

2019 AAHA Dental Care Guidelines for Dogs and Cats*

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ABSTRACT

The 2019 AAHA Dental Care Guidelines for Dogs and Cats outline a comprehensive approach to support companion animal practices in improving the oral health and often, the quality of life of their canine and feline patients. The guidelines are an update of the 2013 AAHA Dental Care Guidelines for Dogs and Cats. A photographically illustrated, 12-step protocol describes the essential steps in an oral health assessment, dental cleaning, and periodontal therapy. Recommendations are given for general anesthesia, pain management, facilities, and equipment necessary for safe and effective delivery of care. To promote the wellbeing of dogs and cats through decreasing the adverse effects and pain of periodontal disease, these guidelines emphasize the critical role of client education and effective, preventive oral healthcare. (*J Am Anim Hosp Assoc* 2019; 55:49–69. DOI 10.5326/JAAHA-MS-6933)

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These guidelines were prepared by a Task Force of experts convened by the American Animal Hospital Association. This document is intended as a guideline only, not an AAHA standard of care. These guidelines and recommendations should not be construed as dictating an exclusive protocol, course of treatment, or procedure. Variations in practice may be warranted based on the needs of the individual patient, resources, and limitations unique to each individual practice setting. Evidence-based support for specific recommendations has been cited whenever possible and appropriate. Other recommendations are based on practical clinical experience and a consensus of expert opinion. Further research is needed to document some of these recommendations. Because each case is different, veterinarians must base their decisions on the best available scientific evidence in conjunction with their own knowledge and experience.

Note: When selecting products, veterinarians have a choice among those formulated for humans and those developed and approved by veterinary use. Manufacturers of veterinary-specific products spend resources to have their products reviewed and approved by the FDA for canine or feline use. These products are specifically designed and formulated for dogs and cats and have benefits for their use; they are not human generic products. AAHA suggests that veterinary professionals make every effort to use veterinary FDA-approved products and base their inventory-purchasing decisions on what product is most beneficial to the patient.

† C. Snyder was the chair of the Dental Care Guidelines Task Force.

NAD (nonanesthetic dentistry); PD (periodontal disease staging); VOHC (Veterinary Oral Health Council); VTS (Dentistry) (Veterinary Technician Specialist[s] in Dentistry)

Introduction

The concept that a pet is suffering from oral pain, infection, and inflammation that may not be apparent but is affecting their quality of life is a reality that may not always be fully appreciated by the veterinary profession and often not understood by the pet-owning public. Compromised dental health can affect a pet's overall health, longevity, quality of life, and interaction with its owner without exhibiting obvious clinical signs of disease. The purpose of this document is to provide guidance to veterinary professionals that will enable them to recognize dental pathology and deliver appropriate preventive and therapeutic care to their patients, as well as to provide essential dental education to their clients.

In consideration of our patients' welfare, veterinary professionals must understand that dental patients often experience considerable fear, anxiety, stress, pain, and suffering. In order to achieve optimal clinical success and client satisfaction, it is essential that the veterinary team address these concerns with every client, beginning with the first interaction when scheduling an appointment.

The guidelines are based on evidence-based information whenever possible, although we recognize that relevant data and well-designed veterinary dental studies have not always been conducted for all the topics covered in these guidelines. As a result, expert opinion and the extensive clinical experience of the Task Force members have been used in writing the guidelines. The collective goal of the Task Force was to apply the highest level of evidence-based information available when preparing the guidelines.

The guidelines are intended primarily for general practitioners and veterinary team members without advanced dental training. The Task Force encourages all veterinary professionals to continuously improve their veterinary dentistry knowledge, skills, and treatment capabilities and to recognize cases needing referral. It is well known that many pet owners use the internet as a default resource for pet healthcare information and home treatment.¹ However, because of the specialized nature of dental procedures, including diagnosis and treatment, professional veterinary care is necessary for maintaining pet oral health. Therefore, veterinary dentistry represents an opportunity for a primary care practice to demonstrate a high level of service and professional expertise to its clients and to positively impact patient comfort and wellbeing.

The guidelines are intended to be a first-line resource in helping practitioners achieve that essential goal. Readers should consider the guidelines to be an extension and update of the *2013 AAHA Dental Care Guidelines for Dogs and Cats* (hereafter referred to as the 2013 AAHA Dental Care Guidelines), which continue to be a relevant source of medically appropriate information on veterinary dentistry.² Although the 2013 AAHA Dental Care Guidelines are an

excellent, basic resource for clinicians, the 2019 guidelines published here provide important new information. This includes (1) an expanded and updated discussion of commonly performed veterinary dental procedures, supported by photos that illustrate oral pathology and therapeutic techniques; (2) criteria for periodontal disease staging; (3) the importance for addressing pain and stress in dental patients; and (4) client communication tips for explaining the importance and rationale behind specific dental and oral procedures. Client education is a particularly important and often underappreciated aspect of veterinary dentistry. Without the pet owner's understanding and acceptance of the veterinarian's oral health recommendations, the decision to pursue dental cleaning, oral evaluation, and treatment will seem optional. Applying the AAHA Dental Care Guidelines with an emphasis on client communication will enhance your practice by providing your clients with services that address a critical component of canine and feline healthcare.

Dental Terminology

Although dental terminology is constantly being defined, current definitions applicable to veterinary dentistry are shown in **Table 1**. Readers will find it helpful to review these definitions before reading the remainder of the guidelines.

Veterinary dentistry is a discipline within the scope of veterinary practice that involves the professional consultation, evaluation, diagnosis, prevention, and treatment (nonsurgical, surgical, or related procedures) of conditions, diseases, and disorders of the oral cavity and maxillofacial area and their adjacent and associated structures. Veterinary dental diagnoses are made and treatments performed by a licensed veterinarian, within the scope of his or her education, training, and experience, in accordance with the ethics of the profession and applicable law.

The term "dental" has lost favor as an all-purpose descriptive term because it does not adequately define a particular procedure to be performed. For example, specific diagnostic and treatment terminology should be used to describe procedures such as a complete oral health assessment, orthodontics, periodontal surgery, and advanced oral surgery. Using specific diagnostic and treatment terminology will help staff and clientele understand the importance and specifics of a scheduled procedure.

Additional information on veterinary dental nomenclature can be found on the American Veterinary Dental College (AVDC) website (avdc.org/Nomenclature/Nomen-Intro.html).

Anatomy and Pathology

A comprehensive knowledge of oral and dental anatomy and physiology is imperative for recognizing and treating disease in the oral cavity and teeth. Veterinarians must understand the location,

TABLE 1**Definitions That Pertain to Dental Care Guidelines**

Terminology	Definition
Dental chart	A written and graphical representation of the mouth, with adequate space to indicate pathology and procedures (see the “2013 AAHA Dental Care Guidelines” for included items).
Dental prophylaxis	A procedure performed on a healthy mouth that includes oral hygiene care, a complete oral examination, and techniques to prevent disease and to remove plaque and calculus above and beneath the gum line under anesthesia before periodontitis has developed. <i>Note:</i> The words “prophy,” “prophylaxis,” and “dental” are often misused in veterinary medicine. More descriptive terms to use for the dental procedures that are commonly performed in companion animal dentistry to prevent periodontitis are COPAT, COHAT, and an oral ATP visit.
Dentistry	The evaluation, diagnosis, prevention, and/or treatment of abnormalities in the oral cavity, maxillofacial area, and/or associated structures. Nonsurgical, surgical, or related procedures may be included.
Endodontics	The treatment and therapy of conditions affecting the pulp.
Exodontia (extraction)	A surgical procedure performed to remove a tooth.
Gingivitis	Inflammation of the gingiva with or without loss of the supporting structure(s) shown with X-rays.
Home oral hygiene	Measures taken by pet owners that are intended to control or prevent plaque and calculus accumulation.
Oral surgery	The practical manipulation and incising of epithelium of hard and soft tissue for the purpose of improving or restoring oral health and comfort.
Orthodontics	The evaluation and treatment of malpositioned teeth for the purposes of improving occlusion and patient comfort and enhancing the quality of life.
Periodontal disease	A disease process beginning with gingivitis and progressing to periodontitis when left untreated.
Periodontitis	A destructive process involving the loss of supportive structures of the teeth, including the periodontium (i.e., gingiva, periodontal ligament, cementum, and/or alveolar bone).
Periodontal surgery	Invasive treatment necessary to re-establish or rehabilitate periodontal attachment structures. This is indicated for patients with pockets >5 mm, stage 2 and 3 furcation exposure, or inaccessible root structures.
Periodontal therapy	Treatment of tooth-supporting structures in the presence of existing periodontal disease; includes dental cleaning as defined below and one or more of the following procedures: gingival curettage for nonsurgical removal of plaque, calculus, and debris in gingival pockets; root planing periodontal flaps; regenerative surgery; gingivectomy-gingivoplasty; and the local application of antimicrobials.
Periodontium	The supporting structures of teeth, including (1) periodontal ligament, (2) gingiva, (3) cementum, and (4) alveolar and supporting bone.
Pocket	A pathologic space between supporting structures and the tooth, extending apically from the normal attachment location of the gingival epithelial attachment.
Professional dental cleaning	Scaling (supragingival and subgingival plaque and calculus removal) of teeth with power or hand instrumentation, tooth polishing, and oral examination performed by a trained veterinary healthcare provider under general anesthesia.

Some definitions were derived from previously published descriptions²

COHAT, comprehensive oral health, assessment, and treatment; COPAT, comprehensive oral prevention, assessment, and treatment; oral ATP, oral assessment, treatment, and prevention.

purpose, and function of the structures of the head and oral cavity shown in **Figure 1**.^{3–5} Dogs and cats have two generations of teeth (diphyodont), with the roots being longer than crowns. Most of the permanent tooth is composed of dentin, with the central portion of the tooth being the pulp chamber containing blood vessels, nerves, lymphatics, connective tissue, and odontoblasts (Figure 1).⁶ The tooth supporting structures, or “periodontium,” consist of the gingiva, periodontal ligament, cementum, and alveolar bone. The periodontal ligament attaches the tooth in the alveolus by being affixed between the cementum and the alveolar bone (Figure 1).^{3,7}

There are many pathologic processes that affect the oral cavity of dogs and cats (congenital, infectious, traumatic, neoplastic, autoimmune, and others). The most common and significant disease

is the inflammation of the tissues of the periodontium, or periodontal disease. The clinical terms used to describe the active process of periodontal disease include gingivitis and periodontitis. Gingivitis, the earliest stage of periodontal disease, is described as inflammation confined to the gingiva and commonly induced by bacterial plaque. Gingivitis is reversible and preventable.^{8,9} Plaque-induced gingivitis can be reversed by removal of the bacteria above as well as below the gingival margin and prevented with consistent plaque-removing home oral hygiene efforts.¹⁰ Calculus, or bacterial plaque that has become calcified by salivary minerals, is mostly an irritant and is relatively nonpathogenic.^{8,9}

The bacterial population at the tooth surface is initially composed of gram-positive, aerobic bacteria. The bacterial biofilm

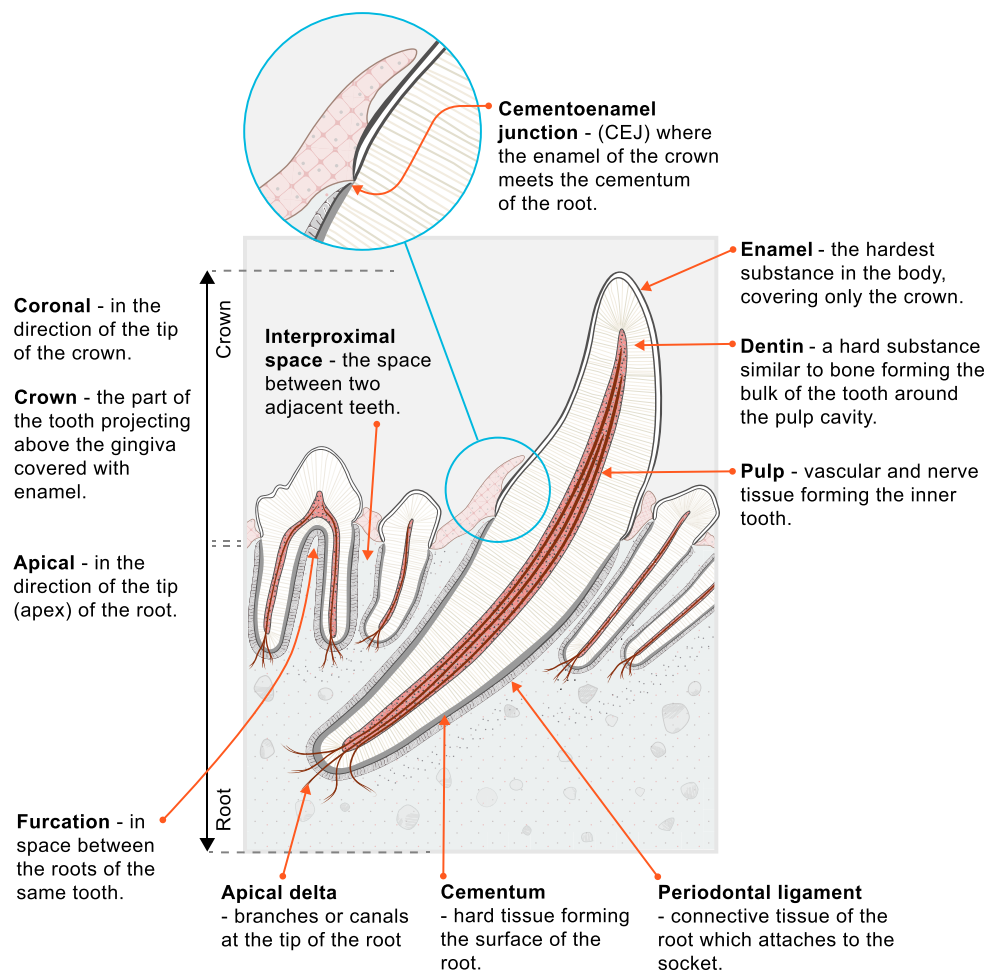


FIGURE 1 *Anatomy of a tooth.*
© 2019 Veterinary Information Network (VIN), illustration by Tamara Rees.

eventually invades the sulcus between the gingiva and the tooth, creating an environment selecting for a more destructive anaerobic, gram-negative population.¹¹ The bacterial byproducts directly cause tissue injury resulting in host inflammation, which directly contributes to loss of attachment between the tooth and periodontal structures. If left untreated, the chronic inflammatory host response can progress to periodontitis.⁹ Periodontitis is an inflammation resulting in irreversible loss of the supporting tissues of the teeth, progressing from periodontal ligament attachment loss to the loss of alveolar bone, resulting in clinically detectable attachment loss. Although this process can be stabilized, it is not easily reversible and can ultimately lead to tooth loss. Other factors influencing the progression and ultimate severity of periodontal disease may include breed predisposition, malocclusion, chewing habits, systemic health, and local irritants.¹²

Fractured teeth have been reported in up to 49.6% of companion animals.¹³ In the case of a complicated fracture (pulp exposure), the pulp chamber becomes contaminated by oral bacteria and proceeds to infection and necrosis, resulting in periapical infection.¹⁴ Tooth resorption is also common, affecting 27–72% of

domestic cats and fewer dogs, and is caused by odontoclastic destruction of teeth. Although the etiology of these progressive lesions remains unproven, gingival inflammation and exposure of the pulp chamber can be the result.¹⁵ These are some of the most common pathologies encountered in veterinary general practice and are associated with various painful stages during the course of progression. Practitioners can supplement their education and experience by consulting the growing body of literature and online resources on the oral pathology of dogs and cats.

Dental Disease Prevention Strategies

It is important to communicate with pet owners the importance of dental disease prevention strategies, beginning at the first visit and then throughout the patient's life stages. It is particularly important to emphasize individualized prevention strategies that should be maintained on an ongoing basis. Some companion animal practices use progress visits to evaluate oral health and home oral hygiene efforts by pet owners. A helpful aspect of client education is for veterinarians and staff to explain to clients the following three ways

preventive oral health products work: (1) mechanical (abrasion), (2) nonmechanical (chemical), and (3) a combination of mechanical and chemical modes of action. Some experts prefer oral health products that have dual action because all the teeth can benefit from the combination of mechanistic activities.

In most patients, periodontal disease is a preventable condition. Fractured teeth can often be prevented by appropriate selection of dental chews and toys and behavior modification for separation anxiety and cage-biting.

Preventing Periodontal Disease

Prevention of periodontal disease begins at the first visit, either for a puppy or kitten, as well as for a new adult patient. Recommendations for young patients include the following:

- A complete oral examination of the deciduous dentition will assess any missing, unerupted, or slow-to-erupt teeth. The occlusion should also be evaluated at this time, as well as determination of abnormal jaw length and teeth that are contacting other teeth or soft tissue. In such cases, early extraction may be needed.
- As permanent teeth start to erupt, it is critical to address any retained or persistent deciduous teeth. Immediate extraction of persistent deciduous teeth can help prevent displacement of the erupting permanent teeth that can result in a malocclusion, or that can exacerbate periodontal disease due to crowding. Retained deciduous teeth without a replacement permanent tooth can remain stable, although extraction may be necessary in cases of unstable dentition. Young pets with missing permanent teeth should have intraoral dental radiographs taken to confirm that the teeth are truly not present, as unerupted teeth can be problematic.
- Home oral hygiene training can be started for clients owning pets having erupted, permanent dentition. Juvenile patients actively exfoliating deciduous teeth may experience discomfort associated with home dental care efforts, and negative experiences should be avoided.
- The owner of any puppy or kitten who will be smaller than 20–25 lbs at maturity should be informed that the level of dental care and prevention for their pet is likely to be more involved than that of a larger dog. Brachycephalic breeds also tend to have more dental issues due to the rotation and crowding of teeth.
- A true dental prophylaxis (complete dental cleaning, polishing, and intraoral dental radiographs in the absence of obvious lesions) is recommended by 1 yr of age for cats and small- to medium-breed dogs, and by 2 yr of age for larger-breed dogs. During the procedure, any hidden conditions such as unerupted or malformed (dysplastic) teeth can be identified and

treated. Ideally, periodontal therapy should then be provided at an interval to optimally manage periodontal disease in this preventable stage.

If periodontal disease with attachment loss is already present in the patient, a complete dental assessment, intraoral radiographs, cleaning, polishing, and any necessary treatment will help address any current disease and optimally prevent further disease progression. Appropriate and effective home oral hygiene (see the “Client Communication and Education” section and resources at aaha.org/dentistry) can help maintain oral health in between dental therapy procedures. In most patients, effective periodontal prevention can help keep the oral cavity in a relatively pain-free and healthy state, favorably impacting the systemic health and welfare of the patient.

Clarification of the Impact of Periodontal Health on Systemic Health

The long-held dogma that specific oral bacteria are directly responsible for infection in distant organs is oversimplified and difficult to prove.^{16,17} There is an association shown between periodontal disease and systemic health parameters, and in human medicine, the presence of chronic inflammation associated with periodontitis has been recognized to likely negatively impact overall systemic health.^{18–25} The systemic spread of inflammatory mediators and cytokines and bacterial endotoxins from periodontal pathogens can impact the vascular system throughout the body and even cause histological changes in distant organs.^{26–28} Management or resolution of the inflammation associated with periodontitis is likely to have greater clinical impact than just considering antibacterial efforts.^{25,29,30} Although evidence demonstrating the direct correlation between systemic disease and oral and dental infections may be difficult to prove, the positive impact on patient quality of life is often clinically demonstrated and widely experienced.

Patient Assessment, Evaluation, and Documentation

History and Physical Examination

A thorough history of patient health should always include an evaluation and update on systemic maladies as well as an evaluation and review of oral hygiene efforts performed by the pet owner. Proactive management of oral health includes documenting any efforts by the client to provide home dental care. These include tooth brushing; type of diet fed; access to “chews,” treats, and toys; information on chewing habits; and updating any current or previous professional or home dental care. A thorough physical examination should be performed to evaluate all body systems regardless of species, breed, age, health status, and temperament. Patients presenting for complaints separate from the oral cavity should be

evaluated for the primary complaint. Appropriate diagnostic tests and treatments should then be recommended. Patients with underlying health conditions should be appropriately assessed so that general anesthesia associated with dental or other procedures can be safely performed.

Conscious Oral Evaluation

The conscious oral evaluation is an important first step to anticipating procedural extent and preparing and educating clients regarding anticipated findings while under general anesthesia. In many instances, the examiner will underestimate the presence of disease during conscious evaluation, only to have the full extent of oral pathology revealed by periodontal probing and intraoral radiography.

Examination of the conscious patient can be facilitated by use of individualized pharmacologic and nonpharmacologic protocols designed to reduce anxiety, stress, and pain. For anxious, conscious patients, there should be no hesitation to recommend use of anxiolytics to facilitate an awake oral examination. For established patients, anxiety can be effectively relieved by administering trazodone in dogs and gabapentin in cats, ideally the evening before and at least 2 hr before presentation if deemed safe and appropriate. For new patients who are difficult to assess, rapid-acting sedatives or anxiolytics such as butorphanol, acepromazine, dexmedetomidine, or alfaxalone are recommended. The use of anxiolytics and sedatives should not replace the need for procedure-associated analgesic strategies but will support the analgesic efficacy of analgesic medications. Additional, nonpharmacologic techniques of compassionate restraint that can help facilitate conscious patient evaluation include low-stress handling, use of pheromones, reduction of excess noise, and the use of highly palatable treats as a distraction. These techniques reduce conflict escalation and ensure the safety of the patient, the client, and veterinary staff. Familiarization with techniques described in the American Association of Feline Practitioners' Feline-Friendly Handling Guidelines is recommended.³¹

All physical exam findings should be recorded in the medical record (**Table 2**). Aside from general physical exam findings, visual attention should be paid to the head and oral cavity, and the visual evaluation should be performed with appropriate palpation. Specific signs associated with oral disease include pain on palpation; halitosis; drooling; viscous or discolored saliva; dysphagia; asymmetric calculus accumulation or gingivitis; resorbing teeth; discolored, fractured, mobile, or missing teeth; extra teeth; gingival inflammation and bleeding; loss of gingiva and bone; and abnormal or painful temporomandibular joint range of motion. Occlusion should be evaluated to ensure the patient has a functional, comfortable bite.³² The head should be evaluated and palpated including inspection and retropulsion of the globes, lymph nodes, nose, lips, teeth,

TABLE 2

Items to Include in the Dental Chart or Medical Record

Signalment
Physical examination, medical, and dental history findings
Oral examination findings
Anesthesia and surgery monitoring log and surgical findings
Any dental, oral, or other disease(s) currently present
Abnormal probing depths (recorded for each affected tooth)
Dental chart with specific abnormalities noted, such as discoloration; worn areas; missing, malpositioned, supernumerary, or fractured teeth; tooth resorption; furcation exposure; and soft-tissue masses
Radiographic findings/interpretation
Current and future treatment plan, addressing all abnormalities found. This includes information regarding initial decisions, decision-making algorithm, and changes based on subsequent findings
Recommendations for home dental care
Any recommendations declined by the client
Prognosis

mucous membranes, gingiva, vestibule, dorsal and ventral aspects of the tongue, tonsils, salivary glands and ducts, and assessment of the caudal oral cavity and gag reflex if it can be safely elicited. Any and all abnormalities (including abnormal swellings or masses) should be recorded in the medical record.

Careful attention to a conscious oral evaluation provides the practitioner with an opportunity to demonstrate oral pathology and educate the client about potential treatment options. Full appreciation for the spectrum of treatment options will likely not be known until additional information can be gathered from the radiographic interpretation and additional anesthetized oral examination findings such as pulp exposure, furcation exposure, tooth mobility, or periodontal pocketing. Pre-emptive discussion of oral findings with the client provides additional time for the client to consider what treatment options may be offered once anesthetized oral exam findings are collected. Periodontal probing for pockets or furcation exposure or dental probing to evaluate for pulp exposure or tooth resorption should never be performed on an awake patient. Inadvertent or deliberate contact with sensitive or painful areas such as the exposed pulp risks hurting the pet and exposing the owner or staff to being bit. Additionally, the pet may become averse to objects being introduced into its mouth. This tends to undermine the patient's trust in human handlers and is counterproductive to coaching the client to try various home oral hygiene tools or preventive care techniques.

Unconscious Oral Evaluation

Only after the patient has been anesthetized can a complete and thorough oral evaluation be successfully performed.³³ The

comprehensive examination includes a tooth-by-tooth visual examination, probing, mobility assessment, radiographic examination, and oral exam charting (Figure 2). Figures 3 and 4 show AAHA canine and feline dental charts that can be used to record oral health exam findings for the patient's dental records. After collecting this objective information, an individualized treatment plan can be discussed with the pet owner. A customized treatment plan should consider not only the extent of diagnosed pathology but also the practitioner's comfort level in performing such treatments, the client's willingness to comply with recommended anesthetized recheck oral exams or retreatments, and the client's willingness and ability to provide supplemental home dental care.

It is imperative that the practitioner recognizes that an anesthetized oral examination with intraoral radiography is necessary for complete assessment of oral health. One study found that 28% of grossly normal teeth in dogs actually had clinically important findings radiographically, and a similar study in cats reported 42% of grossly normal teeth demonstrated clinically important radiographic findings.^{34,35} Without intraoral radiography, the full extent of disease can easily be underestimated, leading to inappropriate treatment recommendations and failure to detect painful disease conditions. Additionally, because of the risk of overlooking retained tooth roots or causing iatrogenic jaw fracture, the American Veterinary Medical Association's Professional Liability Insurance Trust considers it difficult to defend recommending dental procedures without appropriate client counseling and without offering intraoral dental radiography.³⁶ If full-mouth intraoral dental radiographs cannot be taken, it is the responsibility of the healthcare team to advise the client that a complete, comprehensive examination cannot be performed.

In order to maximize patient benefits, full-mouth intraoral dental radiographs are necessary to avoid missing inapparent pathology and to establish the patient's baseline. At a minimum, pre- and postextraction

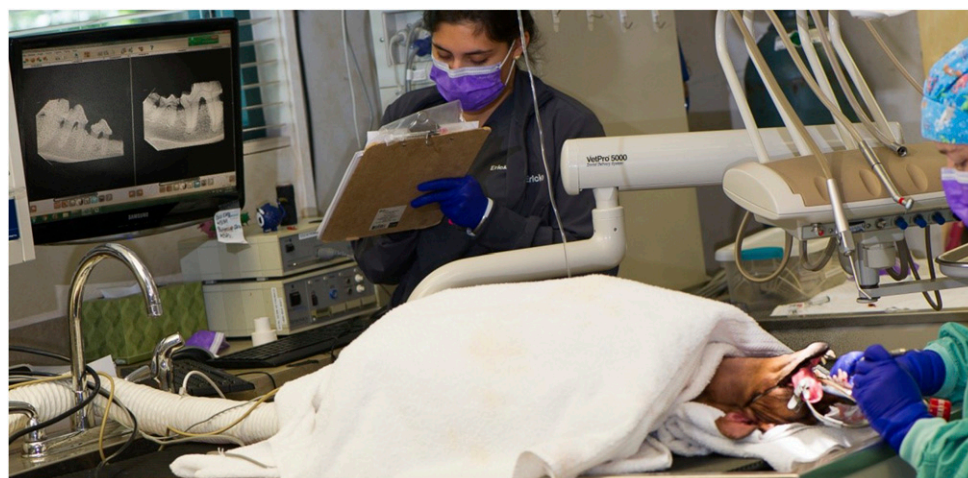
intraoral dental radiographs are essential. Although the interpretation of full-mouth radiographs may risk overtreatment of coincidental findings, it has been well documented that more clinically relevant pathology can only be identified radiographically.^{34,35}

As practitioners obtain the equipment necessary to take intraoral radiographs, it is essential to develop the knowledge and skills necessary to take and interpret diagnostic images. Opportunities to receive continuing education in these areas can be sought from veterinary dental specialists (Diplomate AVDC) and Veterinary Technician Specialists in Dentistry (VTS Dentistry) at national veterinary conventions, the Annual Veterinary Dental Forum, in books and online courses, and at private continuing education events. The Guidelines Task Force strongly recommends full-mouth intraoral dental radiographs in all dental patients.

Considering When to Refer

Recommending and providing optimal dental treatment recommendations for your patients sometimes includes recognizing when they should be referred to a specialist. This should be done when the capabilities of the provider, expectations of the client, or anesthetic management concerns exceed the comfort level of the primary care veterinarian. Referral to a veterinary dental specialist or practitioner with advanced dental training, expertise, or equipment is advisable if the *dental procedure requires skills and expertise beyond the level of capabilities of the primary care veterinarian*. Veterinary dental specialists often have experience managing high-risk dental patients. Referral may be preferable if the *client expresses the desire for a higher level of care that may exceed the capabilities of the primary care veterinarian*. Even though the primary care veterinarian may possess the procedural dentistry skills necessary to treat oral pathology, *referral to a practice with a veterinary anesthesiologist may be beneficial to address anesthetic risk factors and comorbidities*. Additionally, such

FIGURE 2 A “four-handed” dentistry procedure with the practitioner dictating oral exam findings to a dental assistant. Photo courtesy of Jan Bellows.



Canine Dental Record

PATIENT ID: (R) DATE: (L)

Treatment Performed Treatment Recommended

104 105 106 107 108 109 110 411 410 409 408 407 406 405 404

Exam Findings

103 102 101 201 202 203

204 205 206 207 208 209 210 311 310 309 308 307 306 305 304

403 402 401 301 302 303

Dental Conditions:
 AB: Abrasion
 AL: Attachment level
 AT: Attrition
 CA: Caries
 CU: Contact ulcer
 CS: Caudal stomatitis
 CWD: Crowding
 EH: Enamel hypoplasia
 FE: Furcation involvement, exposure (F1-3)
 FX: Fracture (E: Enamel; UCF: uncomplicated crown; CCF: complicated crown +/- root fx)
 G: Gingivitis
 GH: Gingival hyperplasia
 GR: Gingival recession
 MN/FX: Mandibular fracture
 MX/FX: Maxillary fracture
 M: Mobile tooth (1-4)
 C: Circled Missing tooth
 OM: Oral mass
 ONF: Oronasal fistula
 PE: Pulp exposure
 PP: Periodontal pocket (Depth in mm)
 PD: Periodontal disease (I: Gingivitis; 2: 25% attachment loss; 3: 25-50% attachment loss; 4: >50% attachment loss)
 RD: Retained deciduous tooth
 ROT: Rooted tooth
 RTF: Retained tooth root
 SN: Supernumerary tooth
 ST/CU: Stomatitis, contact ulcer
 T/I: Impacted tooth
 TALUX: Luxated tooth
 T/NV: Non-vital tooth
 TR: Tooth resorption (I: Mild dental hard tissue loss; 2: Moderate dental hard tissue loss; 3: Deep dental hard tissue loss; 4: Extensive dental hard tissue loss; 5: Remnants of dental hard tissue loss/gingival covering is complete)
 X: Extraction
 XS: Extraction, sectioned
 XSS: Extraction, surgical

Dental Treatment:
 BG: Bone graft
 BI: Biopsy, incisional
 B/E: Biopsy, excisional
 CRR: Crown reduction
 F: Flap
 GV/GVP: Gingivectomy, plasty
 ONF/R: Oronasal fistula repair
 PCT: Periosteal placement
 RC: Root canal therapy
 RPC: Root planing, closed
 RPO: Root planing, open
 VP: Vital pulp therapy

Stage of Periodontal Disease:
 0 = Normal
 1 = Gingivitis
 2 = Early periodontitis
 3 = Moderate periodontitis
 4 = Severe periodontitis

Note: Exam findings are recorded on the blank on the inside of the chart, treatment recommended is recorded on the line on the outside of the chart, and whether treatment was performed is recorded in the checkbox. Note ✓ if treated, D if treatment was declined, and F if treatment is recommended in the future.

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FIGURE 3 AAHA canine dental record (aaha.org/dental_resources).

referral practices may include access to other individuals with expertise in managing patients with underlying comorbidities that jeopardize the safety of the anesthetic event, especially involving patients with cardiac disease, chronic renal disease, diabetes, or hyperadrenocorticism.

Dental Procedures

General Considerations

Nonsurgical dental procedures must be performed by a licensed veterinarian, a credentialed technician, or a trained veterinary assistant under veterinarian supervision in accordance with applicable state or provincial practice acts. Oral surgery, including surgical extractions, must be performed only by trained, licensed veterinarians. State-by-state regulations concerning what licensed technicians can perform are summarized at avma.org/Advocacy/StateAndLocal/Pages/sr-dental-procedures.aspx.

Anesthesia allows the practitioner and assistants to carry out dental procedures in a safe and effective manner, minimizing the risk of injury. Anesthesia recommendations and techniques are discussed in the "Anesthesia, Sedation, and Analgesia Considerations" section.

All dental procedures need to use a consistent method to record pathological findings, recommended treatments, treatment performed,

Feline Dental Record

PATIENT ID: (R) DATE: (L)

Treatment Performed Treatment Recommended

104 106 107 108 109 409 408 407 404

Exam Findings

103 102 101 201 202 203

204 206 207 208 209 309 308 307 304

403 402 401 301 302 303

Dental Conditions:
 AB: Abrasion
 AL: Attachment level
 AT: Attrition
 CA: Caries
 CU: Contact ulcer
 CS: Caudal stomatitis
 CWD: Crowding
 EH: Enamel hypoplasia
 FE: Furcation involvement, exposure (F1-3)
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 X: Extraction
 XS: Extraction, sectioned
 XSS: Extraction, surgical

Dental Treatment:
 BG: Bone graft
 BI: Biopsy, incisional
 B/E: Biopsy, excisional
 CRR: Crown reduction
 F: Flap
 GV/GVP: Gingivectomy, plasty
 ONF/R: Oronasal fistula repair
 PCT: Periosteal placement
 RC: Root canal therapy
 RPC: Root planing, closed
 RPO: Root planing, open
 VP: Vital pulp therapy

Stage of Periodontal Disease:
 0 = Normal
 1 = Gingivitis
 2 = Early periodontitis
 3 = Moderate periodontitis
 4 = Severe periodontitis

Note: Exam findings are recorded on the blank on the inside of the chart, treatment recommended is recorded on the line on the outside of the chart, and whether treatment was performed is recorded in the checkbox. Note ✓ if treated, D if treatment was declined, and F if treatment is recommended in the future.

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FIGURE 4 AAHA feline dental record (aaha.org/dental_resources).

and treatment declined, as well as future planned treatment and prevention recommendations in the medical record.

Practitioners should be aware that transient bacteremia from the oral cavity is commonplace and increased during oral procedures, and therefore, risk for seeding other remote surgical locations is possible. Combining dental and other surgical procedures should be performed with caution. The risk of multiple anesthetic events should be weighed against the risk of complicated healing in the presence of significant periodontal disease.³⁷

Positioning and safety of the patient is important. The head and neck should be stabilized when forces are being applied in the mouth. The use of spring-loaded mouth gags must be avoided as it may compromise blood flow, which may cause myalgia, neuralgia, blindness, or trauma to the temporomandibular joint. If a mouth prop is necessary, do not fully open the mouth or overextend the temporomandibular joint.³⁸

Whenever possible, practitioners and assistants should demonstrate healthy ergonomic practices to avoid chronic injury. Activities and procedures that cause excessive reaching, bending, and twisting should be limited. For example, instruments and equipment should be arranged where they can be easily grasped. Supplies should

be placed as close as possible to the working area and at working height to decrease stretching and bending. Sufficient space should be allowed to enable turning the whole body, using a swivel stool.

Essential Steps Before, During, and After the Dental Cleaning and Periodontal Therapy

The essential steps for a professional dental cleaning and periodontal therapy are as follows:

1. *Perform an oral evaluation on the conscious patient before administering anesthesia.* A visual assessment can suggest whether periodontal disease exists and its extent.
2. *Radiograph the entire mouth of the anesthetized patient using intraoral film or intraoral digital radiographic systems.*
3. *Scale the teeth supra- and subgingivally using a hand scaler (supragingivally), curette (subgingivally), or an appropriately powered ultrasonic scaler followed by a curette inserted subgingivally to remove additional plaque and calculus (Figure 5).* Do not use a rotary scaler, which excessively roughens the tooth enamel.^{39,40} Elimination of calculus is essential because it acts as a retention matrix for plaque and toxins harmful to the tooth's support. Curettes are designed to assist in the removal of subgingival plaque and calculus for root planing and curettage (soft tissue removal in diseased periodontal pockets). Curettes have a smooth, rounded heel and toe opposite the cutting surface. The rounded back makes curettes less traumatic to soft tissues compared with sickle scalers.
Every professional teeth cleaning should include hand scaling of the accessible root surfaces (Figures 6, 7). Aggressive curettage and scaling causing cementum removal is discouraged. Cementum covering the roots contains cell-activating proteins that encourage reattachment. Dentin does not contain these proteins. Subgingival ultrasonic treatment causes cavitation and disruption of the subgingival ecosystem and biofilm. The design and safety of thin, long, ultrasonic periodontal tips decrease the need to aggressively root-plane teeth affected by periodontal disease.
4. *Crown polishing is recommended after cleaning and scaling, to assist in the reduction of microabrasions on the enamel.* Polish the teeth using a low-speed hand piece prophylaxis angle and polishing cup running at no more than 3000 rpm. Polish with prophylaxis paste or fine-grit pumice because medium or coarse grit can contribute to enamel loss, microabrasions, and predisposition for plaque accumulation. The use of disposable prophylaxis angles and individually packaged prophylaxis paste is strongly recommended to avoid cross contamination.
5. *Perform oral evaluation using a periodontal probe after dental scaling and full-mouth radiographs have been obtained.* Each

tooth should be probed in at least six places parallel to the roots. The probing depth should not be greater than 2–3 mm in a midsized dog and 1 mm in a midsized cat. Oral examination abnormal findings should be charted.⁴¹

6. *Perform subgingival irrigation to remove debris and polishing paste and to inspect the crown and subgingival areas.* Use the air or water syringe to inspect the visible subgingival areas for remaining calculus requiring removal (Figure 8).
7. *After sharing examination findings, a therapy plan, related fees, and informed consent with the pet owner, perform indicated periodontal therapy or extractions.* Periodontal disease staging and appropriate treatment are as follows:
 - *Stage 1 (periodontal disease staging [PD]1, gingivitis):* Dental scaling, polishing, irrigation, home dental care.
 - *Stage 2 (PD2, early periodontal disease with <25% attachment loss):* PD1 care plus locally applied antimicrobials and/or subgingival scaling if pocketing exists.
 - *Stage 3 (PD3, established periodontal disease with 25–50% attachment loss):* Periodontal treatment including periodontal surgery will only be successful if the client is committed to consistently administering home dental care. Extraction indicated if client and patient will not commit to daily home oral hygiene. *Periodontal therapy: closed- or open-root planing ± locally applied antimicrobials or advanced periodontal treatment such as guided tissue regeneration.*
 - *Stage 4 (PD4, advanced periodontal disease with >50% attachment loss):* Extraction or periodontal surgery including osseous resective or additive procedures followed by consistently performed home dental care; prognosis is considered guarded.

Extraction site packing, which includes bone autografts, allografts, or synthetic products, may be appropriate in select extraction sites where the remaining supporting bone is at risk for fracture during the period of extraction site healing, for example, in a dog's mandibular first molar or canine. These products are used to facilitate bone healing when concern over bone integrity or strength exists. The use of extraction site packing is contraindicated in the presence of osteomyelitis or infection.^{42–44}

Periodontal surgery is performed to remove deep debris, eliminate pockets, and to extract teeth. When pocketing or gingival recession exceeds 50% of the root support, extraction is indicated and should be performed by trained veterinarians or referred for treatment by a veterinary dental specialist when the practitioner does not have the expertise, equipment, or facilities to perform treatment. It is recommended that extraction sites >1 mm should be sutured with

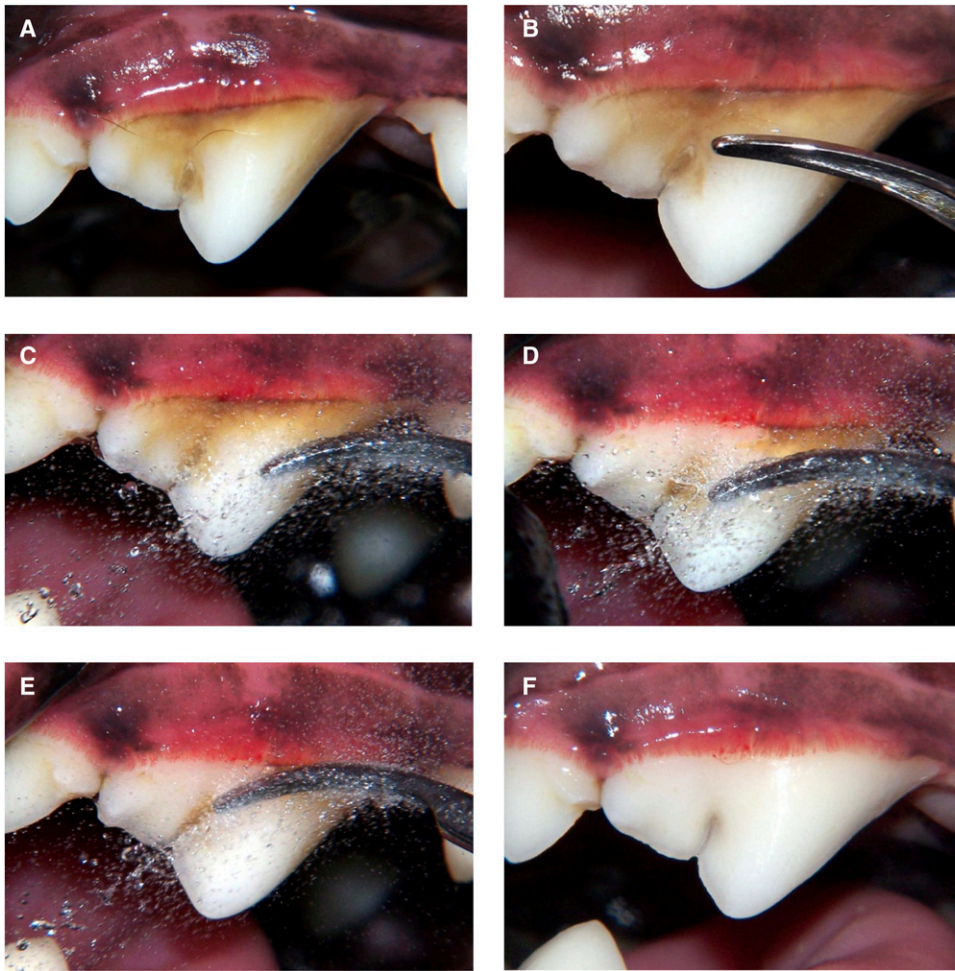


FIGURE 5 Sequence for a dental cleaning and periodontal therapy procedure. (A) Plaque- and calculus-laden right maxillary fourth premolar. (B) Placement of the ultrasonic scaler tip against the crown before activation. (C) Activation and tuning of the ultrasonic scaler to deliver a cooling and irrigation mist. (D) Removal of plaque and calculus. (E) Removal of plaque and calculus from the developmental groove. (F) Cleaned tooth. Photo courtesy of Jan Bellows.

absorbable suture (4-0 or smaller) to keep blood clots in and food and debris out.

8. *Administer either systemic or local perioperative antibiotics where indicated.* The use of antibiotics in veterinary dentistry must be assessed on a case-by-case basis. Therapeutic antimicrobials should be used appropriately in the surgical setting. Most dental procedures are considered to be clean-

contaminated procedures, meaning that after extractions, systemic antibiotics are usually not indicated.⁴⁵⁻⁴⁷

Preoperative antibiotics given several days before surgery may be administered in cases of PD4 for the purpose of making tissues more amenable to surgical handling. Intraoperative antibiotics may be indicated in patients with systemic risk factors, such as subaortic stenosis, systemic



FIGURE 6 The photos show hand scaling of accessible root surfaces. (A) Orientation of the curette before placement in the periodontal pocket. (B) Insertion of curette into the periodontal pocket. (C) Removal of subgingival debris. Photo courtesy of Jan Bellows.

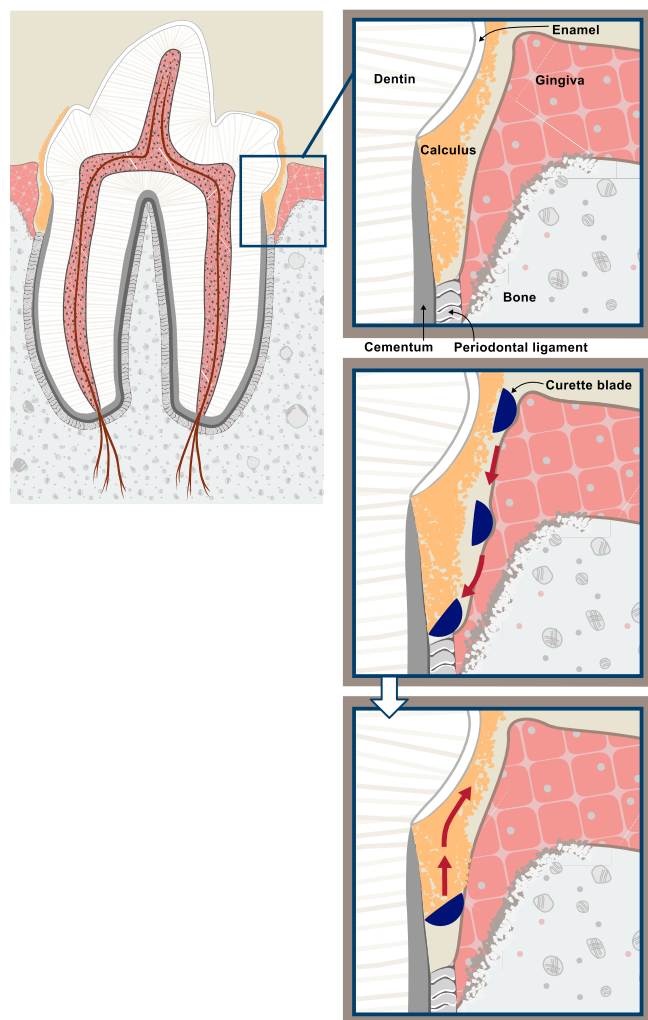


FIGURE 7 The subgingival curette blade is introduced atraumatically below the gumline with the face of the instrument nearly parallel to the root surface. At the bottom of the sulcus, the handle is adjusted, causing the down (cutting) edge of the instrument to contact the root surface. Plaque, calculus, and debris is removed on the upward pull stroke. © 2019 Veterinary Information Network (VIN), illustration by Tamara Rees.

immunosuppression, and orthopedic implants placed in the last 12–18 mo. Appropriate clinical judgment for each individualized patient is necessary. Postoperative antibiotics are indicated when radiographic evidence of presumed osteomyelitis is present. Clindamycin (5.5 mg/kg *per os* q 12 hr) and amoxicillin-clavulanic acid (13.75 mg/kg *per os* q 12 hr) are both approved for use in cases of dental infections and should be prescribed for a full 7–14 day course.

The use of locally applied antimicrobials (LAA), also called periocutics, may be indicated where a >5 mm cleaned pocket exists in PD2 or PD3 cases (Figure 9). The purpose



FIGURE 8 Compressed air used to visualize the root surface and subgingival calculus. Photo courtesy of Jan Bellows.

of use is to improve periodontal health and encourage reattachment to a normal level.⁴⁸ PD4 cases require more invasive periodontal debridement and management; however, locally applied antimicrobials (LAA) may also be a component.

9. Apply antiplaque substances such as barrier sealants. It is important for practitioners to understand the appropriate indications for the use of sealants. The term “sealant” in human dentistry is a substance applied to teeth to prevent tooth decay. In veterinary medicine, barrier sealants are applied to decrease the accumulation of plaque (Figure 10). Although the use of barrier sealants has been shown to decrease accumulation of plaque subgingivally, it does not totally prevent accumulation of subgingival plaque, the occurrence of periodontal disease, the need for home oral hygiene, or professional dental therapy.^{49–51}

The use of resin-bonded sealants is designed to treat damaged tooth structure (e.g., fractured or abraded teeth without pulp exposure) by sealing exposed dentin tubules, thus decreasing sensitivity and risk for bacterial migration leading to pulpitis. A complete examination and intraoral radiographs are necessary before using any bonded sealant to identify nonvital teeth and other pathology. Application of these products requires appropriate training and radiographic follow-up in 6 mo to reconfirm tooth vitality. Inappropriate use may result in increased dental pain, risk



FIGURE 9 Injection of periosteal into a 5 mm cleaned, bleeding periodontal pocket. Photo courtesy of Jan Bellows.

for infection, and loss of tooth vitality. The use of resin-bonded sealants in cases of tooth resorption is contraindicated.^{52,53}

10. *Biopsy all abnormal masses visualized grossly or radiographically and submit samples for histopathologic evaluation by a pathologist qualified in oral tissues analysis.*⁵⁴
11. *Maintain an open airway via intubation until the animal is swallowing and is in sternal recumbency.* Maintain body temperature and continue intravenous fluid support as needed. Continuously monitor and record vital signs until the patient is awake. Continue pain management while the pet is in the hospital and upon discharge.^{55–57}
12. *Provide instruction on home oral hygiene.* The Veterinary Oral Health Council (VOHC) Accepted Products web page (vohc.org/accepted_products.html) lists products that have been scientifically proven to be effective in retarding accumulation of dental plaque and/or calculus.^{58,59}

Anesthesia, Sedation, and Analgesia Considerations

Fear of anesthesia is the most common cause of clients' decisions to forego dental procedures for their pets.⁶⁰ Canine and feline patients in

need of medical or surgical procedures requiring anesthesia can be managed to maintain a favorable balance between risk and derived benefit. Medically important and indicated procedures should not be absolutely discouraged based on chronologic age or most underlying comorbidities. The most recent AAHA/AAFP Pain Management Guidelines provide the entire veterinary care team an opportunity to revisit the pathophysiology of pain and intervention strategies and associated pharmacology/pharmacokinetics of treatment.

General anesthesia with endotracheal intubation, appropriate monitoring, and physiologic support is necessary for dental procedures, including dental cleaning and scaling as well as more advanced dental care. Expert opinion and published data strongly support the use of general anesthesia for dentistry. So-called "anesthesia-free" dentistry has not been shown to be safer or comparable to the capacity to supra- and subgingivally clean teeth in an anesthetized patient and is therefore unacceptable.^{2,61}

Any dog or cat presenting for anesthesia should be considered on an individual basis. Anesthesia for older dental patients and those with comorbidities requires special attention. Each patient will have specific physiologic alterations or diseases unique to that individual. Thus, the anesthetic protocol needed for one patient typically will be quite different from that needed for another. The use of local anesthetics as dental blocks dramatically decreases the depth of general anesthesia needed, and thereby helps support blood pressure, decreases ventilatory depression, provides analgesia, and generally increases safety. Additionally, anxiolytic administration prior to veterinary visits has become routine to decrease stress in some patients. The synergistic effect between anxiolytics and other drugs necessitates consideration for decreased amount of premedication, induction agents, and maintenance anesthetics necessary to achieve the desired effect and should be considered when formulating an anesthetic plan.

As with any patient, a thorough and complete history and preanesthetic examination should be completed. Any previous anesthetic experience with the patient should be noted, and close attention should be paid to any anesthetic complications or abnormal responses. A minimum database including laboratory evaluation and imaging will be individually developed. Additional diagnostics will be indicated for some dental patients based on clinical signs, practical availability, and client consultation. Any abnormal preanesthetic findings should be thoroughly evaluated and delaying the anesthesia and surgery should be considered if necessary to address any potential problem areas identified. Veterinarians must be in tune with their clients, their patient's psychosocial issues, and the existing human–animal bond. Often, stressed and compromised animals do not thrive at the veterinary practice, away from their families and homes.

Considerations should be made to make the dental stay brief and less stressful. Outpatient techniques with prompt return of the patient to familiar settings and routines are highly desirable for all

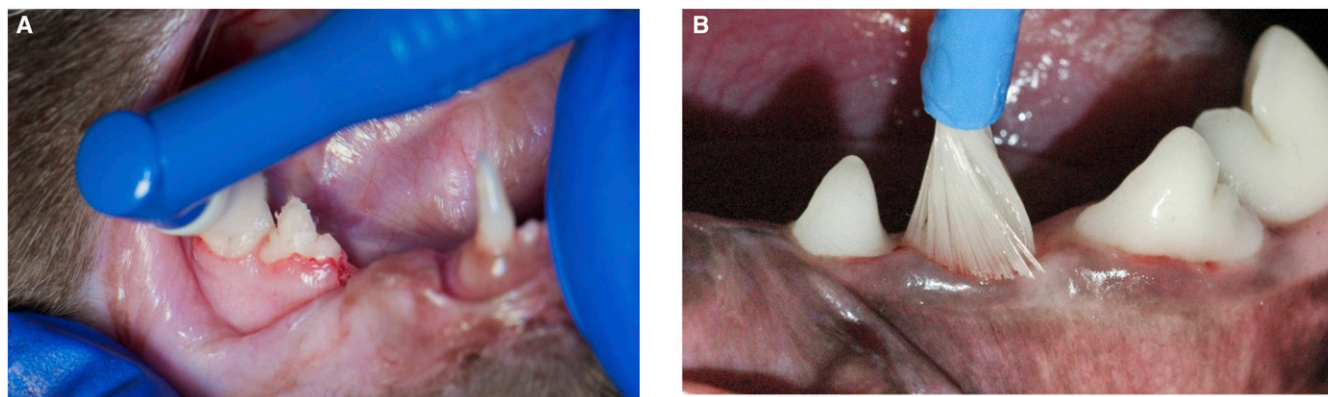


FIGURE 10 Application of antiplaque sealant. (A) Barrier sealant gel professionally applied to a cat's gingival sulcus; home plaque prevention gel is then reapplied weekly by the pet owner. (B) Application of hydrophilic gingival dental sealant professionally applied to a dog's gingival sulcus; reapplication is recommended every 6 mo. Photo courtesy of Jan Bellows.

dental patients. A gentle approach, both in pharmacology and in the application of clinical techniques, is especially important and will benefit all patients. Support of the human–animal bond is an important goal, and dedicated emphasis on the reduction of fear, stress, and pain is always warranted and primarily addressed through management and behavioral modification. Anesthetic management represents a powerful combination of additional modalities.

General Anesthesia

For outpatient dental anesthesia, it is useful to select perioperative medications that (1) typically provide for a rapid and complete recovery (propofol or alfaxalone), (2) can be carefully reversed (diazepam, midazolam, opioids, and dexmedetomidine), (3) can be totally eliminated by supported ventilation (isoflurane, sevoflurane, or desflurane), or (4) do not have substantial intrinsic toxicity or significant adverse effects should drug effects persist (diazepam, midazolam, or butorphanol). In situations in which delayed or inadequate recovery is recognized, physiologic support including judicious fluid therapy, support of body temperature, ventilatory support, and extended postanesthetic care should be provided. It is worth noting that there is a strong consensus among veterinary anesthesiologists to reverse dexmedetomidine only when medically necessary, which allows the beneficial residual sedation to continue after the completion of procedures in order to facilitate and ease recovery. If necessary, consider using a low dose of atipamezole in cats.⁶²

Adequate fluid replacement should be given to help prevent a renal crisis and to help maintain a proper perioperative hemodynamic state. The rate of IV fluid administration will depend on the particular patient's needs, but will generally be in the range of 3–5 mL/kg/hr.⁶³

Careful planning and additional attention to drug and dosage selection is important to safely manage high-risk patients. Some

injectable general anesthetic agents need to be used with care in higher-risk patients (including geriatric animals) because of the typically altered hemodynamics, pharmacokinetics, and pharmacodynamics; decreased plasma protein binding; and decreased ability for hepatic metabolism and renal excretion in compromised animals. Brachycephalic breeds and their associated airway conformations warrant particularly close attention during the induction and recovery periods to avoid hypoxia and prevent dyspnea.

Inhalant general anesthetics are the anesthetics of choice in many small animal patients, especially for procedures lasting longer than 10–15 min. The inhalants isoflurane and sevoflurane offer the advantage for outpatient anesthesia of rapid adjustment of inhaled and alveolar anesthetic dose and effect. However, inhalational induction of anesthesia (by either mask or chamber) is contraindicated in almost all clinical situations.⁶⁴

Dose-dependent vasodilatation and hypotension preclude the use of higher doses of inhalant anesthetics in many higher-risk patients. Dose-sparing anesthesia achieved using lower doses of synergistically acting injectable systemic agents (e.g., a fentanyl infusion) with local anesthetic techniques allows for the maintenance of partial IV anesthesia (PIVA) with comparatively low doses of inhalants. In other words, “less is more.” In more extreme cases, injectable agents (total IV anesthesia [TIVA]) are best used in conjunction with intubation and oxygen supplementation but without inhalant anesthesia. This approach can often support markedly improved hemodynamics.

Patients should be preoxygenated for 2–5 min before anesthetic induction to help prevent hypoxia from developing during induction. Every anesthetized patient should be intubated to protect and maintain a patent airway. The safety that often has been associated with inhalants, as opposed to injectable anesthetics, is partly due to the customary, if not obligatory, provision of supplemental oxygen as the carrier gas for the volatile anesthetics. Endotracheal intubation

and administration of supplementary oxygen can easily be incorporated into injectable general anesthetic techniques and substantially adds to patient safety. If anesthesia is deep enough to allow for placement of an endotracheal tube, then the patient is no longer able to protect its airway from either obstruction or aspiration of regurgitated or foreign material. Adherence to proper techniques protects our personnel and practices from waste anesthetic gases.⁶⁴

Sedation

In select cases in which teeth cleaning, polishing, and extractions are not anticipated, heavy sedation may be appropriate and sufficient to collect limited baseline information. Examples include a targeted intraoral radiograph recheck and a more involved preliminary examination of the oral cavity. When making the decision to use sedation versus general anesthesia, there are three considerations: (1) protecting the patient, (2) protecting personnel, and (3) protecting equipment. The loss of intrinsic airway protection requires us to place an endotracheal tube and serves as an operational distinction between sedation and anesthesia. The use of reversible agents, such as alpha-agonists, or boluses of induction agents, such as propofol combined with a quiet and dim environment and care to avoid stimulation, may provide sufficient chemical restraint to meet these ends.

Sedation-only procedures generate limitations including risking aspiration of fluids and aerosolized bacteria into the airways and substandard ability to monitor ventilatory capacity without a proper endotracheal tube in place. Because of the brief duration of action and efforts to minimize depth of sedation, challenges arise surrounding the ability to appropriately monitor patient hemodynamics because time and patient handling (additional stimuli) are necessary to properly affix monitoring equipment. This results in difficulties monitoring the adequacy of sedation even with well-trained and dedicated staff. Because of the absence of reaching a surgical plane of anesthesia, sedation risks self-inflicted injury from the patient's reflexes when attempting to probe subgingivally during an oral exam and unnecessary risk for damage to equipment if bitten. Personnel health must also be considered during sedated procedures because an absence of a proper endotracheal tube while delivering inhalant gas risks human exposure to waste gas, ultrasonic scaling with inappropriate irrigation results in increased bacterial aerosolization, and abrupt patient response to stimuli risks bite injury.

Local Analgesia

Anyone performing oral surgical or periodontal procedures should be familiar with dental nerve block techniques, including a thorough knowledge of oral anatomy and analgesic agents and their application. Administration of local anesthetics will decrease the amount of required inhalant anesthetic, will decrease the required amount of

other analgesics, and will ease the transition to administering postoperative oral pain medications at home. Specific techniques for local anesthetic dental nerve blocks (indications, doses, and specific techniques) are described in detail by Niemiec et al., Beckman, and Gracis, and others.^{61,65-68} Three approaches for the maxillary nerve block are well described and offer choices based on anatomy and personal preference.⁶⁶ The maxillary tuberosity approach, using either an intra- or extraoral (via the buccal pouch) access, allows for a very short needle insertion just posterior to the caudal molar and maxillary tuberosity. Both the subzygomatic approach and the technique of advancing the needle through the infraorbital canal provide access to the maxillary nerve as alternatives. Care is taken to avoid damage to the maxillary or infraorbital neurovascular bundle and inadvertent vascular or intraneural injection. Molars may not be adequately blocked using the infraorbital nerve block technique alone, but anesthesia should be reliable from the third or fourth premolar and the more rostral structures including the canine teeth.⁶⁷

The mandibular or inferior alveolar block can be performed at the angle of the mandible. The more successful intraoral approach technique is recommended.⁶⁸ More rostral block at the mental foramen is less effective.⁶⁰ Rarely, the lingual branch will be anesthetized with a mandibular nerve block, and a very few patients may bite their tongue during recovery. Recovery of the patient in sternal recumbency with the tongue between the jaws may decrease this risk.

Regardless of the local anesthetic technique or site, always aspirate to avoid intravascular injection of local anesthetic. Other uses of local anesthetics may contribute to the basic nerve block techniques and include "splash blocks," infiltration anesthesia, intraosseus anesthesia, intraseptal injection, periodontal ligament or intraligamentary injection, and intrapulpal injection.⁶⁶

Nonanesthetic Dentistry

Nonanesthetic dentistry (NAD), also referred to as anesthesia-free dentistry, is a procedure in which the teeth are scaled and polished without the benefit of general anesthesia. NAD is considered not appropriate because of patient stress, injury, risk of aspiration, and lack of diagnostic capabilities. Because this procedure is intended to only clean the visible surface of the teeth, it provides the pet owner with a false sense of benefit to their pet's oral health.^{69,70}

Veterinary dentistry relies on detailed examination by a veterinarian with thorough knowledge of oral anatomy, physiology, and pathology to make an accurate diagnosis. The examination includes radiographs, requiring the animal to be motionless, as well as the use of costly equipment in the oral cavity. Periodontal probing (noxious stimulus) is also required to allow appropriate diagnosis and treatment recommendations.

Removal of plaque and calculus is the most common treatment recommended and performed for the treatment of periodontal disease. It requires that subgingival surfaces be cleaned. This process is uncomfortable, and at times painful, for the patient. Removal of supragingival calculus alone is purely cosmetic and ineffective to treat disease. The processes described above are not possible in a conscious dog or cat. Without general anesthesia, an accurate diagnosis cannot be made, patient pain cannot be addressed, the patient's airway cannot be protected from aspiration, and disease cannot be appropriately treated.

When NAD is performed, the owner may be under the false impression that the pet was not stressed by restraint, that pain was managed, and that oral disease was accurately diagnosed and treated. Patients who undergo NAD may go for long periods with untreated disease, leading to more costs to health status (disease progression and pain) and increased costs to the client. Peer-reviewed data addressing the safety and efficacy of this controversial procedure are very limited.^{71–73}

The risks of anesthesia in healthy or minimally compromised patients are very low when performed by appropriately trained individuals. A veterinarian concerned about the risk of anesthetizing a patient may seek the assistance of a diplomate of the American Veterinary Dental College or a diplomate of the American College of Veterinary Anesthesia and Analgesia.⁷⁴ See aaha.org/dentistry for additional resources for discussing the risks of NAD.

Addressing Pain

For both veterinary professionals and pet owners, the ability to recognize dental pain is limited because dogs and cats often mask overt signs of oral discomfort. Untreated dental pain may be indirectly demonstrated by halitosis, teeth chattering, weight loss, change in eating habits, lethargy, and change in behavior with reluctance to engage in the human–animal bond. A short course of oral pain medication may provide objective improvement to the patient's quality of life, thus bolstering support for the dental procedure.

It is imperative to recognize the importance of pre-emptive, intraprocedural, and postprocedural dental pain management. The use of pre-emptive multimodal analgesia with synergistic complementary classes of analgesics is obligatory and effective in managing dental procedural pain.

Pre-emptive versus postprocedural nonsteroidal anti-inflammatory agents may be most effective but would not be selected for patients with hypovolemia, dehydration, chronic renal disease, azotemia, and other risk factors.

Opioids are often used alone or in combination with tranquilizers in the dental patients as preanesthetic medications. Use of anxiolytics and sedatives does not replace primary analgesics but will

support analgesic efficacy. Various opioid agonists, opioid agonist-antagonists, and partial agonists have great value.

The Role of Technicians and Assistants

Credentialed veterinary technicians and veterinary assistants have a prominent role in canine and feline dental care. Highly efficient veterinary dental practices fully use and empower them in both the exam room and the dental suite. The Guidelines Task Force strongly encourages veterinary practices to support the training and education of their veterinary technicians and assistants to assume a larger and appropriate role in dental practice. In the exam room, they should obtain a patient medical and dental history. They should be able to explain to the client the dental procedures indicated, answer questions, translate veterinary diagnoses into lay terms, and reassure the client by demonstrating expertise in dentistry.

In the dental suite, a credentialed veterinary technician should perform both a conscious and anesthetized initial oral exam and dictate charting to a veterinary assistant, take diagnostic radiographs, perform cleaning procedures, and place regional blocks if indicated. Because extractions are considered oral surgery, they should not be performed by veterinary technicians. Veterinarians need to provide the appropriate level of oversight and supervision as required by their state practice acts (www.avma.org/Advocacy/StateAndLocal/Pages/sr-dental-procedures.aspx).

Veterinary technicians and assistants are the veterinary team's patient advocates and client educators. They should spend time with the pet owner before and at the time of discharge, explaining the procedures and treatments performed, home oral hygiene, and medications. In addition, they should interview the client to determine the best home dental care options for the pet and advise, demonstrate, and instruct the owners on how to provide quality home oral hygiene for their pet.

Practices should encourage continuing education and training of veterinary team members. Enabling team members to increase the level of their training and education brings satisfaction and contributes to the retention of skilled personnel. Delineation of duties based upon the training and education of the staff also benefits the practice by fully using the team and ensuring patient safety. Many skills in dentistry should be only performed by credentialed veterinary technicians with the knowledge base to understand how to perform a skill and understand why a procedure is performed and the risks associated with each task.

The highest level of training and certification is the Veterinary Technician Specialist in Dentistry, designated as VTS (Dentistry). This certification is issued by the Academy of Veterinary Dental Technicians and awarded to credentialed veterinary technicians who complete a rigorous 2 yr process of education. VTS (Dentistry) training includes both didactic and experiential learning culminating in a credential examination. Although most credentialed veterinary

technicians may not have the interest to pursue VTS (Dentistry) training, companion animal practices should support and encourage basic and advanced continuing education in dentistry for all team members. Trained veterinary assistants are valued members of the practice team and should act as assistants to the credentialed veterinary technician. Care should be given to assure that veterinary assistants are only performing tasks appropriate to their skill level and their state's practice act.

Facility, Equipment, and Operator Safety Requirements

Facility Requirements

Excellent dental care for canine and feline patients requires an efficient, organized, and safe work environment. As a result of environmental contamination that occurs during many dental procedures, a dedicated space in a low-traffic area separate from the sterile surgical suite is necessary. Other requirements include appropriate ventilation, an anesthetic scavenging system, and adequate surgical lighting and magnification. This allows adequate visualization for oral treatments and surgery. The procedure table must be impervious and sanitizable and allow for drainage because dental procedures typically produce a large amount of water.

Materials, Instruments, and Equipment

An assortment of correct dental surgical instruments is essential for adequate dental care. A "one size fits all" approach to dental surgical equipment is inadequate. Several different sizes of dental luxators, elevators, periosteal elevators, scalers, curettes, and mechanical scaler inserts make for a more comprehensive oral surgery suite. Dental instruments must be in proper working order and properly stored, with defective instruments repaired or discarded and replaced. Other dental materials, consumable dental equipment, and products must not be expired. As with any surgical instruments, all dental instruments must be cleaned and autoclaved between each use and stored in a sterile manner until the next use. Instruments may be autoclaved according to procedure, such as examination materials, suture packs, oral surgery instruments, exodontia instruments, periodontal surgery instruments, and materials. Additionally, materials used for guided tissue regeneration must be sterile and perioceutics used according to manufacturer recommendations. It goes without saying that proper knowledge of instrument use and storage is essential. Single-use items must be discarded after each patient use. If barrier sealants and dentin sealants are used, each must be selected and applied appropriately. References from the 2013 AAHA Dental Care Guidelines provide recommendations and information on ordering equipment.^{8,75-78} A basic assortment of recommended materials and instruments for

veterinary dentistry is listed in **Table 3**. See aaha.org/dentistry for additional resources on instruments.

Operator Protection

Pathogens and debris such as calculus, tooth fragments, plaque, water spray, and prophylactic paste are aerosolized during dental procedures. It is prudent to irrigate the oral cavity with a 0.12% chlorhexidine solution before dental scaling, tooth sectioning, and drilling to decrease bacterial aerosolization.⁷⁹ The safety of the operator is ensured during dental procedures by using radiographic, oral, respiratory, skin, eye, and ear protective devices as noted in the 2013 AAHA Dental Care Guidelines.² Ergonomic considerations for personnel performing dental procedures include proper seating, fatigue mats for standing, and proper positioning of both the patient and materials to minimize immediate and chronic operator injuries. Instruction on proper instrument handling techniques should be provided.² Radiographic safety precautions should be adhered to at all times while radiographs are obtained. Radiation protection should include the use of a lead shield or apron, thyroid shield, and a radiation dosimeter. Sources of radiation in the dental suite include direct exposure to the primary beam, scatter radiation, and leakage from the tube head. The operator and other staff should not be in the path of the primary beam. Scatter radiation can be minimized by standing at least 6 ft from the source, maintaining a 90-135° angle from the path of the primary beam, and avoiding touching the tube head or housing during exposures. Tests for leakage radiation should be conducted on a regularly scheduled basis by a licensed professional.⁸ See aaha.org/dentistry for more resources on radiation safety.

Client Communication and Education

Terminology and Messaging

The most important step in achieving compliance with oral health recommendations is getting the client to understand the value and believe in the importance of regular dental care. This awareness generally results when the client realizes that oral pathology is a source of chronic pain, infection, and poor quality of life for the pet.^{20,80} The majority of dental care takes place in the primary care setting. A fundamental aspect of delivering high-quality veterinary dental care is for the practice team to use consistent dental care terminology and messaging with the client. When this is consistently done using tools such as a written treatment plan, client compliance with your oral health recommendations will generally follow.

Dental terminology should reflect the importance and breadth of the dental and oral disease prevention, diagnostics, and therapies. For example, the consensus viewpoint of the Guidelines Task Force is that using the simplified term "prophylaxis" is incorrect and misleading because our dental patients often have calculus and gingivitis before

prophylactic therapy is recommended.⁸¹ Neither prophylaxis nor the term “dental” adequately convey the breadth or complexity of oral health services offered in primary care or referral practices. The broader terminology “oral health” better conveys the full scope of this aspect of pet healthcare. Even the correct use of medical terminology without properly educating the client as to its meaning is insufficient. The practice team should avoid acronyms, overly simplified terminology, and medical jargon when discussing oral healthcare with clients. Perhaps more than most other aspects of veterinary care, proper use of oral health terminology is directly linked to client understanding, acceptance, and compliance with your recommendations.

Explaining the Role of Anesthesia

The client should be told that their pet *needs* a comprehensive, *anesthetized* oral exam and dental radiographs in order to perform a preventive cleaning or dental-periodontal therapy. It is also vital that the client understands the distinction between *awake* and *anesthetized* dental procedures. When the veterinarian explains that an awake patient must be anesthetized for a proper exam and therapy, clients understand the central role of anesthesia in oral healthcare. This often leads to a discussion of the client’s concerns about anesthesia, a common reason given by pet owners who decline oral care. Clients and, sadly, practitioners are often susceptible to unsupported myths about unreasonable risks of general anesthesia.

It is helpful to manage client expectations on the need for general anesthesia early in a patient’s life or at the outset of an oral health visit. Sample dialog might consist of “Your pet will need an anesthetized oral exam, dental radiographs, and cleaning between 1 and 2 yr of age, even if no abnormalities are seen on the awake exam.”^{34,35} After that, a periodic anesthetized oral exam, treatment, cleaning, and prevention should be given throughout her lifetime. We will develop a prevention plan that will work for you and your pet.”

Discussing Regular Oral Healthcare

Oral health should be discussed at the first appointment and every visit thereafter. A 6 mo awake oral health exam is appropriate. The patient should be evaluated for permanent dentition, retained or persistent deciduous teeth, unerupted teeth, and crowding. A regular awake exam can identify oral health problems that can be effectively treated at an early stage with minimal discomfort to the pet. For example, extraction of persistent deciduous teeth when the permanent tooth begins to erupt can avoid more extensive intervention later on.⁸²

Although most clients will not have experience with diabetes, heart disease, or a ruptured cruciate ligament, they are all familiar with their personal oral health. It is helpful to use the client’s existing personal hygiene habits for themselves and their children as a bridge

to dental care recommendations for a pet. Client education topics and recommendations will differ based on the pet’s age and breed and the client’s prior misconceptions about pet oral healthcare.⁸³ By discussing dental care at each appointment, the client becomes familiar with the concept of oral health. Using “road-mapping” techniques and providing the client with written instructions and recommendations will facilitate in-depth pet oral health discussions at later healthcare visits. See aaha.org/dentistry for additional client education resources.

Nonanesthetic Scaling of Teeth

Clients should be informed that groomers and others should never be allowed to scale a pet’s teeth. Scaling of teeth must always be accompanied by polishing and must only be done by trained veterinary personnel operating in a clinical setting with an anesthetized animal. Explain that NAD scaling is a cosmetic procedure, does not improve oral or systemic health, and can cause pain, fear, bleeding, and infection.

Recommending Home Oral Hygiene and Products

Advise clients regularly of the potential damage done by inappropriate chew toys and the benefits of regular home dental care. In offering this guidance, specific recommendations are more likely to be followed. For example, explain that “Your dog will benefit from feeding this food and using this toothpaste and toothbrush at least once a day,” or “The prescription diet is working well to control tartar (calculus) and plaque on the back teeth, but I would like you to add these dental wipes for the incisor and canine teeth.” Clients must be told specifically that brushing only removes plaque, not calculus. Brushing needs to be done daily to be of benefit. Brushing teeth with already inflamed gingiva will cause pain and animal aversion. Even daily brushing does not preclude the need for anesthetized exams, radiographs, and therapy, the same as in human dental care.

Discussing the Anesthetized Oral Exam

It is critical to have a written protocol to avoid misunderstanding regarding an anesthetized oral exam. It is not until the mouth and oral radiographs have been evaluated under anesthesia that a full treatment plan and the costs of a dental procedure can be accurately determined. As soon as the anesthetized oral exam and full-mouth intraoral radiographs have been reviewed, the findings and treatment plan can be discussed with the client. The consent form must clearly state that if the owner cannot be contacted, any findings requiring additional treatment that are not already specifically on the consent will not be performed, and a separate appointment and procedure will be scheduled. Advise the owner beforehand that if more extensive disease is found, staging procedures may be recommended. Clients

TABLE 3**Materials Needed for the Practice of Veterinary Dentistry*****Necessary materials**

Antiseptic rinse
Prophy paste in individual single use tubs (fine grit)
Prophy angle and cups
Hemostatic agents
Needles and syringes
Intraoral dental radiographic capabilities
Equipment to prevent hypothermia: conductive blanket, forced-air warming blanket, circulating water blanket, towels, blankets, IV fluid warmer, dental water reservoir warmer
Gauze sponges
Antimicrobial agents for local application
Resorbable suture material sized appropriately for surgical needs (3-0, 4-0, or smaller)
Bone augmentation/guided tissue regeneration material
Local anesthetic drugs and delivery system

Necessary equipment

A dental machine with tubing and attachments for low and high-speed handpieces, mechanical scaler, suction and pressurized air/water delivery system
Dental radiograph generator (wall, ceiling mount or floor model)
Suction
High- and low-speed hand pieces (two of each)
Pressurized air water delivery system
Autoclave or gas sterilization system
Various sizes of high-speed and low-speed burs (round/cross cut taper/finishing burs)
Power scaler with tips for gross and subgingival scaling (ultrasonic, subsonic, piezoelectric)
Head or eye loupes for magnification

*Disposable items are for single use only.

may feel guilty for not knowing that their pet was in pain or had an oral infection. It is important to let them know that these problems often develop gradually and can be avoided in the future with proactive oral healthcare.

In some cases, even if an individual tooth or teeth can be saved, this may not be the best choice for an owner who is not committed to follow-up care or who has limited resources. When presenting options for treatment, make sure the client clearly understands all treatment options available, including risks, benefits, and costs, and provide the information needed to make an informed decision. Sophisticated treatment options may not be the best choice for a client with limited resources or who is not committed to regular oral healthcare for the pets.

Explaining the Role of Nutrition in Dental Health

The phrase “food be thy medicine” can apply to preventive dental healthcare. Commercial diets specifically designed to retard the accumulation of plaque and calculus are especially helpful if the

owner is unable or unwilling to brush a pet’s teeth. These preventive diets work by mechanical (abrasion) and/or nonmechanical (chemical) mechanisms. The “kibble” can be larger in size or have a unique texture that mechanically cleans the surface of the tooth or coats it in an “anticalculus” agent.⁸⁴

Although many products make this claim, only those that have been accepted by the VOHC have met preset standards of doing so. The VOHC helps veterinarians and owners choose effective products to help decrease the accumulation of plaque and/or calculus. AAHA supports the scientific methodology employed by the VOHC. The VOHC website (vohc.org) can be a useful resource for guiding clients and the veterinary care team to help understand product label claims.

When appropriate, many clinicians encourage pet owners to select complete and balanced “dental” diets as the lifelong source of nutrition for the pet. As with any recommendation, practitioners should evaluate compliance and efficacy for the individual patient during subsequent examinations.

Offering supplemental treats to pets can be an important part of the human–animal bond. However, choosing treats that support oral health is also helpful. There is a broad array of treats that have been accepted by the VOHC to decrease plaque and calculus accumulation. The Guidelines Task Force believes that there is not a strong rationale for offering hard treats (antlers, synthetic, or natural bones) that could damage the structural integrity of the tooth, ultimately leading to unnecessary pain and infection for the pet. See aaha.org/dentistry for additional resources on appropriate treat selection.

Discussion at the Discharge Appointment

Written and verbal client communication is fundamental to the maintenance of pet oral health. This dialog should address all procedures and potential complications, immediate postoperative home oral care (e.g., no brushing until surgically manipulated gingiva has healed), medications and their side effects, and any diet changes that might be necessary (e.g., soft or premoistened food in the immediate postoperative period). If clients are not properly advised of normal postanesthesia behavior and postoperative side effects affecting a pet, they may be reluctant to allow another procedure.

Sharing the patient's dental chart, photographs, and radiographs with the client at the discharge appointment is helpful in illustrating the extent of the pre-existing pathology and effects of treatment. Clients better appreciate inapparent oral pathology once they see the visual evidence of its effects and the benefits or therapeutic intervention. See aaha.org/dentistry for additional client education resources.

Establish an appointment for a follow-up or recheck examination in 10–14 days, even if the procedure performed is limited to a prophylactic cleaning. Rechecks will help determine owner compliance and the need for continued care. At the discharge appointment, clients are generally more focused on postanesthesia care than on continued oral hygiene. The recheck is an opportunity to affirm the positive steps that the owner has already taken in caring for the pet's oral health and to establish an ongoing treatment plan.

Summary

Not only is oral health a fundamental aspect of overall pet health and wellbeing, but veterinary dentistry is now considered a standard component of companion animal medicine. Any full-service, primary care companion animal practice should have the capability to perform basic canine and feline dental examinations and procedures, including those performed under general anesthesia. This capability assumes that the veterinarian and other clinical staff have the expertise and essential resources necessary to perform veterinary dentistry. These include facilities, materials, and equipment, including barrier protection, specific for veterinary dentistry. It is important that the practice team

routinely apply the nomenclature and terminology specifically associated with veterinary dentistry. This is done not only to ensure precision in performing dental procedures but also to educate clients about the unique aspects of oral healthcare.

Lifetime oral health assumes that individualized periodontal disease prevention and treatment plans will be implemented. Avoiding and managing the inflammation, pain, and potential for systemic infection associated with periodontal disease are strong contributors to the pet's quality of life and longevity.

Evaluation and documentation of dentition and oral pathology involves oral evaluation of both the conscious and anesthetized patient. Initial evaluation of the conscious patient can be facilitated by pharmacologic protocols to reduce the patient's stress and anxiety. A comprehensive oral health assessment involving radiography requires general anesthesia. It is important to recognize that many grossly normal teeth in dogs and cats have clinically important pathology or abnormalities that can be detected only by intraoral radiography performed under general anesthesia. Because dental procedures can be painful, intra- and postoperative pain management, often using multimodal protocols, is an essential component of veterinary dentistry.

The guidelines describe a step-by-step process for the procedures that are typically performed for canine and feline dental patients. These include oral examination, radiography, tooth scaling, periodontal disease staging, plaque and calculus removal and mitigation, general anesthesia, and instructing pet owners on home oral hygiene. Although some of these procedures are often performed in a referral setting, they are all within the capabilities of properly trained and equipped primary care practices. Additional resources can be found at aaha.org/dentistry.

Oral healthcare is a necessary aspect of lifetime pet wellness. However, because veterinary dentistry involves general anesthesia, many clients are hesitant to consider dental procedures for their pet. For this reason, client education plays a pivotal role in successfully integrating veterinary dentistry into your practice's service offerings and incorporating dental care into a lifetime healthcare plan for canine and feline patients. ■

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