of the lower jaw due to the upper incisors hitting directly into the mandible's soft tissue. The underlying bone then becomes more rarified from the pressure. The treatment of non-breeding dogs is to selectively extract the teeth that are less important ie. incisors that are causing the traumatic occlusion. Scrupulous home care is essential to avoid the periodontal sequella often associated with this bad bite.

Class I malocclusions are those in which the jaw length is normal however individual teeth are out of position. In this group are misaligned rotated or tipped teeth and malerupted teeth. Often the adult tooth bud can be improperly positioned within the jaw causing a subsequent malpositioning of the adult tooth. More frequently, retained deciduous teeth can improperly guide the adult tooth in incorrectly. In brachycephalic breeds due to lack of jaw space, the same full complement of teeth found in a mesaticephalic head (midsize muzzle) creates significant space restrictions. This causes impactions, crowding of teeth, and maleruptions. Selective tooth removals will eliminate trauma.

Dental and Periodontal Pathology

When evaluating the dental structures for pathology on a physical examination, it is helpful to be able to classify the abnormal findings into lesions that are either long standing or chronic versus acute. Is the structure of the tooth and possibly the color of the teeth being affected? This determination can be beneficial to recommending to the client the appropriate treatment. Changes in the tooth structure can either be from acute trauma like fractures or chronic degradation from caries and idiopathic resorption. The former requiring restoration+/- root canal therapy the latter extraction or crown amputation. Also the time when the structural defects are seen might shed light on the underlying cause of the pathology. In young animals after eruption deformation of the tooth shape or missing enamel might have viral or febrile disease as the etiology. Radiographs and possible enamel bonding might be the appropriate treatment. Primary tumors that affect young teeth in their formation, on the other hand, are seen with the complex or the compound odontomas and need to be treated with "Enbloc resections".

The Periodontium represents all structures that are related to the support of the teeth in the mouth. These structures are the gingiva, periodontal ligaments, cementum and alveolar bone. Diseases that affect this support system can be acquired. Bacterial plaque will accumulate on the crowns within 14 hours of a dental prophylaxis. If left untreated, this mineralizes into calculus. Both plaque and calculus cause the body to respond to the bacterial waste products. The degree of the body's response to the bacteria precipitates the degree of inflammation of the gingiva. As the disease progresses both the gingiva and bone recedes allowing the bacteria to penetrate deeper into the supporting bone. The bacterial colony changes from predominantly gram + aerobes to gram - anaerobes subgingivally. Not only will the tooth become mobile from the bone loss and potentially cause draining tracts if the subgingival infection does not have an outlet, but the surrounding mucosa which is in contact with the dental calculus will become inflamed. The treatment of choice for stage 2-3 periodontal pocketing is subgingival root planing and gingival curettage. This should be followed by the use of Doxirobe in the pocket to allow the reattachment of the long junctional epithelium to the root surface.

"CUPS" Chronic Ulcerative Paradental Stomatitis is a hyperallergic response by the body to the accumulated plaque and calculus. Thick "ropey" necrotic smelling saliva and severe pain is often seen. The most effective treatment to date for CUPS is total mouth extractions.

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Evaluation of Periodontal Disease

Exam room findings can often lead the clinician to better assess the patient as to the severity of the oral disease and give a more accurate prediction to the client as to the necessary therapy. The hallmark signs of an irreversible disease are that there is destruction of the supporting structures of the tooth. In this case gingival and bone recession are the most visible signs of this irreversible process. Mobility occurs when the tooth loses its vital support. In single rooted teeth this can be only 20-25 % of bone loss before the tooth is noticeably mobile. The scheme of mobility evaluated from side to side or rostral –caudal is from 0 = no movement to 3 = > 1 tooth width distance movement. Grade 2-3 evaluated in the exam room is a seriously affected tooth which should be recommended as a possible extraction.

In multi rooted teeth a 50 % attachment loss that equals gingival recession plus any pocket formation, is measured at the free gingival margin to the depth of the pocket. Exposure of the furcation is not a reason to remove teeth. Clients need to be informed of their options as to your therapy and their necessary role in homecare maintenance in order to be successful. Often it is extremely important that the clinician stage the disease in the exam room and then set the client up for the phases that the treatment will involve. This way the pet owner understands that your therapy is not a “one shot” endeavor which will clear the pet of all it’s ills. Often periodontal therapy involves multiple anesthetic procedures to appropriately treat and good client and patient homecare compliance.

Avulsed Teeth

Avulsions of the teeth usually occur more frequently to the rostral canines and can either be partial or complete. The apex of the tooth is displaced and alveolar bone is often fractured. Mobility of the tooth requires radiographs to determine if there is root fracture concomitant to the fractured alveolar bone. Usually the radiographs show a disparity of periodontal space width from one tooth side to the other when a luxation is present. The sequella of a damaged apical blood supply is pulpal necrosis in the mature tooth. The immature tooth due to an open apex and a greater tendency to recover may only develop a partial pulp necrosis limited to the coronal aspect. This may lead later to internal changes of the tooth so further radiographic assessment should be recommended.

Luxated teeth are digitally reduced to a normal position. A wire / acrylic splint should be placed around the affected tooth and stabilized to the contralateral side during the initial alveolar fracture healing. The splint should not interfere with the animal’s opening and jaw closing. The procedure of splint placement is as follows: Apply a “figure 8” 24 gauge wire around the reduced canine and the contralateral canine. Suture any soft tissue lacerations. Cleanse the crown after the tooth has been reduced. The tooth surfaces which will receive the acrylic are acid etched with 40% phosphoric acid gel for 1 minute followed by rinsing with water. On drying, this will leave a frosted appearance to the enamel. Acrylic is applied circumferentially around the reduced tooth and the contralateral anchorage tooth which is connected by an acrylic bridge formed across the palatal mucosa if it is a maxillary canine injury. A cold-curing acrylic without significant exothermia should be used for splinting (Pro-temp Garant-ESPE or Maxitemp Schein). The animal is sent home with a curved tip syringe and a dilute 1:100 chlorhexidine flush (1 cc of Nolvasan with 8 ounces of water). Normally the splint is removed in 4 weeks and the non-vital tooth is root canalled at this time.

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TMJ Luxations and Jaw Fractures

In cases of suspected trauma to the TMJ, skull radiographs in conjunction to intraoral dental films need to be taken. If there is any suspicion of a traumatic malocclusion, the TMJ bilaterally should be imaged. The more common TMJ luxations are of the dorsal cranial position. On clinical evaluation, the lower jaw moves laterally to the contralateral side. Depending on the duration of the luxation, in acute cases, an attempt at reducing the condyle back into the fossa might be achieved as follows: place a hexagonal pencil between the carnassial maxillary 4th premolar and the mandibular molar on the side of the luxation and then force the jaws closed at the same time as rotating the pencil to drive the condyle ventral and then caudal. If successful the rostral teeth should indicate a centric occlusion. A tape muzzle is then applied to allow minimal opening of the jaws thereby preventing the joint from opening and to allow fibrosis to occur. This should be for 3-4 weeks.

In the case of a caudal ventral luxation the jaw will lateralize to the ipsilaterally affected TMJ. The latter is often caused by cranial-caudal trauma to the mandible from high rise falls. Often the fossa is fractured as the condyle is driven caudally. An attempt to fuse important in addition is to rule out with lateral deviations of the jaw are condylar neck fractures which will collapse the length of the mandible to the ipsilateral side.

Attempts at reduction of the luxation is dependent

Fractures of the vertical mandibular ramus are often at the juncture to the horizontal ramus since the more dorsal portion or coronoid is protected by the maxillary zygoma. The bone is extremely thin at this site and a fracture difficult to stabilize with internal fixation. Stabilization of caudal fractures and reduced TMJ luxations are either done with a tape muzzle or by fusing the canine teeth. The teeth are first acid-etched, rinsed and dried. A bonding agent is then applied and light cured. The teeth are fused in a partially opened position with a composite resin. The opening is just enough to allow the tongue to pass through it, therefore allowing the animal to lap soft food. Initially the client is instructed to help syringe food in the patient's mouth for the first week. Alternatively an esophagostomy tube can be placed at the time of surgery.

The primary concern of the oral surgeon is to reestablish occlusion of the upper and lower jaws if there is any traumatic displacement. First aligning the teeth will allow the proper alignment of the underlying fractured bones which are attached to the teeth. Fractures of the upper jaw pose specific problems of stabilization since the palatal and maxillary bones are thin and incapable of holding screws and plates. Any facial deviations caused by their fracture must be stabilized by utilizing a combination of interosseous or interdental wiring techniques and acrylic splinting. The splint can be kept in place by directly bonding it to the pre-etched teeth similar to above. It can also be kept in place by priorly placing interdental wires and a then covering them with the acrylic. Significant trauma to the dorsal naso-maxillary bones with disruption of the turbinates can lead to subcutaneous emphysema. This rarely requires intervention since spontaneous resolution occurs post operative to the fracture repair

Fractures of the mandible lend themselves to acrylic and wire stabilization. Although plates and screws can be used in edentulous areas, when the teeth are present an increase risk of perforating the roots and creating chronic draining tracts exist. Often when tooth roots are within the fracture site it becomes necessary to extract the tooth in part or totally. A partially hemisected tooth followed by a vital pulpectomy can serve as an abutment tooth for purposes of an acrylic splint retention and stabilization. It also allows for a functional tooth after the oral trauma has healed.

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Symphyseal fractures are commonly dealt with by a full cerclage wire behind the canine teeth. Usually the wires are placed through an eighteen gauge needle which enters through the submandibular skin below the canines and exits at the muco- gingival line on the distal aspect of the canine. This loops over the symphysis and reenters into the needle tip which has been passed again from the ventral mandible up through the muco-gingival line on the distal aspect of the other lower canine. The wire ends are then twisted on each other until the symphysis is stable. Additionally an acrylic splint can be bonded between the canines for additional stabilization

Dental Eruption Problems

Dental eruption disorders encompass teeth that are either partially or completely impacted, or misaligned. The brachiocephalic breeds like the Boxers, Shih Tzu, Lhasa Apso and the Maltese are more prone to this development due to crowding from inadequate jaw space to accommodate the full complement of teeth. In contrary, other breeds have impactions due to tooth malformation or transposition of the adult tooth buds which then lead to eruption problems.

In the case of partial or total impaction, clinically the normal eruption times for deciduous and adult teeth are prolonged. Either individual or groups of teeth may be affected. Often the clinical crowns might be present but dramatically reduced in height or tipped in their axis when compared to the teeth of the contralateral side. Frequently, in place of the tooth is a large fluctuant purplish swelling. The animals are usually not affected in their behavior or eating habits. Depending on the encountered pathology the end result of impactions usually is cyst development.

In the case of partial eruptions clinically visible is that the horizontal axis of the crown becomes tipped. Radiographically the axes of the roots of the affected teeth develop abnormal curvatures or dilacerations to accommodate for this restricted coronal growth. In the human literature they attribute dilacerations possibly to trauma. It is further hypothesized that this confinement impacts the development of the endodontic system which, depending on the severity of the curvature may lead to vascular compromise and pulpal necrosis. Often visible under the affected teeth are periapical lucencies due to the leaching of the devitalized pulpal tissue into the surrounding bone. These teeth need to be treated either endodontically i.e. with a root canal or surgically extracted due to the danger of bone loss and fracture.

Contrary to a partial impaction or incomplete eruption, is the sequellae associated with a total impaction of the adult tooth. In the literature, Odontogenic cysts often result from lack of eruption. These cysts are classified into: Periapical or radicular cysts, Dentigerous or follicular cysts and Eruption cysts. The definition of the true cyst is an epithelium-lined pathologic cavity. Periapical cysts develop usually from non-vital teeth and necrotic pulp. The apical inflammation results in the formation of a dental granuloma. The degradation products of the pulpal necrosis stimulate the epithelial rests of Malassez which are located in the periodontal ligaments. This epithelial proliferation leads to a periapical cyst which as more debris develops within the cyst there is an increase of osmotic pressure. The pressure increase draws fluid within the cyst and a stimulation of the surrounding osteoclasts to break down more bone of the surrounding bone leading to cystic enlargement. If the cyst ruptures and hemorrhage forms within the cyst, dystrophic calcification can occur. In people the radicular cysts are usually asymptomatic and cannot be differentiated radiographically from the granuloma. If they are long-standing cysts they can cause root resorption of the offending teeth and adjacent teeth. The treatment is usually to extract the non-vital tooth and curette the apical zone. An alternative would be to do an apicoectomy and direct lesional curettage.

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The calcifying odontogenic cyst is believed to be derived from odontogenic epithelial remnants within the gingiva or within the mandible or maxilla. The cyst usually consists of a single cavity in which the fibrous wall encloses an epithelial lining which is irregular in structure. The basal cell layer consists of ameloblast-like cells. The most characteristic of this cyst is the keratinized, anucleate “ghost” cells which form small foci within the epithelial lining or larger keratin masses which extend into the cystic lumen. Mineralization of these ghost cells is common and calcified masses of variable sizes are seen. The cysts usually are solid and are amenable to simple excision.

Fracture of the Mandible Maxilla and TMJ

Depending on the extent, type and angle of external forces generated on the bones of the skull, this will lead to either simple or compound, closed or open fractures. Clinically depending on which bones are involved adjacent structures can be compromised. Not uncommon is ocular contusions and perforation of the tympanic membrane in maxillary fractures. Epistaxis, oral hemorrhage and respiratory dyspnea are routinely present with palatal bone disruption. Mandibular lateralization occurs to the ipsilateral side of mandibular ramus fractures and fractures of the TMJ condyle. Lateralization occurs to the contralateral side of a dorso cranial TMJ luxation.

Therapeutic osseous repair must take into consideration any dental elements which are involved with the fracture site. Combination of wiring and acrylic bonding techniques should be utilized for stabilization. Any teeth within the fracture site should be removed immediately or subsequently root-canalled after the primary bone callus has formed. Any bone fragments that have been separated from their blood supply should be removed. All exposed bone needs to be covered with mucosal flaps in order to speed healing.

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