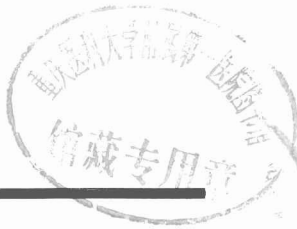
Guide to Dental Problems for Physicians and Surgeons

EDITED BY
SETH R. THALLER
WILLIAM W. MONTGOMERY



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Accurate indications, adverse reactions, and dosage schedules for drugs are provided in this book, but it is possible that they may change. The reader is urged to review the package information data of the manufacturers of the medications mentioned.

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To all my teachers, who are responsible for what I know and where I have gone.
To my parents, who have supported me through all my trials and tribulations.
To Pat, who has been able to listen and give advice whenever needed.

Foreword

A substantial number of patients presenting to a primary care facility will have complaints directly related to the oral cavity. Unfortunately, most physicians are little concerned with a part of the body considered to be the province of the dentist. This is even true of physicians and surgeons who primarily treat problems in the surrounding head and neck region. Therefore, the management of these problems may result in confusion. Primary care physicians, including emergency room physicians, family practitioners, and pediatricians, are frequently the first clinicians to examine a patient presenting with complaints associated with dental etiologies. Physicians must possess sufficient knowledge of dentistry-related problems to manage them effectively. In addition, plastic surgeons, otolaryngologists, head and neck surgeons, as well as general surgeons, are frequently confronted with patients who require detailed attention to problems associated with the face and/or oral cavity. A thorough knowledge of dental pathology and the possible modalities of treatment is required by these specialists as well.

Until the conceptualization of the present volume, information needed to manage these patients was available only in the literature written specifically for the dentist. This volume meets the needs of those physicians not specifically trained in the area of dentistry. It provides the relevant information in a concise and usable manner and enables physicians unfamiliar with dental problems to recognize and diagnose these abnormalities correctly. The goal of this book has been effectively achieved, i.e., recognition, diagnosis, and management of dentistry-related problems by physicians. It should serve as a practical guide for all physicians involved in the care of dentally compromised patients.

The editors, Drs. Seth R. Thaller and William W. Montgomery, are ideally suited for the preparation of such a volume. Their experience combines knowledge of dentistry, otorhinolaryngology, otolaryngology, and plastic surgery. The editors are keenly aware of the multitudinous problems in each of these major specialties and they manage to bridge the gap for those physicians not specifically trained in the field of dentistry.

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Preface

From our clinical perspectives as a plastic surgeon (S.R.T.) and an otolaryngologist/head and neck surgeon (W.W.M.), we have organized this book to fill a lacuna in the medical literature. Although 30 to 50% of problems encountered in a primary care setting may be attributable to the oral cavity, we know of few references in the medical literature that deal with this subject. There is, indeed, a vast dental textbook literature, but such works are often lengthy, too detailed, and generally not oriented toward the needs of busy practitioners.

Our *Guide to Dental Problems for Physicians and Surgeons* is a concise and clinically relevant reference book, describing unfamiliar and possibly confusing dentistry-related problems frequently encountered by both primary care clinicians and surgical subspecialists dealing with the face and/or oral cavity. Although few physicians receive any formal dental education, they are often the first to be called by patients presenting with complaints that may be secondary to dental problems. We hope that our book will guide physicians in obtaining skills that aid in the recognition and identification of patient problems due to dentistry-related etiologies. This in turn will facilitate good patient management.

This *Guide* is organized into sections that deal with the clinically relevant problems related to underlying dental processes. The contributors have been selected because of their experience and proven clinical expertise. We will introduce and emphasize the notion of an interrelationship between several fields of clinical training that are available for the diagnosis and treatment of these often complicated dental problems. We will stress the importance of providing proper documentation and detailed follow-up in the contemporary medicolegal environment. In addition, we remind readers of the necessity for referring to more experienced and knowledgeable consultants in the treatment of problems that may be ignored beyond the capabilities of the individual practitioner.

Seth R. Thaller, M.D., D.M.D.

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Contents

chapter 1

General Concepts: Overview of Anatomy and Basics of History and Physical Examination

THOMAS A. MUSTOE, M.D.
SETH R. THALLER, M.D., D.M.D.

Patients with dental-related problems often present with a confusing array of signs and symptoms. Therefore, a knowledge of head and neck anatomy, including the oral cavity and dentition, is essential for proper diagnosis and institution of appropriate treatment. Often, physicians are understandably uncomfortable with evaluation of this area, especially the oral cavity and dentition, because of its unfamiliarity.

This chapter will provide an outline of the anatomy, with the key points highlighted, and a description of relevant factors necessary for obtaining a good history and physical examination.

Unfortunately, this chapter cannot supplant standard anatomy textbooks, which should be readily available in any medical school or hospital library. Instead, our purpose is to make the reader conversant with the principles of anatomy, history, physical examination, differential diagnosis, and treatment plans. Equipped with a working knowledge of anatomic terms and the function of organs and tissues in both health and disease, the physician can then better cope with recognition, definition of etiology, and prognosis. Most of all, this will permit communication between a number of medical and/or dental specialists who are confronted with these types of clinical problems.

ANATOMY

Bony Anatomy

Skull

The skull can be divided into:

1. *Cranial vault*: frontal, occipital, paired parietal, sphenoid, and ethmoid bones;
2. *Skull base*: occipital, temporal, sphenoid, and ethmoid bones;
3. *Facial Skeleton*: The facial skeleton is suspended from the cranial vault at (a) the zygomaticofrontal process, laterally; (b) the nasal ethmoid complex, medially; (c) the pterygoid process-suture with maxilla, posteriorly; and (d) the maxillary suture line with ethmoid and zygoma at the orbit. In instances of facial trauma, these areas or buttresses take the major impact and, except for the mandible and nasal bones, are the principal sites of facial fractures.

Jaws

The upper jaw is composed of the paired maxillae, which remain fixed to the skull. The alveolar process, which hangs down from the body of the hollow maxilla and encloses the maxillary sinus, contains the teeth and supporting structure. The floor of the nasal cavity and the maxillary sinuses are the roof of the oral cavity and the hard palate; thus, the roots of the maxillary teeth are separated from the sinus by only a thin, osseous shell. Therefore, dental pathology can present clinically as a sinus problem.

The temporomandibular joint (TMJ) separates the mandible from the skull. The mandible proper is made up of a horizontal segment (body) and two roughly perpendicular parts (rami) that join the body posteriorly at nearly right angles (Fig. 1.1*A*). Anteriorly, on the external surface, there is a midline ridge, the symphysis menti, together with a triangular eminence, the mental protuberance (Fig. 1.1*B*). In the midbody of the mandible at about the level of the bicuspid teeth lie the mental foramina. A bony ridge is demonstrated at the inner surface of the mandible (mylohyoid line) for the origin of the mylohyoid muscle and a slight depression anteriorly (diagastric fossa) for the anterior belly of the digastric muscle. The sublingual gland is located inferiorly near the oval fossa and superiorly to the mylohyoid muscle.

Normal adult teeth are located within irregularly shaped sockets of variable size within the alveolar portion of the mandible. At its inferior border, the mandible is thicker and reveals a shallow groove where the facial artery crosses it. The medial surface of the ramus contains the ovoid mandibular foramen, where the inferior alveolar vessels and nerves enter, then course anteroinferiorly through the mandibular canal, and exit at the mental foramen. Located on the superior border of the ramus are two processes which are separated by a U-shaped mandibular notch or sigmoid notch: a) the thin triangular coronoid process anteriorly, and b) the thicker condylar process posteriorly. The mandibular condyle, which has an oval surface superiorly for articulation with the articular disk of the temporomandibular joint (TMJ), does not form a right angle with the mid-

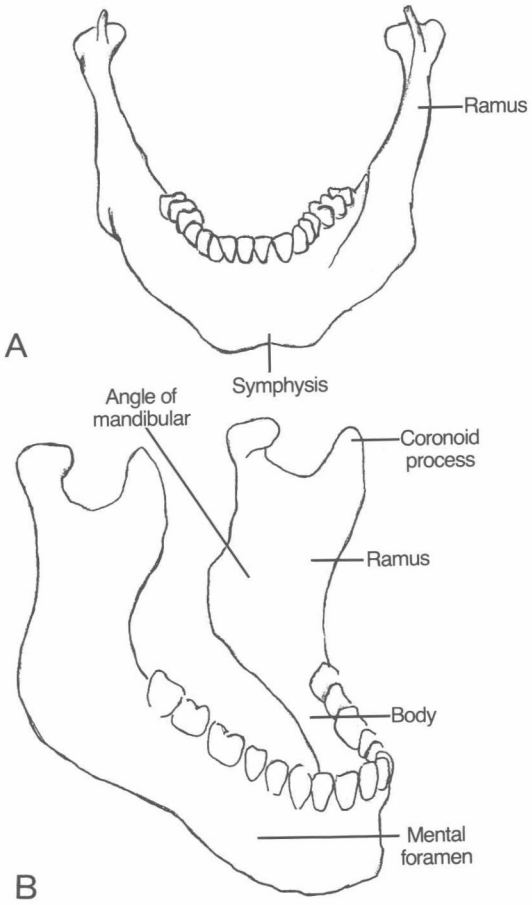

Figure 1.1. *A.* Anterior view of mandible. *B.* Oblique view of mandible.

sagittal plane of the skull, but lies 5 to 20 degrees medially from this plane. The articular condyle is connected with the ramus by a thinner supporting segment, the neck.

Temporomandibular Joint (Fig. 1.2)

The anatomic boundaries of the TMJ, which is located just anterior to the tragus of the auricle and approximately 1 to 1.5 cm below the skin surface, are the zygomatic arch anteriorly and laterally and the temporal bone posteromedially. Normal function depends on the complex interaction between masticatory components: teeth, synovial joint, muscles, nerves, and bone.

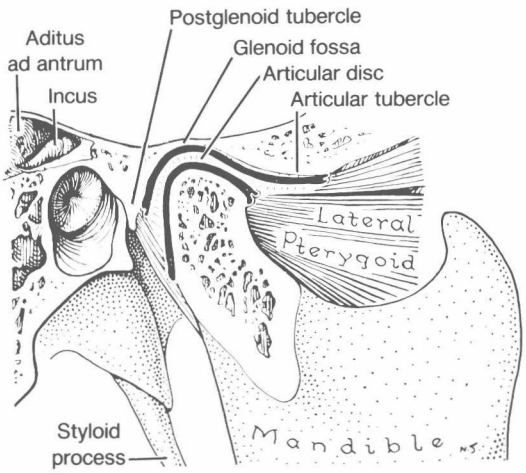

Figure 1.2. Sagittal section of the temporomandibular joint. Note the mandibular fossa and the condyle on the head of the mandible. (From Anderson JE. Grant's Atlas of Anatomy. 8th ed. Baltimore: Williams & Wilkins, 1983.)

Alterations in any of these can clinically manifest themselves as TMJ dysfunction.

Basically, the TMJ is a specialized ginglymoarthrodial joint with its articulation located between the condyle of the mandible and glenoid fossa of the temporal bone. Because of this relationship it is able to undergo both gliding and hinged movements.

The *condyle,* located on the posterior border of the ramus, which it meets at a right angle, has an elliptical shape, with a convexity superiorly to fit into the glenoid fossa. This configuration, however, is somewhat variable, allowing the condyle to adapt to a wide range of movements. A superior or articular portion and an inferior or constricted neck divide the condyle into two sections. Its mesioanterior diameter is somewhat greater than its anteroposterior diameter, with a slight medial orientation within the glenoid fossa directed toward the foramen magnum. Each condyle is roughly parallel to a line joining the buccal and lingual molar cusps of the mandibular teeth. The *tympanic plate* is separated from the condyle by a small glenoid lobe of the parotid gland.

Glenoid Fossa

The *glenoid fossa,* an oval or oblong depression located within the temporal bone, is just anterior to the auditory canal. In its lateral projection, the glenoid fossa demonstrates a slow, S-shaped curve that is concave posteriorly and convex anteriorly. A convex-shaped articular tubercle serves to prohibit compression of the tympanic bone during condylar movement. The anatomic boundaries are the articular eminence anteriorly, the root of the zygoma and auditory process laterally, and the tympanic plate of the petrous portion of the temporal bone posteriorly.

Innervation

Sensory input is derived from connective tissue with neurovascular components located just posterior to the articular disk, and travels via the auriculotemporal nerve and the deep temporal masseteric branches of the mandibular division of the fifth cranial nerve.

Articular Disk

Within the TMJ, between the glenoid fossa superiorly and the condyle inferiorly, is the articular disk or meniscus, which divides the joint into two distinct compartments lined with synovial membranes. The disk has a somewhat oval shape and a fibrous consistency. At its posterior aspect, dense fibrous connective tissue accommodates the glenoid fossa and articular tubercle; at its inferior aspect, it is concave, consisting of avascular fibrous tissue which contains cartilage cells (fibrocartilage) that cover the articular surfaces.

Disk Attachments

Circumferentially, the disk is attached to the capsular ligament, except anteriorly where it receives a portion of the insertion of the superior belly of the *lateral pterygoid muscles.* Clinically, this anatomic relationship is extremely important, since any muscular dysfunction may pull the disk away from its normal position.

Also, the disk is independently bound to the mandibular condyle. However, laterally and medially, it is not attached to the joint capsule. Posteriorly, the articular disk continues into a wad of loose connective tissue which then fuses and extends to the posterior wall of the articular capsule. Finally, both the temporalis and masseter muscles insert into the disk. These complex attachments permit simultaneous movement of the disk alone with the condylar neck.

The *articular capsule,* which is a ligamentous structure consisting of a collagenous connective tissue center, is attached to the temporal bone around the edges of the avascular surfaces of the glenoid fossa with the articular tubercle lying just anterior. It then continues in an inferior direction, where it is bound to the condylar neck and fuses with the meniscus.

In the superior aspect, the architecture is somewhat loose, thereby allowing the anterior gliding movements of the mandible while the inferior aspect is taut, allowing mandibular hinge movements. The capsule is thickened laterally, where it is referred to as the *lateral TMJ ligament.* At this location the fibers run backward and downward from the posterior aspect of the zygoma to the posterior border of the condylar neck. The ligament itself divides into separate layers, each with a specific function. The lateral fan-shaped fibers serve to limit mandibular condylar displacement away from the articular eminence; the medial fibers, on the other hand, prevent excessive retrusive excursion as well as compression of the soft tissue located posterior to the articular eminence. These fibers also contain sensory pain fibers. The upper part of the parotid gland covers the ligament and is intimately related to both the superficial temporal vessels and the auriculotemporal nerve.

Mandibular Movement (Fig. 1.3)

In order for this system to function physiologically, all the active structures, i.e., muscles and ligaments, must work together as a unit with the passive components, i.e., teeth and support structures. Fortunately, although far from perfect, the system is exceedingly adaptable. Because of its unique characteristics and anatomic location, it is also subjected to a wide range of pathologic processes.

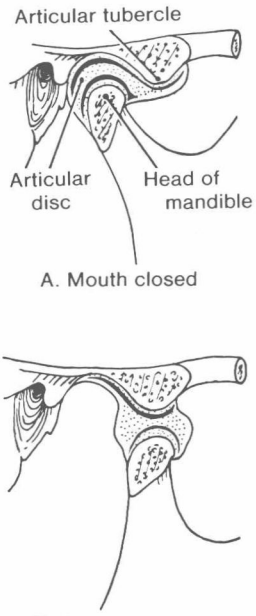

Figure 1.3. Sagittal section of the temporomandibular joint to show the changing relationship between the head of the mandible and the temporal bone when the mouth is opened. Observe that the head of the mandible, together with the articular disk, slides forward to the articular tubule while the head of the mandible rotates on the disk. (From Basmajian JV. Primary Anatomy. 7th ed. Baltimore: Williams & Wilkins, 1976.)

A combination of hinge and gliding motions is responsible for jaw opening and closing. As the mouth opens widely, the articular disk moves forward along the articular eminence. Simultaneously, the condyle rotates forward on the lower surface of the cartilage. This movement, described as "pure rotation," occurs through an imaginary horizontal axis drawn between the two condylar heads. Maximum mandibular opening requires further gliding that must be initiated by the external pterygoid muscles as the condyle translates forward over the articular eminence. This movement occurs when, as a single unit, both the condyle and meniscus continue to glide along the slope of the articular eminence.

Mandibular closure occurs in the opposite direction. With protrusion, the condyle and cartilage maintain the same relative position to one another and the cartilage and condyle move forward and downward together toward the articular fossa.

Lateral chewing movements occur through a combination of basic movements and are also modified by alternative muscle movements.

Muscles of Mastication

A group of paired muscles known as the muscles of mastication, with an intimate relationship to the TMJ, play a significant role in the propagation of myofacial pain dysfunction.

Temporalis. The entire deep temporal fossa, the frontal, the parietal squamous, the greater wing of the sphenoid and, superficially, the temporal fascia serve as the temporalis muscle origin. The two insertions of the temporalis muscle are the deep margin and deep surface of the coronoid process, with anterior, or superficial, fibers continuing beyond to the anterior border of the ramus. These fibers then converge through a gap between the zygoma and the side of the skull deep to the arch and masseter muscle. The temporalis muscle, which is supplied by the deep temporal nerve of the mandibular division of the trigeminal nerve, elevates the mandible through its vertical fibers which position and retract the mandible when they are directed posteriorly.

Lateral Pterygoid. The lateral pterygoid originates from the lateral surface of the pterygoid plate as well as from the upper surface of the greater wing of the sphenoid and then runs backward and laterally to its insertion on the inferoanterior neck of the mandible. A smaller portion from both heads inserts on the anterior surface of the articular disk of the TMJ. The lateral pterygoid muscle is supplied by the mandibular nerve and serves to protract the lower jaw.

Medial Pterygoid. The medial pterygoid muscle originates from the pyramidal process of the palatine and the lateral lamina of the pterygoid plate. In a deeper plane, the superficial head arises from the tuberosity of the maxilla and adjoining bone, then runs downward and backward, lying on the lower part of the lower head of the lateral pterygoid. It then inserts on the medial surface of the angle and ramus of the mandible as it forms a sling around the mandibular angle. In conjunction with the masseter, it helps stabilize the lower jaw. The medial pterygoid is supplied by the mandibular nerve.

Masseter (Fig. 1.4). The masseter muscle originates from the posterior part of the lower margin and medial surface of the zygomatic arch. Superficially, it is involved with the zygomatic process of the maxilla, as well as with the margin of the zygomatic arch. The muscle inserts onto the entire lateral surface of the mandible, including the coronoid process, and covers almost the entire lateral aspect of the mandible. The most powerful muscle of mastication, the masseter is supplied by the masseter branch of the mandibular nerve. Elevation of the mandible is its primary action.

Accessory Muscles. Suprahyoid muscles, including the mylohyoid, digastric, and stylohyoid muscles, elevate the hyoid bone and depress the mandible when the hyoid bone is stabilized by the infrahyoid muscles. These work in coordination with the internal pterygoid muscles to help pull the mandible forward.

The origin of the *mylohyoid muscle* is the hyoid bone and its insertion is the medial surface of the anterior mandible. This muscle group opens the jaw by exertion of the muscle pull in an inferior and posterior direction.

The *digastric muscle* (anterior belly) originates from the digastric tendon and inserts on the medial surface of the lower mandible. This aids in opening the jaw.

The *stylohyoid muscle* originates in the styloid process and inserts on the side of the tongue.

Infrahyoid muscles include (a) thyrohyoid, (b) sternohyoid, (c) sternothyroid, and (d) omohyoid muscles. They act to stabilize the hyoid bone and to lower the hyoid bone and the larynx.

The muscles that close the jaw (temporalis, masseter, pterygoids) are very strong and are capable of exerting a tremen-