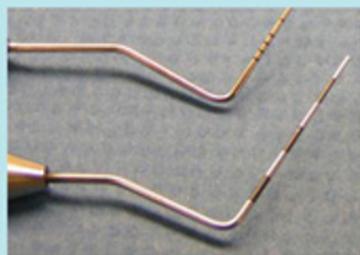


Second Edition

Small Animal Dental Procedures

for Veterinary Technicians
and Nurses

Edited by Jeanne R. Perrone



WILEY Blackwell

Small Animal Dental Procedures for Veterinary Technicians and Nurses

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Second Edition

Edited by

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WILEY Blackwell

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To my dad, Frank, who taught me responsibility and the value of providing quality medicine

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To my brother, Andy, who taught me never to give up

To my sister-in-law, Lucy, who taught me that all challenges can be overcome with grace

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To my nephew, Jordan, who taught me spirit and bravery

To my best friend and confidant, Lisa, for over 30 years of being a part of my life

To the members of the AVDT who have brought me love and laughter since the year 2000

To all the veterinary technicians, veterinary assistants, veterinarians, and veterinary dentists I have been blessed to work with for making me into the technician I am today

To my Tony, who constantly teaches this Italian girl how to be a little more Puerto Rican

To my pets and patients, past and present, my source of love and acceptance

Lastly, to Luna, our model for the medical diagrams in Chapter 1 and a former patient of mine. I received word from her mom and our artist, Brenda Gregory, that she passed away from an inoperable tumor on December 29, 2011. Her mother, Brenda, is grateful that she will be immortalized in this book.

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Foreword

In the year 2000, a group of veterinary technicians with a passion for veterinary dentistry began an arduous journey. Their vision was to form a dental specialty organization for technicians who wish to excel in the field. The Academy of Veterinary Dental Technicians (AVDT) was formed. Over the next several years, the organizing committee succeeded in writing a constitution and an exam, which is given annually to qualified candidates. AVDT also had to meet specific guidelines for technicians seeking to become Veterinary Technician Specialists. Today AVDT is recognized by both the National Association of Veterinary Technicians in America (NAVTA) and the American Veterinary Dental College (AVDC).

Since the beginning, AVDT has provided an avenue for technicians and assistants involved with dentistry to grow and learn together. The idea for this book has evolved over time. All of the existing written material for veterinary dentistry has been provided by the veterinarians in the field. AVDT has chosen to use our pool of very knowledgeable and qualified veterinary technician specialists to write a dental book by technicians specifically for the use of other technicians, assistants, and students.

This book is designed to be a learning tool to increase skill levels and understanding of various dental procedures. Basic dental skills, such as doing a complete prophylaxis, charting teeth, and taking diagnostic radiographs, are just a few examples of essential tasks that we should be able to perform competently. Additionally, it is necessary to have the knowledge of more complex dental procedures.

Increasing our levels of competence yields many tangible benefits to us all. In addition to achieving pride in our accomplishments, we become more valuable members of the veterinary dental health care team. Our increased knowledge allows us to pursue job opportunities with potential monetary increase. We will also establish a necessary foundation to pursue our professional challenges in a knowledgeable manner.

It is our hope that you will find this book to be a good reference guide, a resource to find specific dental information that will help make your dental experiences less

intimidating, and a resource for you to hone your skills and tweak areas that need improvement. Remember that we all have our patients' best interests in mind and our ultimate goal is to provide them with good oral health through our best efforts.

Judy Ozier, CVT, VTS (Dentistry Retired)

Foreword from Academy of Veterinary Dental Technicians

The Academy of Veterinary Dental Technicians (AVDT) has partnered with Wiley to bring this text to you to encourage the education and training of veterinary technicians and nurses. It is a comprehensive text that will supply detailed knowledge to the reader of how to prevent, identify, and treat common oral conditions. This expanded second edition will supply additional information in order for the veterinary team to provide the highest standard of dental care to our patients.

I am extremely proud of the authors' willingness to review and expand the chapters within the covers of this book. Veterinary dentistry is continually evolving, and we feel it is paramount to remain current within our profession. Our editor has spent countless hours reviewing this text to provide the readers with a high-quality resource for veterinary dentistry.

The AVDT is a group of technicians who have completed the rigorous requirements to become a Veterinary Technician Specialist (VTS) in Dentistry and are recognized by the National Association of Veterinary Technicians in America (NAVTA). These technicians have attained a higher level of recognition and advanced knowledge and skills in the field of dentistry. The members of the AVDT are considered experts in the field of dentistry and enjoy sharing their knowledge within the veterinary team and advancing the quality of care for our patients.

This book could not have been completed without the encouragement and support from the AVDT members and their families, the American Veterinary Dental College (AVDC), and The Foundation of Veterinary Dentistry. Thank you for making this project possible.

Candice Hoerner, CVT, VTS (Dentistry)
President, AVDT

Preface

With the upsurge in dental education available for veterinary technicians at the regional, state, and national levels, I am excited to provide the second edition of this text written for technicians by technicians.

The text is divided into 10 chapters, covering all branches of dentistry that the veterinary technician could encounter in practice. The contributors also touch upon the role of the veterinary technician, stressing the importance of connecting to the owner professionally using their dentistry knowledge. Professionalism is gained through education and experience.

This book is geared for technician students, working technicians, and technicians who are pursuing their specialty certification in dentistry. In keeping with changes in technology, the book has two components: the book and the website. The website component was added for two reasons: (1) there is sufficient space to store the large number of photographs and drawings that could not fit in the book and (2) it provides the reader with an extra educational experience using a project or a quiz based on the chapter. As requested by many of our reviewers, we have added video content to some of the chapters. These videos can be found in the web section of the book.

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MAI Animal Health
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Gotham Veterinary Center
American Veterinary Dental College

Without their contributions, this book would not have come to be.

Jeanne R. Perrone

1

The Basics

Gerianne Holzman, CVT, VTS (Dentistry)

Learning Objectives

- Identify all anatomical sites and systems of the head, skull, and teeth
- Explain the relationship between structures in the oral cavity
- State the eruption timetable for primary and adult teeth
- Describe the stages of tooth development
- State the dental formula for the pediatric and adult dog and cat
- List and define oral directional terminology
- Define and perform both the anatomic and Triadan numbering systems used to count and identify teeth in the pediatric and adult dog and cat

This comprehensive text on small animal dentistry meets the need for both novice and experienced veterinary technicians to advance their knowledge and explore new career paths. To learn advanced techniques, one needs to begin with the basics. This chapter discusses the anatomy of the skull and the teeth. With this knowledge, the veterinary technician learns the complex relationship between all structures surrounding the oral cavity. Dental disease, while generally thought of as a condition of the mouth, can also affect the nares, sinuses, and eyes.

Most mammals – including humans, dogs, and cats – have two sets of teeth in their lifetime: primary (or deciduous) and permanent (or secondary). Usually, the primary teeth exfoliate before the eruption of the permanent teeth. Malocclusions and dental disease can occur if this natural progression does not happen. (Two teeth should not occupy the same place at the same time.) Knowing the normal age of tooth eruption and the development of the tooth aids the veterinary technician in performing an oral exam.

In the mouth, the usual directional terminology of dorsal, ventral, medial, and lateral does not apply. The oral structures create a unique set of terms to determine location. Learning this specific terminology simplifies charting, surgical assisting, and explaining oral pathology.

Anatomy of the Skull¹

Oral Cavity

The primary structures of the oral cavity consist of teeth, gingiva, tongue, soft palate, and hard palate. These vital organs of mastication and breathing can be involved with oral disease. Knowing what is normal helps in recognizing abnormalities.

Teeth²

Each species has a distinct dental formula. The dental formula is the number and types of teeth expected in a normal mouth. Dogs and cats have four types of teeth, each with separate purposes for eating and chewing. Domesticated animals, fed commercial diets, do not always use their teeth in the same manner as their wild ancestors. Incisors cut, pick up, and groom. Canines rip, tear, and hold. Premolars and molars grind food into a more digestible size (Figs. 1.1 and 1.2). Carnassials are the largest chewing teeth in the mouth. In both the dog and cat, they are the upper fourth premolar and the lower first molar.

Primary dental formula: canine (total 28)

- Maxilla: incisors (6), canines (2), premolars (6), molars (0)
- Mandible: incisors (6), canines (2), premolars (6), molars (0)

Permanent dental formula: canine (total 42)

- Maxilla: incisors (6), canines (2), premolars (8), molars (4)
- Mandible: incisors (6), canines (2), premolars (8), molars (6)

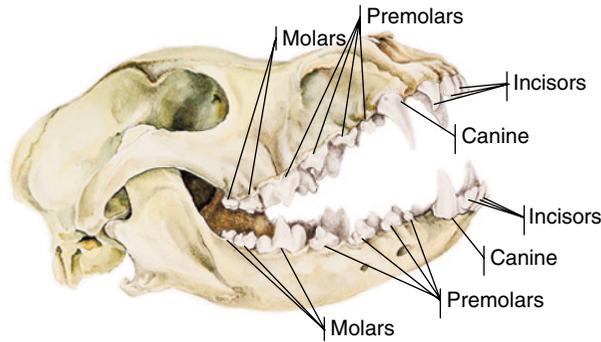


Figure 1.1 Canine skull showing permanent dentition (Illustration by Brenda Gregory).

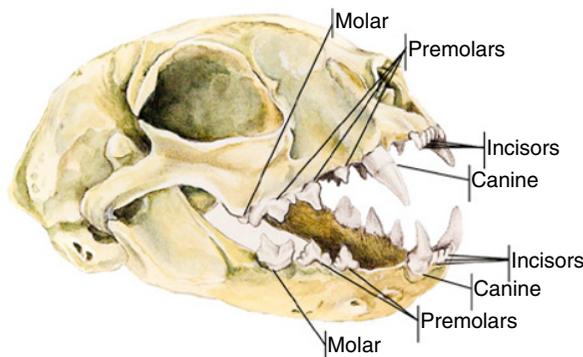


Figure 1.2 Feline skull showing permanent dentition (Illustration by Brenda Gregory).

Primary dental formula: feline (total 26)

- Maxilla: incisors (6), canines (2), premolars (6), molars (0)
- Mandible: incisors (6), canines (2), premolars (4) molars (0)

Permanent dental formula: feline (total 30)

- Maxilla: incisors (6), canines (2), premolars (6), molars (2)
- Mandible: incisors (6), canines (2), premolars (4), molars (2)

Dental formulae are often written as: canine (permanent): $2 \times (I3/3, C1/1, P4/4, M2/3)$; and feline (permanent): $2 \times (I3/3, C1/1, P3/2, M1/1)$. Anatomically, cats normally are missing their first upper premolars, first lower premolars, and second lower premolar teeth.

Gingiva³

The gingiva is the soft tissue surrounding and supporting the teeth. It also covers the alveolar bone supporting the teeth. Most often pink, the gingiva may be fully or partially pigmented. It should be glossy and smooth. Gingiva is modified epithelial and connective tissue. It divides into attached and unattached (or free) gingiva. Where the gingiva meets the rest of the oral mucosa of the lips is the mucogingival

junction. Attached gingival tissue protects bone and tooth-supporting structures from infection, trauma, and periodontal disease. The junction between the free gingiva and the tooth is the gingival sulcus. Normal depth of this space is 3 mm in dogs and 1 mm in cats. If the depth of the sulcus is greater than normal, it indicates the presence of connective tissue loss known as a periodontal pocket. Pockets are often associated with gingivitis, an early form of periodontal disease.

Tongue

The tongue has four primary functions: to taste food, to lap up liquids, to form food into a bolus, and to aid in swallowing. Canines have a relatively smooth and over long tongue. Panting provides an efficient method for dogs to lower their body temperature. Feline tongues are rough due to the presence of firm, upright papillae, which aid in grooming and cleaning. The tongue can be pink or pigmented. In certain dog breeds (e.g., chow chows), the tongue is near to black. In dogs, a median groove is present on the dorsal surface. Hairs may grow in this groove. While aesthetically displeasing, they rarely cause injury.

The dorsal surface of the tongue contains papillae, some of which are specialized into taste buds. Different tastes and combinations – sweet, sour, bitter, and salty – are sensed over all surfaces of the tongue, not just in specific sections.

Specialized muscles and nerves of the tongue provide animals with the ability to drink fluids. A cat's tongue creates a “bowl” formation to allow it to scoop up water. In dogs, the tongue curls and twists water into the mouth. The tongue rolls food around the mouth forming a bolus or smooth round ball. With the aid of the tongue muscles, this bolus of food is then pushed to the back of the mouth and swallowed.

Hard and soft palate

The hard and soft palates comprise the “roof” of the oral cavity. The hard palate, created by the incisive, maxillary, and palatine bones, is covered by the soft tissue of the palatine rugae. The rugae, on each side of the palatine raphe (or midline), are symmetrical. Clefts or openings in the hard palate create direct access to the nasal cavity and sinuses. Surgical correction is appropriate for this genetic condition.

The incisive papilla located at the most rostral area of the hard palate is a raised round structure (Fig. 1.3). It aids in the senses of smell and taste and should not be confused with an oral mass. The soft palate is a continuation of the soft tissue overlying the hard palate. This movable fold of tissue connects the oral cavity to the pharynx. It is smooth and does not contain rugae.

Bones

The skull is composed of two sections: cranium and face. The cranium protects the brain and associated structures. The face comprises the bones of the oral, nasal, and ocular cavities. Bones provide the basic structure and support for blood vessels, muscles, tendons, all soft tissue structures, and teeth. Dogs and cats have three primary head shapes:

- Mesaticephalic or average (e.g., Labrador retriever [Fig. 1.4], German shepherd dog, domestic cat)



Figure 1.3 Incisive papilla in a canine (Courtesy of Jill Jecevicus).



Figure 1.4 Mesaticephalic head shape: Labrador retriever.

- Brachycephalic or short-faced, resulting in crowded and rotated teeth (e.g., pug [Fig. 1.5], Persian cat, English bulldog)
- Dolichocephalic with a long narrow nose and face (e.g., Irish wolfhound, greyhound, Siamese cat [Fig. 1.6]).

Skull⁴

The primary bones of the cranium are:

- Frontal
- Parietal
- Interparietal
- Temporal
- Ethmoid
- Occipital
- Sphenoid



Figure 1.5 Brachycephalic head shape: pug.



Figure 1.6 Dolichocephalic head shape: Siamese (Courtesy of Rebecca Johnson).

The facial bones consist of:

- Lacrimal
- Temporal process (includes zygomatic arch)
- Nasal
- Maxilla
- Incisive
- Pterygoid
- Ventral nasal conchae
- Mandible

The primary bones of the oral cavity are the mandibles and maxilla and the incisive. They support the teeth, attach to muscles, and provide protection to vessels and nerves. Within the mandible, maxilla, and incisive bones, the alveolus surrounds the tooth root and connects to the periodontal ligament (Figs. 1.7–1.9).

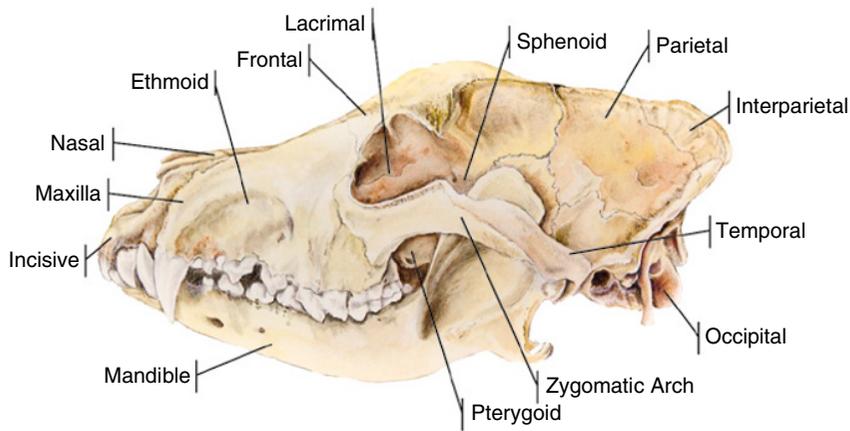


Figure 1.7 Lateral view of skull bones (Illustration by Brenda Gregory).

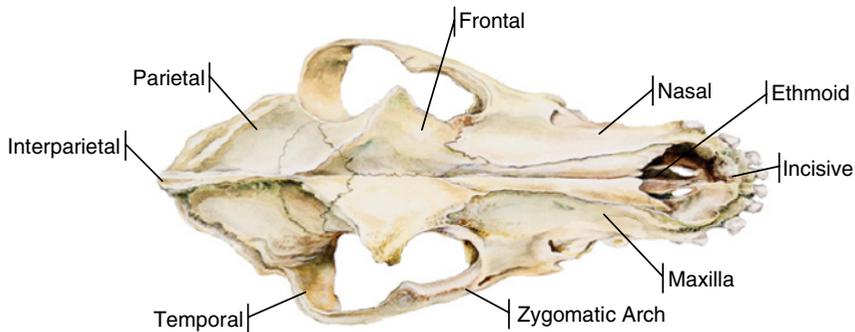


Figure 1.8 Dorsal view of skull bones (Illustration by Brenda Gregory).

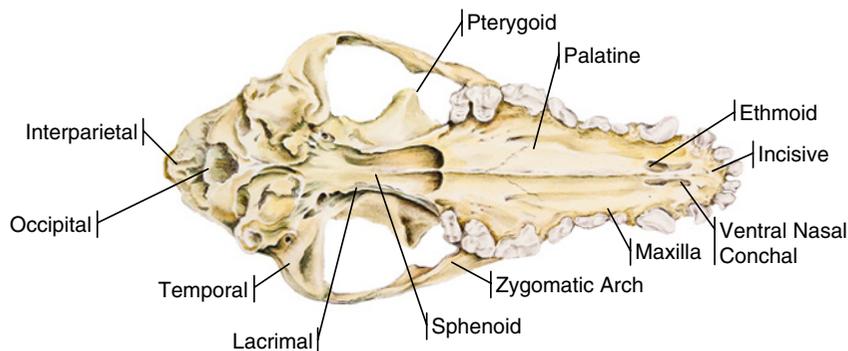


Figure 1.9 Palatine view of skull bones (Illustration by Brenda Gregory).

Mandible

The mandible supports the teeth of the lower jaw. Two separate bones meeting at the rostral midline (symphysis) create the mandible. The mandibular symphysis is a fibrous joint. Unlike in humans, it is rare for this juncture to fuse completely in dogs

and cats. Cats tend to have a very “loose” mandibular symphysis. The ends of the mandibles meet the temporal bone to form the temporomandibular joint or TMJ. It is a hinge joint. Muscles of mastication, originating along the cranium, insert into the body of the mandible near the TMJ. They provide the ability to open and close the mouth, eat, chew, and bite. In rare cases, the TMJ can luxate, preventing the animal from closing its mouth.

Incisive

The incisive bone is the rostral section of the maxilla. It supports the upper incisor teeth. Defects in the formation of this bone can cause a cleft palate.

Maxilla

Along with supporting the remainder, the upper canines, premolars, and molars, the maxilla also includes the palatine bones, creating the hard palate. The maxilla separates the oral cavity from the nasal cavity.

Muscles

Muscles of the skull allow movement, facial expression, chewing, eating, and biting. While these are not the sleek muscles of the limbs, the strong muscles of the face are designed to rip and tear food. They also create an extreme ability to bite. In humans, the biting force is 250–300 pounds per square inch (psi) with the ability to create a sudden snapping force of 25,000–30,000 psi. Contrast this to the canine with a normal range of 300–800 psi and the potential for 30,000–80,000 psi when provoked.

Nerves

The trigeminal nerve (cranial nerve V) begins at the brain stem and divides into three branches: ophthalmic, maxillary, and mandibular. The trigeminal nerve and its subsidiary branches provide sensory and motor function. To keep within the context of this chapter, we will only discuss the branches related to dentistry.

The maxillary nerve provides sensation to the lower eyelids, nasal mucosa, maxillary teeth, upper lip, and the nose. Branching from the maxillary nerve, the minor and major palatine nerves provide sensation to the soft and hard palates as well as giving rise to taste fibers. The infraorbital nerve branches into the three alveolar branches that enter the alveolar canal and each tooth root. The caudal superior, middle superior, and rostral superior alveolar nerves supply the maxillary molars, premolars, and canines/incisors, respectively.

The mandibular nerve provides motor function to the mouth by innervating muscles of biting and eating. The mandibular nerve and its many branches provide sensation to the cheeks, tongue, mandibular teeth, lower lip, and the skin of the head. The mandibular nerve branches into the masticator nerve, which aids in opening the mouth; the related masseteric and deep temporal nerves, which allow closing of the mouth; the lateral and medial pterygoid nerves, which aid in raising the mandible while eating; the buccal nerve, which provides sensation to the skin and mucosa of the cheek; the inferior