Oral Cavity and Pharynx

Persons who specialize in the care and treatment of the oral cavity have a great responsibility. The oral cavity participates actively in respiration, nutrition, and excretion - the three essentials of life itself. Indeed, unless the oral cavity is functioning normally, these three essentials are hampered. Proper health and function of the oral cavity are mandatory for sustained, physiologic life. Ill health of the mouth results in decreased function of the organism in general. A simple toothache can lead to dehydration, weight loss, infection, sepsis, and even death. Trauma to the face and jaws commonly results in severe general decline of the individual's health. Before treating abnormalities or pathologic conditions, the clinician must be knowledgeable of normalcy.

The Oral Cavity

The oral cavity is divided into two major portions: the vestibule and the cavum oris.

The Vestibule

The vestibule is bounded externally by the lips and cheeks and internally by the alveolar processes and teeth. Above and below, it is bounded by the reflection of the mucosa from the cheeks and lips onto the alveolar process. Laterally, it is known as the buccal vestibule, and anteriorly it is referred to as the labial vestibule. The parotid salivary gland duct empties into the buccal vestibule opposite the maxillary molars. Palpation of this vestibule reveals a smooth moist trough. No masses of lesions are noted in the normal state. The mucosa should be uniformly pink, throughout.

The lips are the fleshy folds of tissue surrounding the orifice of the mouth. They are lined by moist mucous membrane intraorally. Extraorally, they are covered by skin. Where the skin and mucous membrane join, a distinct margin, the vermillion border, is seen. From this line to the wet mucosa inside the lip is the vermillion zone. This vermilion zone is characteristic of man only. It is pink because the epithelium is thin and the rich network of underlying vessels shows through.

In the midline of the upper lip, a small protrusion, the tubercle is noted. Just above this is the philtrum, a depression leading to the columella of the nose. The lower lip has a small, midline depression corresponding to the tubercle.

The substance of the lips is primarily composed of fatty tissue laterally and salivary glands medially, with the orbicularis oris muscle sandwiched between. Connective tissue binds the various structures into a functioning unit. Moreover, the skin and mucous membrane are tightly fixed to this connective tissue by multiple fibrous bands that transverse the entire thickness.
The upper and lower lips are attached to their respective alveolar processes by a web of fibrous tissue in the midline known as the **labial frenum**. The frenum is covered with mucosa.

The cheeks, which form the lateral boundary of the vestibule, are similar in structure to the lips. Fatty tissue lies under the skin, and glands lie under the mucosa. Sandwiched between the fat and glands is the buccinator muscle.

Intraorally, the mucosa is bound to the deeper structures of the cheek by fibrous tissue. This aids the mucosa in conforming to the shape of the buccinator during contraction and helps to prevent cheek biting during chewing.

Small yellow dots may be seen on the cheek mucosa just inside the corner of the mouth. They are not abnormal and represent rudimentary sebaceous glands. They are referred to as **Fordyce's spots**.

The **buccal fat pad** is a lobular convex structure occupying a small area between the buccinator muscle and the masseter muscle. Some of this fat extends back into the space between the temporalis and the pterygoid muscles. Moreover, the fat may also reach superiorly into the temporal fossa and inferiorly into the pterygomandibular space. This mass of fat lying between the buccinator and masseter muscles is the buccal fat pad, often referred to as the "fat pad of Bichat". It is most interesting that even in patients suffering from severe malnutrition, the buccal fat pad persists much longer than does subcutaneous fat in other portions of the body.

**Cavum Oris**

Within the confines of the alveolar arches is the **cavum oris**. Superiorly, the boundary is the hard and soft palate. The mylohyoid muscle forms the floor. The anterior tonsillar pillar acts as the posterior boundary, leading into the oropharynx.

The ** palate or roof of the oral cavity is divided into the hard palate and the soft palate.** The maxillary palatine processes and horizontal processes of the palatine bone contribute to the skeleton of the hard palate. A thick layer of soft tissue covers the hard palate. Peripherally, the mucosa surrounding the teeth is known as the **palatine gingiva.** The soft tissues over the posterior two thirds of the hard palate are more spongy than at the anterior one third, owing to the fact that in the mucosa of the posterior two thirds lie most of the palatine salivary glands. The mucosa of the anterior one third of the palate reveals radiating ridges, the **palatine rugae.** Just behind the central incisors is the incisive (nasopalatine) **papilla,** which marks the nasopalatine foramen. Extending posteriorly from the papilla in the midline is the **median palatine raphe.** It is narrow, sharp ridge of fibrous tissue covered by mucosa, and it marks the median palatine suture.

The mucosa covering the hard palate extends posteriorly to envelop the palatine muscles. This area is the **soft palate.**
The muscles in the soft palate are the \textit{tensor veli palatini} supplied by the trigeminal nerve, the \textit{levator veli palatini} supplied by the pharyngeal plexus, and the \textit{musculus uvulae} also supplied by the pharyngeal plexus of nerves. The mucosa of the soft palate is more red than that of the hard palate because of the greater keratinization of the hard palate and the rich and densely arranged vessels of the soft palate.

Just behind the boundary between the hard and soft palates is a pair of small pits on either side of the midline, the \textit{palatine foveae}. Some of the ducts of the palatine glands empty here. When the mouth is wide open, a fold of mucous membrane can be seen extending from the lateral root of the soft palate to the retromolar pad of the mandible. Beneath this fold is the \textit{pterygomandibular raphe}, which is interposed between the buccinator muscle and the pharyngeal constrictor muscle. Further posteriorly, a second fold can be seen extending to the base of the tongue. This is the \textit{palatoglossal arch}, or \textit{anterior tonsillar pillar}, and represents the mucosal covered palatoglossus muscle. A third fold can be seen more medial and posterior, the \textit{palatopharyngeal arch} or \textit{posterior tonsillar pillar}. This third arch represents the palatopharyngeus muscle. Between the anterior and posterior tonsillar pillars a depression, the \textit{tonsillar fossa}, is evident. Herein lies the palatine tonsil.

The posterior border of the soft palate is free and doubly concave. The mucosa continues onto the nasal mucosa. A small projection of muscle and mucosa, the \textit{uvula}, is located in the midline of the free posterior border.

The \textit{alveolar processes} form the lateral and anterior boundaries of the cavum oris, separating it from the buccal and labial vestibules. They are bony processes of the maxilla and mandible and are composed of cancellous bone covered with a thin plate of cortical bone (See Chapter 1). The roots of the teeth are anchored in the alveolar processes in sockets lined with cortical bone known as \textit{lamina dura}. The mucosa covering the alveolar processes is the \textit{gingiva}. Triangular projections of gingiva between the teeth are the \textit{interdental papillae}. As the gingiva reflects into the vestibule, it is smoother, more mobile, and darker in color.

Behind the last mandibular molar, a fleshy area, the \textit{retromolar pad}, is located. It contains glands and fibrous tissue. As the alveolus atrophies following loss of teeth, this pad becomes more prominent. Clinically, it is continuous with the pterygomandibular fold.

The tongue occupies the space between the lower alveolus and the floor of the mouth. It is a muscular organ covered with specialized mucosa and is attached at its base and central portion to the floor of the mouth. The muscles of the tongue are described in Chapter 2.

The tongue may be divided into an anterior two thirds and a posterior one third. The body and the tip are the anterior two thirds. The posterior one third is the base and the root.

A V-shaped trough, the \textit{terminal sulcus}, separates the two divisions. Embryologically, the anterior two thirds of the tongue develops from the first branchial arch. It receives nerve innervation from the chorda tympani and lingual nerves. The posterior one third develops from the second and third branchial arches and is innervated by the glossopharyngeal nerve. At the apex of the terminal sulcus is a blind pit, the \textit{foramen cecum}, which marks the point of embryological development of the thyroid gland.
The dorsal surface of the anterior two thirds of the tongue faces the palate. Four different types of papillae are located anterior to the terminal sulcus. The mushroom-shaped prominences directly in front of the terminal sulcus are the *circumvallate papillae*. They have a trough surrounding them. The walls of this trough contain taste buds and the depths contain the *serous salivary glands of Von Ebner*. *Filiform papillae* cover the entire palatine surface of the tongue and give the tongue its velvety appearance. Interspersed among the filiform papillae are the *fungiform papillae*, which appear as red dots and contain taste buds. Along the posterior lateral area of the tongue are parallel folds of tissue, the *foliate papillae*. These also contain taste buds.

Posterior to the terminal sulcus, the dorsal surface of the tongue contains oval prominences surrounded by shallow furrows. This is lymphatic tissue and is often termed the *lingual tonsil*.

Projected upward behind the root of the tongue is the *epiglottis*. It is a flap of mucous-covered cartilage shaped like a leaf, which attaches to the tongue by the *median glossoepiglottic fold* and two *lateral glossoepiglottic folds*. The lateral folds are also partially attached to the lateral walls of the pharynx. The two blind pouches between median glossoepiglottic fold and the right and left glossoepiglottic folds are called the right and left *valleculae*.

Inferiorly, the stem of the epiglottis is attached to the thyroid cartilage.

The root of the tongue is well anchored. Laterally, it is attached to the pharyngeal walls by the superior pharyngeal constrictor muscle. Inferiorly the tongue is anchored by the hyoglossus and genioglossus muscles. The palatoglossal arch or fold attaches the root of the tongue to the palate.

The ventral or inferior surface of the tongue rests on the mucosa of the floor of the mouth. It is covered by smooth mucosa. In the midline is the *lingual frenum*, which is a sickle-shaped fold attaching the underside of the tongue to the floor of the mouth. Anteriorly, on either side of the frenum, can be seen the *caruncles*, openings for the right and left submandibular ducts. An irregular fold, the *plica sublingualis*, begins here and runs posteriorly along the floor of the mouth, marking the openings of the ducts of Rivinus of the sublingual gland.

On many people, the veins on the ventral surface of the tongue are quite large, tortuous, and superficial. They appear dark blue, and may even be mistaken for a pathologic condition.

Muscles, nerves, and blood supply to the lips, cheeks, oral cavity, and tongue are described in detail in Chapters 2, 3, and 4.

**The Pharynx**

That part of the respiratory-digestive tube placed behind and below the nasal cavities and mouth is the *pharynx*. It is a conical, muscular tube with the base pointed upward. The
boundaries are from the base of the skull to the sixth cervical vertebra. The narrowest point is at its termination in the esophagus.

The pharynx may be divided into three parts: nasopharynx, oropharynx and laryngopharynx. As with the oral cavity, nerves, blood vessels, and muscles are described in detail in Chapters 2, 3, and 4.

**Nasopharynx**

The nasopharynx is about one inch in length and lies behind the nasal cavity, above the oral cavity and in front of the first cervical vertebra. On the lateral wall is seen the opening for the auditive (eustachian) tube. This opening is at the level of the inferior concha. Superiorly and posteriorly guarding the opening is a crescent-shaped bulge, the torus tubarius. The posterior-inferior end of the torus tubarius passes down as a fold, the salpingopalatine fold, to attach to the palate. The salpingopharyngeal fold, marking the salpingopharyngeal muscle, is more prominent and arises in the same area to pass down and attach to the lateral wall of the lower pharynx. Behind the torus is a blind pouch, the pharyngeal recess. Lymphatic tissue, known as the pharyngeal tonsil (adenoids), lies in this area.

**Oropharynx**

The oropharynx is about 2 inches in length, lies in front of the second and third cervical vertebrae, and extends from the soft palate to the hyoid bone. The anterior tonsillar pillar (glossopalatine fold) is considered the anterior boundary of the oropharynx. In the oropharynx are seen the medial glossoepiglottic fold and the two lateral glossoepiglottic folds, which attach the epiglottis to the base of the tongue. The depressions between the folds are the valleculae. The epiglottis is a flap of cartilage covered with mucosa, shaped like a leaf, and projecting obliquely upward behind the root of the tongue. The free end is capable of flapping over the entrance to the trachea during swallowing. It keeps material from entering the trachea and directs swallowed material backwards so that the material will enter the esophagus.

**Laryngopharynx**

The laryngopharynx is that portion of the pharynx that extends from the level of the hyoid bone to the lower border of the cricoid cartilage. It lies in front of the fourth, fifth, and sixth cervical vertebrae and is approximately 3 inches in length.

The larynx, located in the laryngopharynx, is the voice box. It projects up into the laryngopharynx and is the entrance to the trachea which leads into the lungs. On either side of the laryngeal opening, between it and the walls of the pharynx, is a blind pouch, the piriform sinus.

Three major cartilaginous forms make up the bulk of the framework of the larynx: the thyroid cartilage, the epiglottis, and the cricoid cartilage. The thyroid cartilage is shaped like a shield. The cricoid cartilage is shaped like a signet ring and the epiglottis is leaf-shaped. They are held together by ligaments and muscles. When the muscles and ligaments are
removed, it is easier to see how the parts fit together. The arytenoid, corniculate, and cuneiform cartilages are small, paired sesamoid structures that complete the framework.

Looking down into the larynx from above, we can see the vocal cords crossing the interior. As air passes over them, the cords vibrate and sound is produced. The sounds vary, depending on the tightness of the cords. This tension is controlled by several muscles all working in a very coordinated fashion. The larynx is, indeed, a highly sophisticated and specialized organ.

The interior of the larynx is covered with mucosa and clinically may be examined with a laryngoscope. This instrument retracts the root of the tongue downward and pulls the epiglottis forward, opening the larynx. The view seen by the clinician is exemplified in the figure.

Below and posterior to the laryngopharynx is the esophagus leading to the stomach.

The muscles of the pharynx are the superior, medial, and inferior constrictors, the stylopharyngeus, salpingopharyngeus, and the palatopharyngeus. The nerves and blood supply are discussed in Chapters 3 and 4. The constrictors and salpingopharyngeus are supplied by the pharyngeal plexus and glossopharyngeal nerve. The blood supply is via the ascending pharyngeal artery, superior thyroid artery, and thyrocervical branches of the subclavian artery.

**Clinical Notes**

Debris or a foreign body such as a fish bone is occasionally trapped in the valleculae or in the piriform sinus. Removal of such an item can be quite difficult, particularly if the patient is a child.

When the lingual frenum attaches close to the tip of the tongue, a condition known as *ankyloglossia* (tongue-tie) occurs. This limits the mobility of the tongue and may impair speech. If so, a *frenectomy* may be performed to increase tongue mobility. Even more importantly, if the lingual frenum attaches high on the lingual gingiva of the mandibular incisors, it must be released in order to obviate early periodontal disease in this area. Ankyloglossia with the lingual frenum attached high on the lingual gingiva of the anterior teeth, will, by action of the tongue, pull the gingiva away from the teeth and bone.

If the mucosa of the larynx is stimulated by a foreign body, such as filling material, saliva, or food, the muscles controlling the vocal cords will cause the cords to close the opening into the trachea. This is known as *laryngospasm*. It protects the tracheobronchial tree from debris. However, it also prevents air from entering the lungs and, therefore, often causes an emergency. Intravenous injection of a rapidly acting muscle relaxant will paralyze the cords, opening the passage into the trachea. Once the cords are relaxed, air can be introduced into the trachea and lungs. However, one must be careful not to project the causative foreign body into the trachea.