

**OUTLINE**

## Landmarks of the Face and Oral Cavity

- Landmarks of the Face
- Landmarks of the Oral Cavity
- Palate Area of the Oral Cavity
- Tongue
- Floor of the Mouth
- Salivary Glands

## Bones of the Head

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- Bones of the Face

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- Muscles of the Tongue
- Muscles of the Floor of the Mouth
- Muscles of the Soft Palate
- Muscles of the Neck

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- Arteries of the Face and Oral Cavity
- External Carotid Artery
- Veins of the Face and Oral Cavity

**HEAD AND NECK ANATOMY****SPECIFIC INSTRUCTIONAL OBJECTIVES**

The student should strive to meet the following objectives and demonstrate an understanding of the facts and principles presented in this chapter:

1. List and identify the landmarks of the face and the oral cavity.
2. Identify the bones of the cranium and the face and identify the landmarks on the maxilla and the mandible.
3. Identify the parts of the temporomandibular joint (TMJ) and describe how the joint works.
4. List and identify the muscles of mastication, facial expression, the floor of the mouth, the tongue, the throat, the neck, and the shoulders. Explain their functions.
5. List and identify the nerves of the maxilla and the mandible.
6. Identify the arteries and veins of the head and the neck.

**KEY TERMS**

- |  |   |                                      |
|--|---|--------------------------------------|
| <b>ala of the nose</b> (109)                   | <b>condyloid process</b> (115)          | <b>facial nerve</b> (122)            |
| <b>alveolar mucosa</b> (110)                   | <b>coronoid process</b> (115)           | <b>facial artery</b> (127)           |
| <b>alveolar process</b> (115)                  | <b>deep facial vein</b> (128)           | <b>facial vein</b> (128)             |
| <b>angle of the mandible</b> (115)             | <b>dental arteries</b> (127)            | <b>fauces</b> (111)                  |
| <b>anterior alveolar nerve</b> (124)           | <b>digastric</b> (125)                  | <b>filiform papilla</b> (112)        |
| <b>anterior superior alveolar artery</b> (128) | <b>ducts of Bartholin</b> (112)         | <b>fimbriated folds</b> (112)        |
| <b>anterior tonsillar pillars</b> (111)        | <b>ducts of Rivinus</b> (112)           | <b>foliate papillae</b> (112)        |
| <b>articular disc</b> (117)                    | <b>ethmoid bone</b> (114)               | <b>Fordyce's spots</b> (110)         |
| <b>buccal nerve branch</b> (125)               | <b>ethmoid sinuses</b> (114)            | <b>frena</b> (110)                   |
| <b>buccal mucosa</b> (110)                     | <b>external auditory meatus</b> (113)   | <b>frontal bone</b> (113)            |
| <b>buccinator</b> (117)                        | <b>external carotid artery</b> (126)    | <b>fungiform papilla</b> (112)       |
| <b>circumvallate papilla</b> (112)             | <b>external jugular vein</b> (129)      | <b>genial tubercles</b> (115)        |
| <b>common carotid</b> (126)                    | <b>external oblique ridge</b> (115)     | <b>genioglossus</b> (121)            |
| <b>condyle</b> (115)                           | <b>external pterygoid muscles</b> (117) | <b>geniohyoid</b> (122)              |
|  | <b>extrinsic muscle</b> (121)           | <b>gingiva</b> (110)                 |
|  |   | <b>glenoid fossa</b> (113)           |
|  |   | <b>glossopharyngeal</b> (122)        |
|  |   | <b>greater palatine artery</b> (128) |

(continues)

**KEY TERMS** (continued)

- greater palatine foramen (115)  
 greater palatine nerve (122)  
 hyoglossus (121)  
 hyoid bone (121)  
 hypoglossal (122)  
 incisive arteries (127)  
 incisive nerve branch (125)  
 incisive papilla (111)  
 inferior alveolar artery (127)  
 inferior alveolar branch (125)  
 inferior nasal conchae (115)  
 infraorbital artery (128)  
 infraorbital foramen (115)  
 infraorbital nerve (124)  
 internal carotid artery (126)  
 internal jugular vein (129)  
 internal oblique ridge (115)  
 internal pterygoid muscles (117)  
 intrinsic muscles (121)  
 labial commissures (110)  
 labial mucosa (110)  
 labio-mental groove (110)  
 lacrimal bones (115)  
 lesser palatine foramen (115)  
 lesser palatine nerve (122)  
 linea alba (110)  
 lingual branch (127)  
 lingual foramen (115)  
 lingual frenum (112)  
 lingual vein (112)  
 mandibular artery (127)  
 mandible (115)  
 mandibular foramen (115)  
 mandibular notch (115)  
 mandibular nerve branch (125)  
 masseter muscles (117)  
 mastication (113)  
 mastoid process (113)  
 maxilla (115)  
 maxillary artery (127)  
 maxillary nerve branch (122)  
 maxillary sinus (115)  
 maxillary tuberosity (115)  
 maxillary vein (129)  
 median sulcus (112)  
 median suture (115)  
 mental artery (127)  
 mental foramen (115)  
 mental nerve branch (125)  
 mental protuberance (115)  
 mentalis (117)  
 middle superior alveolar artery (128)  
 middle superior alveolar nerve (124)  
 mucosa (110)  
 mylohyoid (122)  
 mylohyoid artery (127)  
 mylohyoid nerve branch (125)  
 nasal bones (115)  
 naso-labial groove (109)  
 nasopalatine nerve (122)  
 occipital bone (114)  
 oral vestibule (110)  
 orbicularis oris (117)  
 palate (111)  
 palatine bones (115)  
 palatine raphe (111)  
 palatine rugae (111)  
 palatine suture (115)  
 palatine tonsils (111)  
 palatoglossal arches (111)  
 palatoglossus (121)  
 palatopharyngeal (122)  
 palatopharyngeal arches (111)  
 papilla (112)  
 parietal bone (113)  
 parotid duct (112)  
 parotid glands (112)  
 parotid papilla (110)  
 philtrum (110)  
 platysma (122)  
 posterior superior alveolar artery (128)  
 posterior superior alveolar nerve (125)  
 posterior tonsillar pillars (111)  
 pterygoid (114)  
 pterygoid artery (128)  
 pterygoid plexus of veins (129)  
 pterygopalatine nerve branch (122)  
 rami (115)  
 retromandibular vein (128)  
 retromolar area (115)  
 saliva (112)  
 sphenoid bone (114)  
 sphenoid sinuses (114)  
 Stensen's duct (110)  
 sternocleidomastoid (122)  
 styloglossus (121)  
 stylohyoid (122)  
 styloid process (113)  
 sublingual caruncles (112)  
 sublingual folds (112)  
 sublingual glands (112)  
 sublingual sulcus (112)  
 submandibular glands (127)  
 symphysis (115)  
 synovial fluid (117)  
 taste buds (112)  
 temporal bone (113)  
 temporal muscles (117)  
 temporomandibular joint (TMJ) (115)  
 tongue (111)  
 torus (111)  
 torus mandibularis (112)  
 trapezius (122)  
 trigeminal (122)  
 tubercle of the lip (110)  
 uvula (111)  
 vermilion border (110)  
 vermilion zone (110)  
 vestibule fornix (110)  
 vomer bone (115)  
 Wharton's duct (112)  
 xerostomia (113)  
 zygomatic nerve (125)  
 zygomatic bones (115)  
 zygomatic major (117)

**INTRODUCTION**

This chapter provides information on the anatomy of the head and neck. The dental assistant must be able to describe this anatomy, including the locations of structures and their functions. Identifying the anatomy of the head, face, and neck in normal, healthy tissues enables the dental assistant to recognize the abnormal.

**Landmarks of the Face and Oral Cavity**

Landmarks of the anatomy are usually skeletal or soft tissue structures that are easily recognizable. They are used as reference points in describing the locations of anatomical structures or for taking measurements. It is important for the dental assistant to be familiar with the landmarks that make up the face and oral cavity.

**Landmarks of the Face**

The face has the following landmarks: ala of the nose, naso-labial groove, philtrum, vermilion border, vermilion

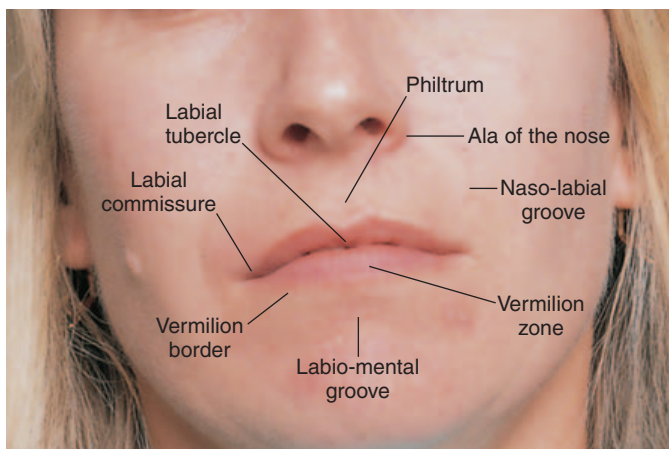
zone, the tubercle of the lip, labial commissures, and the labio-mental grooves (Figure 7-1).

The **ala of the nose** is the wing of the nose or outer edge of the nostril. From the ala of the nose to the corners of the mouth is a groove called the **naso-labial groove**, or sulcus. Between the bottom of the nose and the middle of the upper lip is a shallow, V-shaped depression known as the **philtrum**. All these landmarks are covered with skin consistent with the skin in other parts of the face. These are areas to look at for scarring from accidents, surgeries, or physical conditions, such as cleft lip.

The lips are covered externally with skin and internally with mucous membrane. The reddish portion of the lips is called the **vermilion zone**. The vermilion zone is highly vascular and covered with a thin layer of epithelium. The **vermilion border** is where the skin meets the vermilion zone and forms a line around the lips. In the middle of the upper lip is a small projection that sometimes enlarges or thickens. It is called the **tubercle of the lip**. The corners of the mouth, where the upper lip meets the lower lip, are known as **labial commissures**. The commissures should be observed for cracks, color changes, and variations in form. Just below the lower lip is the **labio-mental groove**, which runs horizontally and separates the lip from the chin.

### Importance to the Dental Assistant

The dental assistant may notice scars or sores around the nose, mouth, and chin areas. By knowing the normal landmarks of the face the dental assistant can use correct terminology to describe any deviation and record information on the health history. Sometimes facial scars can indicate the person has been in an accident and may have had many x-rays taken and possible surgery. He or she may have had seizures or have had a cleft palate or lip. Knowing this information may assist in the details of the health history and treatment plan.

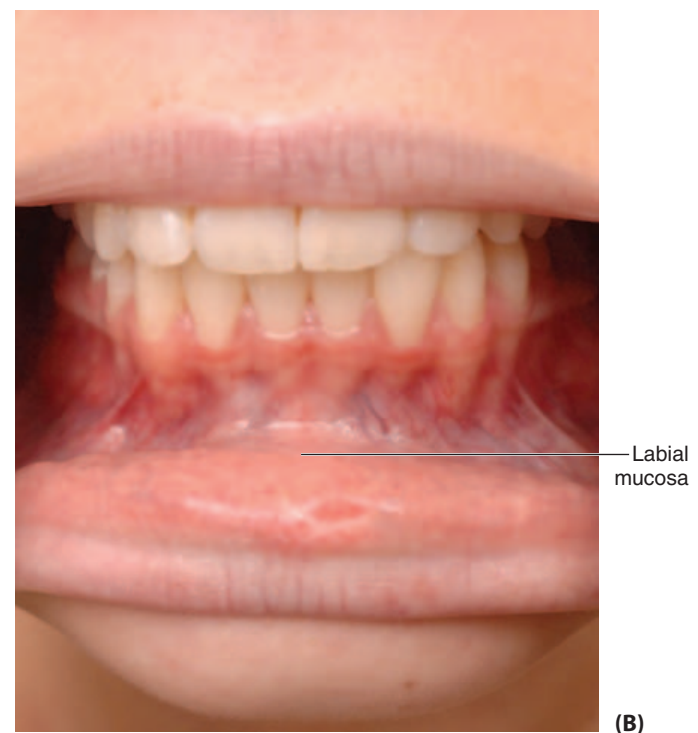
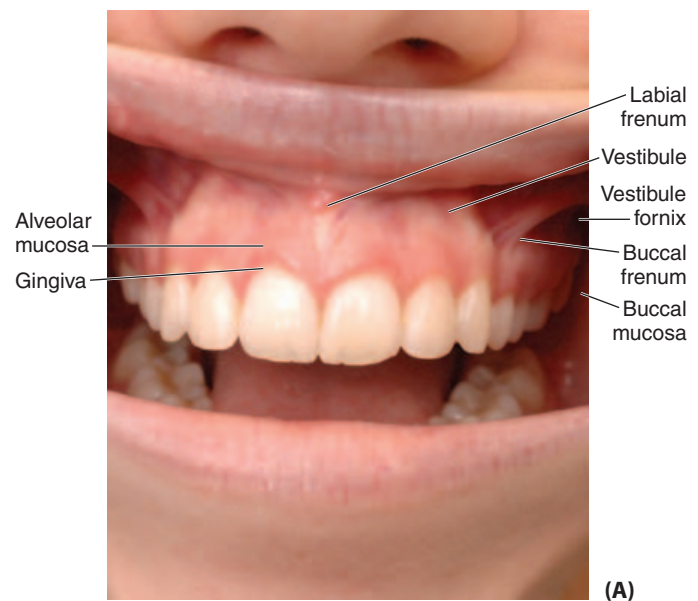


**FIGURE 7-1** Landmarks of the face.

### Landmarks of the Oral Cavity

Understanding the landmarks of the oral cavity aids the dental assistant when taking radiographs, placing topical anesthetic, recognizing healthy tissue, and recording information or medical history on a patient's chart.

The landmarks of the oral cavity include the following: vestibule, vestibule fornix, labial mucosa, buccal mucosa, parotid papilla, Stensen's duct, linea alba, Fordyce's spots, alveolar mucosa, gingiva, labial frenum, and buccal frenum (Figure 7-2).



**FIGURE 7-2** Structures of oral cavity.

Inside the mouth, a pocket is formed by the soft tissue of the cheeks and the gingiva. This is the **oral vestibule** (mucobuccal fold). The deepest point of the vestibule is called the **vestibule fornix**. The fornix forms a U-shaped pocket that is continuous throughout the anterior and posterior areas. The tissue that lines the inner surface of the lips and cheeks is called **mucosa**. The mucosa is named according to location. The inner surface of the lips is called the **labial mucosa**, and the inner surface of the cheeks is the **buccal mucosa**. On the labial mucosa are small, yellowish glands near the commissures called **Fordyce's spots**, which become larger and more visible with age. On the buccal mucosa, opposite the maxillary second molar, is a flap of tissue called the **parotid papilla**, which is where the opening of the **Stensen's duct** is located. On the buccal mucosa is a raised white line that runs parallel to where the teeth meet, called the **linea alba** (Figure 7-3). Mucosa also covers the alveolar bone that supports the teeth. It is called the **alveolar mucosa**. The alveolar mucosa is loosely attached and is highly vascular, giving the mucosa a reddish color. Moving from the alveolar mucosa toward the teeth is the **gingiva**. The gingiva is firmly attached and usually pale pink or brownish pink, depending on pigmentation. This dense, fibrous tissue covered with mucous membrane can withstand pressure during chewing. The portion of the gingiva that meets the tooth is called the free gingiva or marginal gingiva.

When the lips are pulled out, frena become visible. Frena (plural form of **frenum**) are raised lines of mucosal tissue that extend from the alveolar mucosa through the vestibule to the labial and buccal mucosa. On the labial, the main frena are between the maxillary central incisors and the mandibular central incisors, with minor frena along the vestibule of both arches in the labial and buccal areas.

### Palate Area of the Oral Cavity

On the inside of the maxillary teeth is the **palate**, or "roof of the mouth." The palate is divided into hard and soft sections. The hard palate, the anterior portion, is a bony plate covered with pink to brownish pink keratinized tissue. The soft palate, the posterior portion, covers muscle tissue and is darker pink or yellowish. On the hard palate is the **incisive papilla**, which is a raised area of tissue lying behind the maxillary central incisors (Figure 7-4). Extending from the back of the incisive papilla is a slightly raised line that extends down the middle of the hard palate, known as the **palatine raphe**. The ridges that run horizontally across the hard palate behind the incisive papilla are the **palatine rugae**. Occasionally, in the middle of the palate a lump or prominence of bone (exostosis) may be found. This excess bone is called a **torus** (plural is tori), or a torus palatinus, specifically.

The following landmarks are on the soft palate and in the oropharynx areas: the uvula, anterior tonsillar pillars, posterior tonsillar pillars, palatine tonsils, and

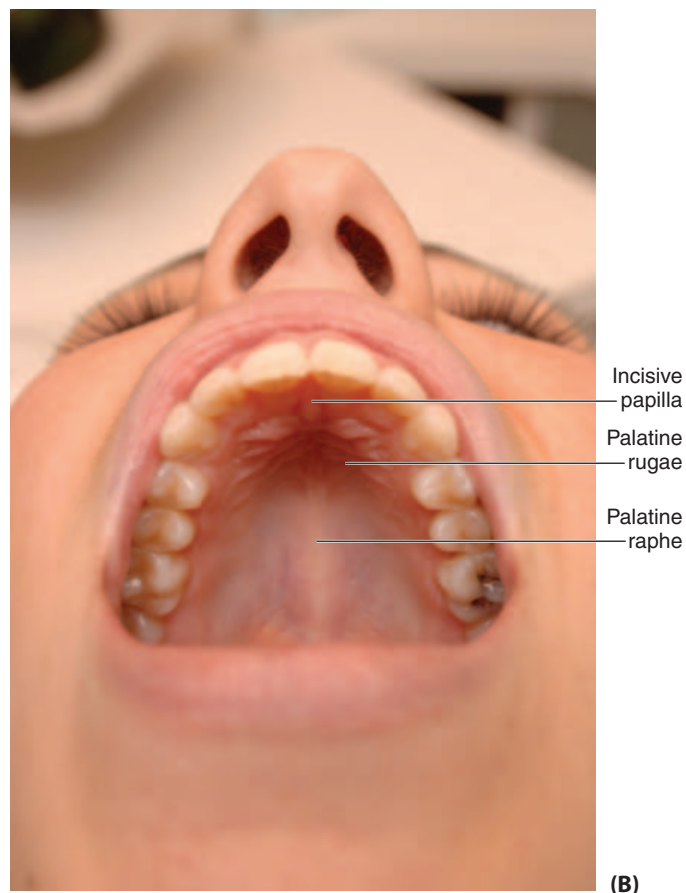
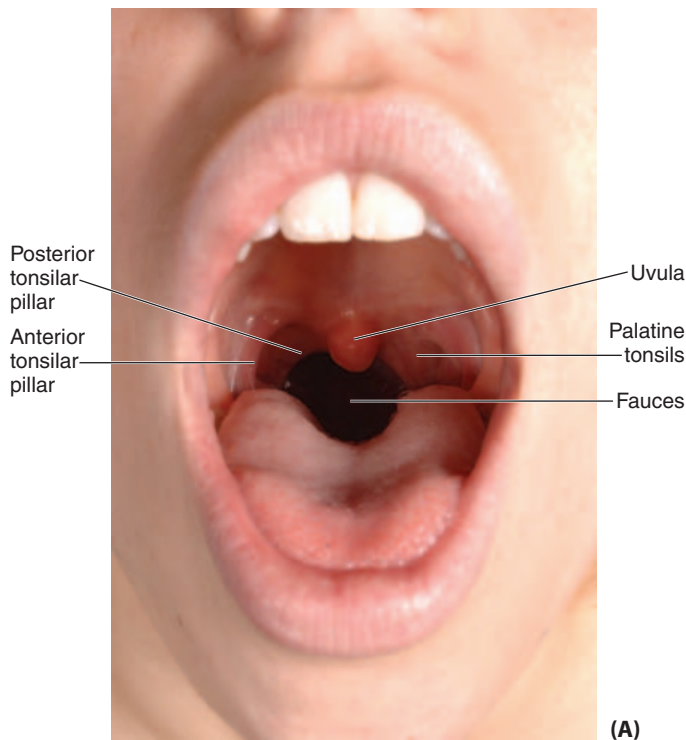


**FIGURE 7-3** The oral vestibule with the linea alba on the buccal mucosa.

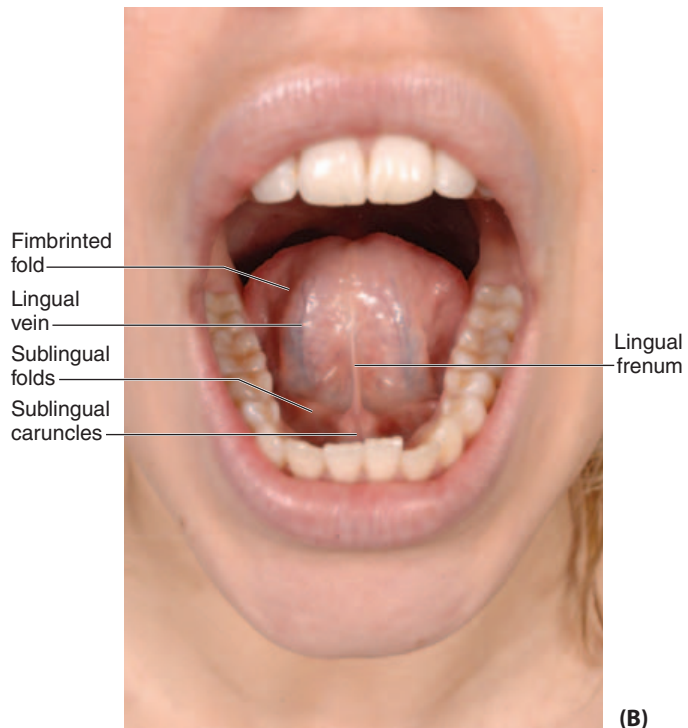
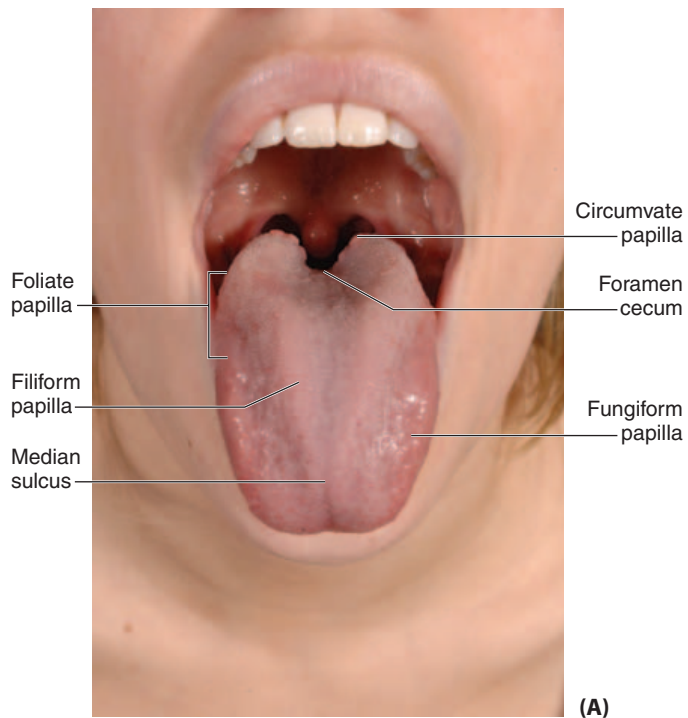
the fauces (Figure 7-4). The **uvula** is a projection that extends off the back of the soft palate. Extending horizontally from the uvula to the base of the tongue are folds of tissue called **anterior tonsillar pillars** or **palatoglossal arches**. Another set of arches is found farther back in the throat. This set is the **posterior tonsillar pillars** or **palatopharyngeal arches**. Between the two sets of pillars is a depressed area where the palatine tonsils are situated. The **palatine tonsils** are often marked with deep grooves and are red and inflamed due to infection. The space in the back of the oral cavity where food passes into the pharynx is the **fauces**.

### Tongue

The **tongue** is a significant region of the oral cavity with the following landmarks: sulcus terminalis, circumvallate papilla, filiform papillae, fungiform papillae, foliate papilla, and median sulcus on the dorsal or top surface of the tongue. On the ventral or underside of the tongue are the lingual frenum, the lingual veins, and the fimbriated folds. When the tongue is extended, a shallow, V-shaped groove is apparent on the posterior portion. This is the sulcus terminalis. This groove separates the anterior two-thirds, or body of the tongue, from the base of the tongue. Anterior to the sulcus, covering the dorsal side of the tongue (Figure 7-5A), are small, raised projections called **papilla**, where taste buds are located. The largest papilla, mushroom shaped, are anterior to the sulcus terminalis in a row of eight to ten and are called **circumvallate papillae**. Anterior to the circumvallate papillae and covering the dorsal side of the tongue are hair-like projections called **filiform papillae**. Papillae that give the tongue the "strawberry effect" are the **fungiform papillae**. On the lateral border of the tongue near the base are the **foliate papillae**, which are slightly raised, vertical folds of tissue. The tongue is divided in half by the **median sulcus**, which runs from the base to the tip of the tongue. The median sulcus is a groove that varies in depth from person to person.

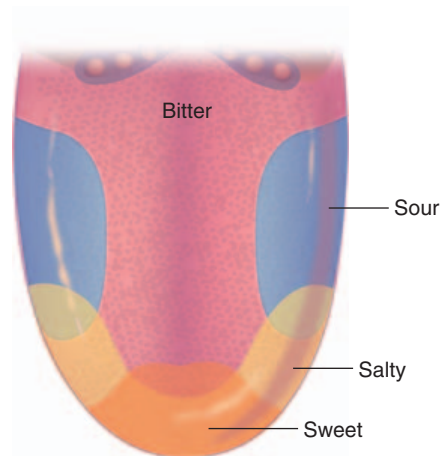


**FIGURE 7-4** Landmarks of the palate and oral pharynx area.



**FIGURE 7-5** (A) Dorsal surface of the tongue. (B) Ventral surface of the tongue.

In the middle of the ventral side of the tongue, a line of tissue extends from the tongue to the floor of the mouth, called the **lingual frenum** (Figure 7-5B). On either side of the lingual frenum are the **lingual veins**. They are bluish and run the length of the tongue.



**FIGURE 7-6** The location of the basic taste buds of the tongue.

Lateral to the lingual veins are folds of tissue called **fimbriated folds**. Sometimes, under the tongue on the alveolar bone are excess bone formations called **torus mandibularis**.

**Sensation of Taste.** The **taste buds**, also known as taste receptors, are oval structures that are located on the dorsal surface of the tongue. When stimulated with different chemicals these receptors carry taste impulses to the brain. To stimulate the sense of taste substances (food) must be mixed with liquid to form a solution. The solution stimulates these receptors to generate one or a combination of the four fundamental taste sensations. The four fundamental taste senses include: sweet, salty, sour, and bitter. These basic taste buds are located on different but overlapping areas of the tongue (Figure 7-6). Sweet tastes are located on the tip of the tongue, salty tastes are on the anterior sides of the tongue, sour tastes are on the posterior sides of the tongue, and the bitter tastes are located in the center posterior section of the tongue.

#### Importance to the Dental Assistant

The dental assistant should be aware that certain drugs cause patients to lose their sense of taste. Taste bud cells are continually being renewed because they have an average life span of only 10 to 10½ days. If a patient is receiving certain toxic agents, such as a cytotoxic agent used to treat cancer, the taste buds may be destroyed and the patient's sense of taste will take a minimum of 10 days, usually longer, to return.

#### Floor of the Mouth

The floor of the mouth includes the sublingual caruncles, sublingual folds, and sublingual sulcus (Figure 7-5B). Where the lingual frenum attaches to the floor of the mouth are two small, raised folds of tissue, one

on either side of the frenum. These are **sublingual caruncles**. On top of these folds of tissue lie the ducts of two salivary glands. The **sublingual folds** begin at the caruncles on either side of the frenum and run backward to the base of the tongue. Lateral to the sublingual fold is a horseshoe-shaped groove that follows the curve of the dental arch, called the **sublingual sulcus**. This sulcus marks the end of the alveolar ridge and the beginning of the floor of the mouth.

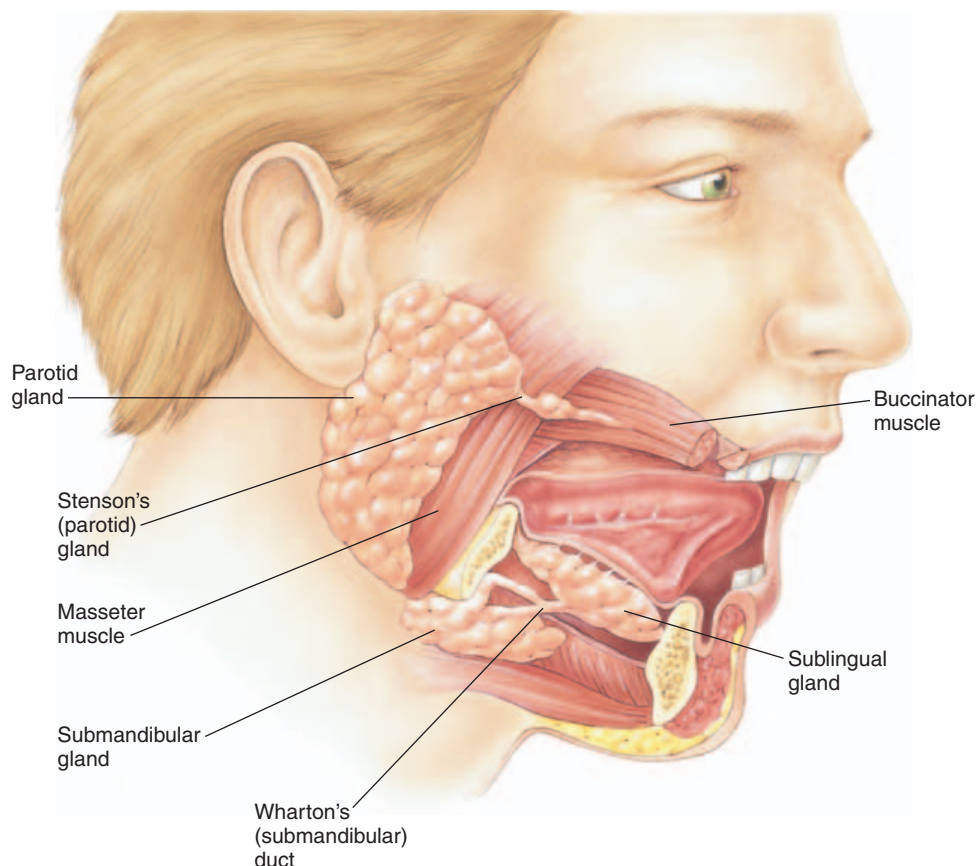
#### Salivary Glands

Three major pairs of salivary glands supply the oral cavity: parotid, submandibular, and sublingual (Figure 7-7). These glands secrete saliva to assist in the process of digestion. The largest of the salivary glands are the **parotid glands**, which lie just below and in front of the ear. The parotid glands empty into the mouth through the **parotid duct** (also known as Stensen's duct). The duct empties into the mouth through the parotid papilla, which is just opposite the maxillary second molar. The **submandibular glands** are about the size of a walnut and lie on the inside of the mandible in the posterior area. They empty saliva into the mouth through the **Wharton's duct**, which ends in the sublingual caruncles. The third set of glands and smallest are the **sublingual glands**, located on the floor of the mouth. These glands either empty directly into the mouth through the **ducts of Rivinus** or through the sublingual caruncles by means of the **ducts of Bartholin**. The ducts of the sublingual glands are similar in function to a "soaker hose."

There are also smaller minor salivary glands that are in the buccal, labial and lingual mucosa, the floor of the mouth, the posterior portion of the dorsal surface of the tongue, the soft palate, and the lateral (side) portions of the hard palate. The saliva from these glands is a mucous saliva.

**Saliva.** **Saliva** is a clear fluid secreted by the salivary and mucous glands throughout the mouth. This fluid varies in viscosity depending on an individual's chemical makeup, diet, and medications. Saliva contains water, mucin, organic salts, and the digestive enzyme ptyalin. It is normally odorless, tasteless, and slightly alkaline. Approximately 1,500 ml of saliva is produced daily.

The function of the saliva is to moisten and lubricate the oral cavity and to moisten food, aiding in the **mastication** (chewing) and swallowing of food. Saliva also initiates the digestion of starches and helps regulate water balance. Excess dryness of the mouth is called **xerostomia** (refer to Chapter 4). Dry mouth is caused by an abnormal reduction in the amount of saliva secretion. It can be related to certain diseases, such as diabetes, or result from radiation or chemotherapy. There are a number of products on the market to assist the patient with dry mouth symptoms.



**FIGURE 7-7** Salivary glands and ducts.

### Salivary Gland Diseases and Problems

The mumps are a viral infection affecting the parotid glands. Characterized by swelling and tenderness, mumps often affect children between ages five and fifteen. Sometimes, the salivary glands develop crystallizations or stones. When these stones try to leave the glands, they block the ducts. Swelling immediately occurs and the stones must be surgically removed.

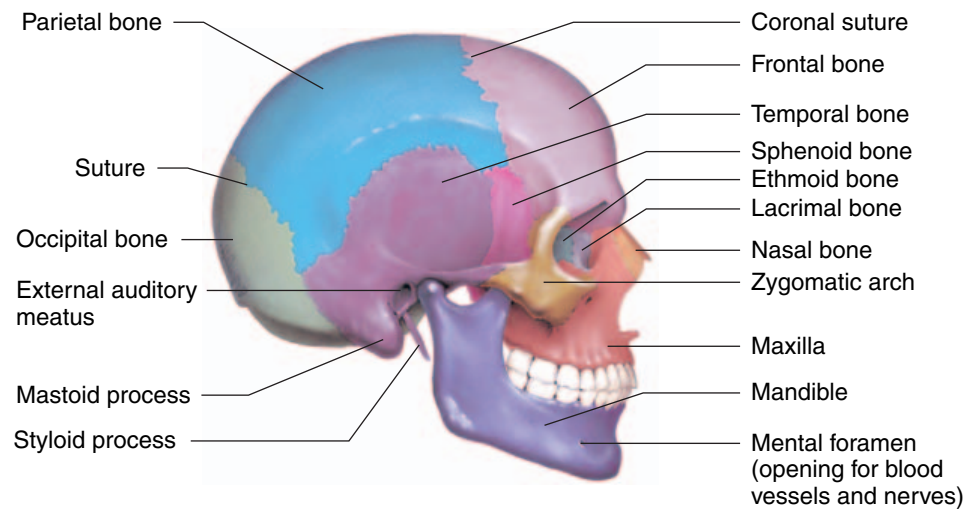
## Bones of the Head

The skull is divided into two sections: the cranium and the face. The cranium covers and protects the brain and is composed of eight bones. The face consists of fourteen bones, including the maxilla and the mandible.

### Bones of the Cranium

The **frontal bone** forms the forehead, the main portion of the roof of the eye socket (orbit), and part of the nasal cavity. On the skull just behind the frontal bone are the two parietal bones, right and left halves joining at the midline. The **parietal bones** form most of the roof of the skull and the upper half of the sides. Below each

parietal bone, forming the lower sides and the base of the skull, are the **temporal bones**. Each temporal bone contains the following landmarks: external auditory meatus, mastoid process, glenoid fossa, and styloid process. The **external auditory meatus** is the opening for the ear. The **mastoid process** is the bony projection found on the bottom border of the temporal bone. A pit or depression found anterior to the mastoid process is the **glenoid fossa**, the location where the mandible articulates with the skull. The **styloid process** is a sharp projection on the under-surface of the temporal bone between the glenoid fossa and the mastoid process. The **occipital bone** forms the back and base of the skull. The occipital bone contains a large opening, the foramen magnum, through which the spinal cord passes. The **sphenoid bone** is a wedge-shaped bone that goes across the skull anterior to the temporal bones. It is a single continuous bone, shaped like a bat with its wings spread. The wings of the sphenoid bone are called the **pterygoid** process. The sphenoid bone forms the anterior base of the skull behind the orbit and contains the **sphenoid sinuses**. The **ethmoid bone** forms part of the nose, orbits, and floor of the cranium. This bone is thin and spongy or honeycombed in appearance. It contains the **ethmoid sinuses** (Figure 7-8 and Table 7-1).



**FIGURE 7-8** Lateral aspect of the cranium. (Photography by Dr. David Fankhauser, University of Cincinnati).

### Bones of the Face

The **nasal bones** form the bridge of the nose. The **vomer bone** is a single bone on the inside of the nasal cavity. It forms the posterior and the bottom of the nasal septum (the nasal septum is a cartilage structure that divides the nasal cavities). On the outside of the nasal cavities are scroll-like bones called **inferior nasal conchae**. Each concha consists of thin, cancellous bone. The **lacrimal bones** are small and very delicate. They are anterior to

the ethmoid bone, comprising part of the orbit (the corner of the eye). The tear ducts pass through the lacrimal bones. The **zygomatic bones** form the cheeks (Figures 7-8 and 7-9 and Table 7-2).

**Maxilla.** The **maxilla** is the largest of the facial bones and is composed of two sections of bone joined at the **median suture**. The maxilla extends from the floor of each orbit and the floor and exterior walls of the nasal cavity to

**TABLE 7-1** Bones of the Cranium

| Name of Cranial Bone | Number     |
|----------------------|------------|
| Frontal              | One (1)    |
| Parietal             | Paired (2) |
| Temporal             | Paired (2) |
| Occipital            | One (1)    |
| Sphenoid             | One (1)    |
| Ethmoid              | One (1)    |

form the roof of the mouth. The maxilla is formed by four processes (outgrowths of bone). The frontal and zygomatic processes meet the frontal and zygomatic bones. The **alveolar process** forms the bone that supports the maxillary and mandibular teeth, and the palatine process is the main portion of the hard palate.

The **infraorbital foramen** (foramen means an opening) is just below the orbit on the maxillary bone and the **maxillary sinus** forms a large cavity above the roots of the maxillary molars. Just beyond the last posterior maxillary tooth is a rounded area known as the **maxillary tuberosity**.

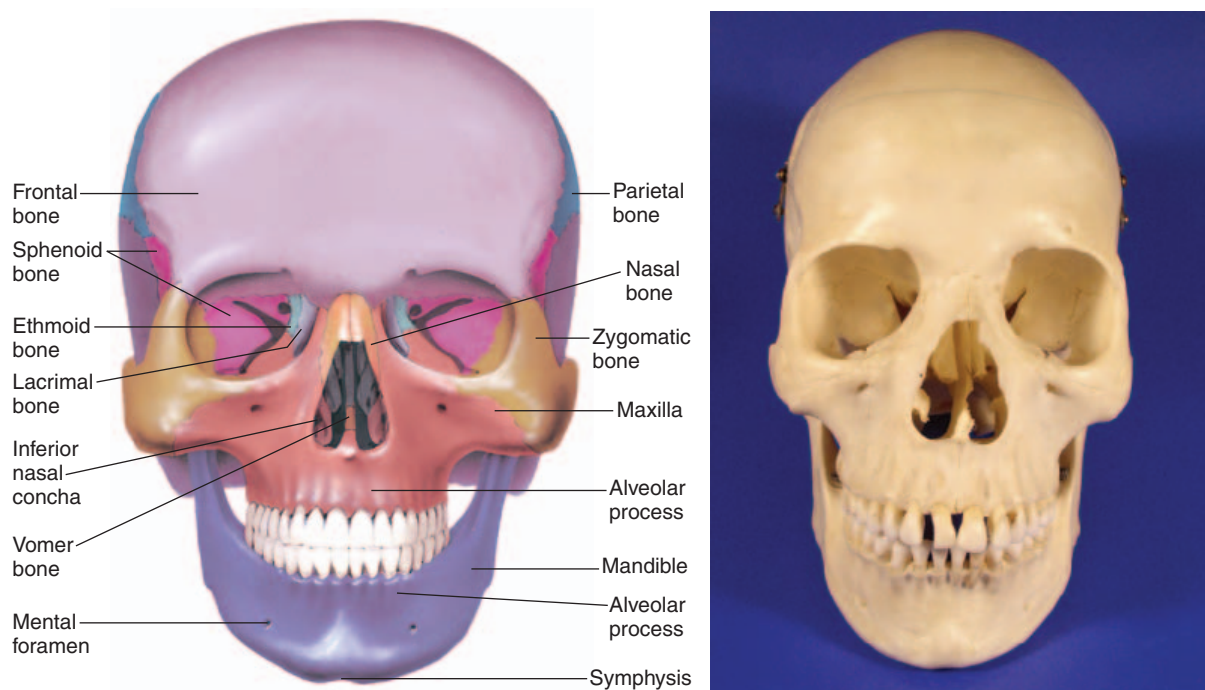
**Palatine Bones.** The **palatine bones** are joined at the midline, often referred to as the median **palatine suture**

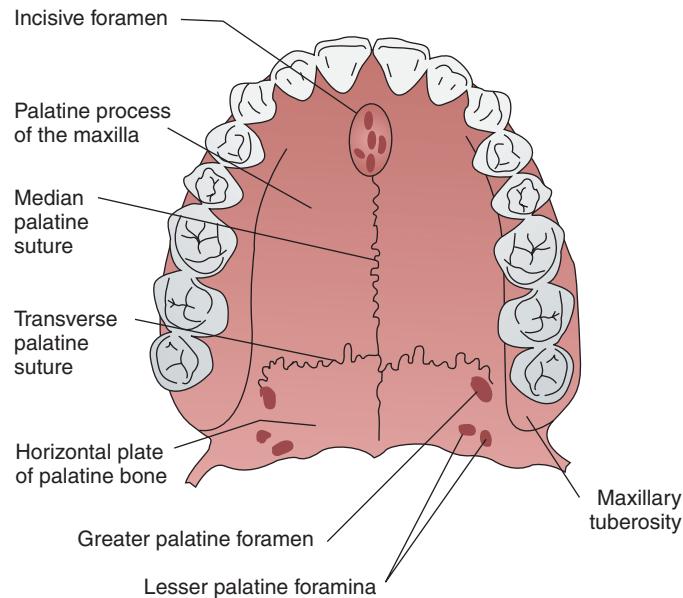
**TABLE 7-2** Bones of the Face

| Name of Facial Bone    | Number  |
|------------------------|---------|
| Nasal                  | Two (2) |
| Vomer                  | One (1) |
| Inferior nasal conchae | Two (2) |
| Lacrimal               | Two (2) |
| Maxillae               | Two (2) |
| Zygomatic              | Two (2) |
| Palatine               | Two (2) |
| Mandible               | One (1) |

(Figure 7-10). Just behind the maxillary central incisors is the incisive (nasopalatine) foramen, which is an opening for the nasopalatine nerve. In the posterior region of the hard palate are three other openings on each side. The first of these three, the largest, is the **greater palatine foramen**. Behind the greater foramen are two smaller or **lesser palatine foramen**.

**Mandible.** The **mandible** is the only movable bone of the face (Figure 7-11A). The mandible consists of a horseshoe-shaped body that is horizontal, with two vertical exten-

**FIGURE 7-9** Bones of the face. (Photograph by Dr. David Fankhauser, University of Cincinnati).



**FIGURE 7-10** Landmarks of the palate.

sions called **rami** (plural form of ramus). At the top of the rami are two projections. The posterior projection is the **condyle** or **condyloid process**, and the anterior projection is the **coronoid process**. The condyle articulates with the temporal bone to form the **temporomandibular joint (TMJ)**. Between the two processes is a depression known as the **mandibular notch** (also referred to as the sigmoid or coronoid notch). From the top of the rami moving downward is the body of each ramus. On the inside of the body of the ramus is the **mandibular foramen**, which is the beginning of the **internal oblique ridge** (Figure 7-11B). The internal oblique ridge, also known as the **mylohyoid ridge**, follows the inside of the ramus and the body of the mandible. Where the ramus meets the body of the mandible on the outside border is the **angle of the mandible**. On the body of the mandible near the apex of the premolars is the **mental foramen**. Extending from the mental foramen, the **external oblique ridge** follows the length of the body of the mandible past the last tooth and up to the ramus. Behind the last molar is a triangular area known as the **retromolar area**. In the center of the mandible on the external surface is a concave area where two bones of the mandible are fused. This area is known as the **symphysis**. The tip of the chin is called the **mental protuberance**. On the internal surface at the center of the mandible is the **lingual foramen**, which is surrounded by small, bony projections called **genial tubercles**. The mandibular teeth are supported in the alveolar process.

#### Importance of the Bones of Head and Face

Dental assistants should learn the bones of the head and the face thoroughly. This knowledge will assist them throughout their program but also in their career working in the dental profession. Two examples as to

when they might use this information include understanding the landmarks seen on dental radiographs and identifying anatomy while assisting during surgical procedures.

## Temporomandibular Joint

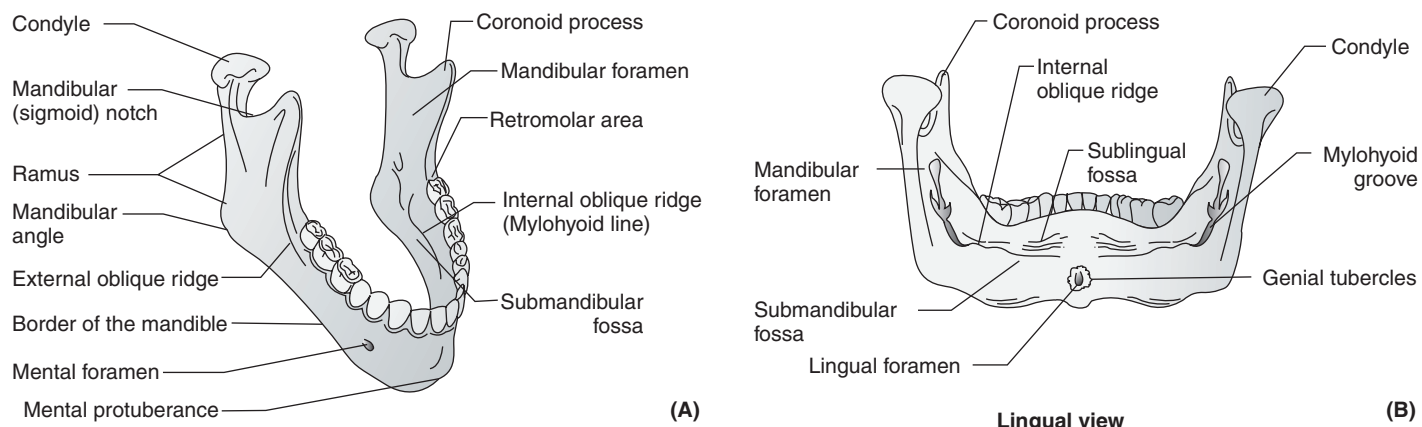
Once the bones of the cranium and the face have been identified, it is easy to locate the temporomandibular joint (TMJ). The joint is named for the two bones that form the union: the temporal and the mandible bones. The TMJ is composed of three parts:

1. Glenoid fossa of the temporal bone
2. Articular eminence of the temporal bone
3. Condyloid process of the mandible

These bones are covered with thick cartilage and are surrounded by several ligaments. There are no blood vessels or nerves in this connective tissue, but **synovial fluid** bathes these bone structures, providing nourishment and lubrication that enable the bones to glide over each other without friction. (Synovial means a thick, sticky fluid found in the joints of bones.)

The TMJ is formed by the condyle of the mandible articulating with the glenoid fossa and the articular eminence of the temporal bone (Figure 7-12). The condyle rests closer to the glenoid fossa, and then moves forward to the articular eminence when the mouth opens.

Between the condyle and temporal bone is the **articular disc** (meniscus). This disc is a dense, fibrous connective tissue that is thicker at the ends. The articular disc is attached to the condyle, so when the condyle glides forward and backward, the disc moves with it.



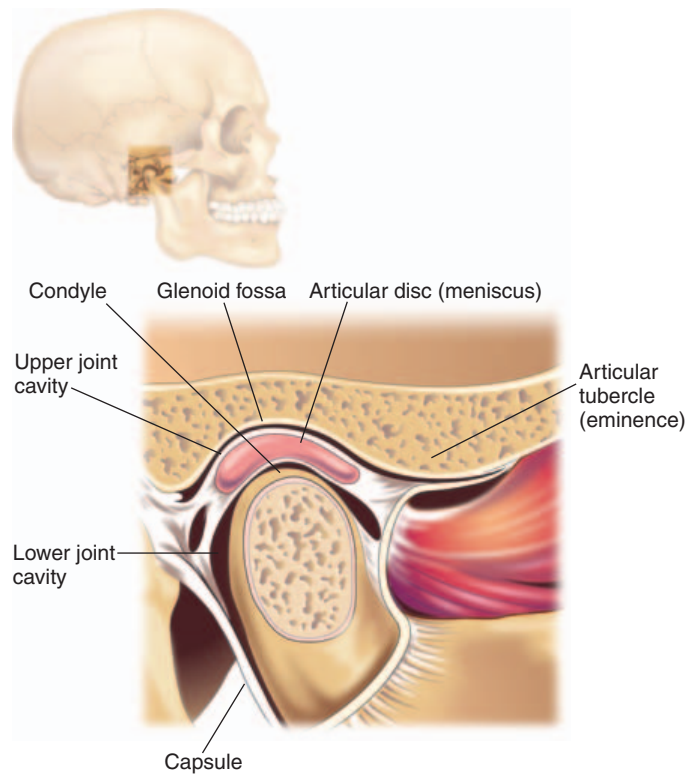
**FIGURE 7-11** (A) Lateral view of the external surface of the mandible. (B) Internal (lingual) view of the mandible. (C) Frontal view of the external surface of the mandible. (Photography by Dr. David Fankhauser, University of Cincinnati).

Surrounding the articular disc is a dense, fibrous *capsule* that encloses the entire joint. The capsule is divided into upper and lower cavities by the disc; these cavities are filled with synovial fluid.

The TMJ is supported by ligaments, and the muscles of mastication control the movements. The left and right

TMJs function in unison and move in two ways: hinge (swinging) motion and gliding movement.

The *hinge motion* occurs in the lower joint cavity when the mouth opens. The condyles and the discs begin this hinge motion by rotating anteriorly. As this motion continues and the mouth opens wider, there is



**FIGURE 7-12** Temporomandibular joint (TMJ).

an anterior *gliding movement* as well. This gliding movement involves both the upper and lower cavities. The gliding continues along the articular disc during protrusion and lateral movements of the mandible during mastication (Figure 7-13).

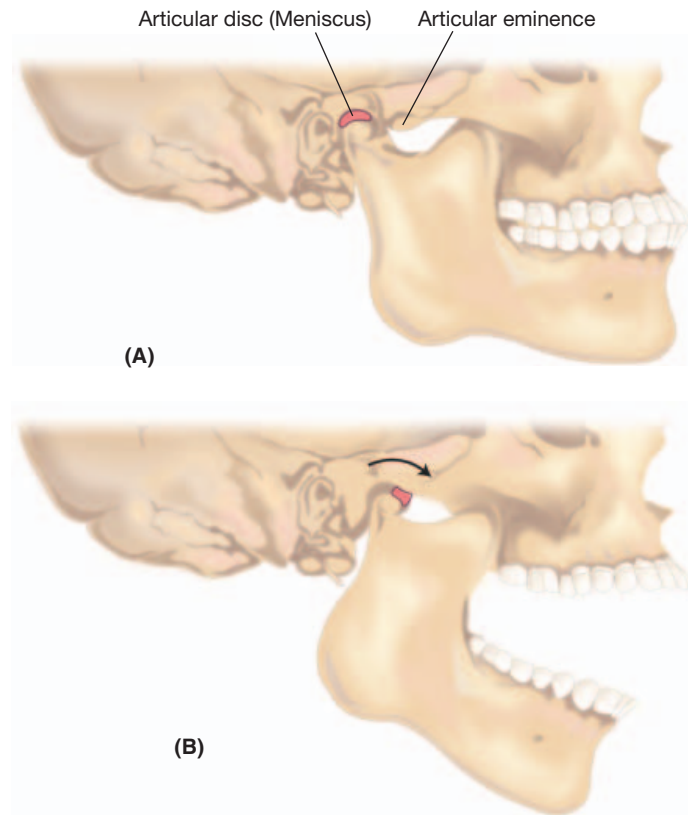
Some problems with the TMJ occur when the disc becomes stuck or displaced. Popping and clicking sounds may result if the disc does not stay interposed between the condyle and the temporal bone. More severe problems may occur as the condition advances. For more information on TMJ disease (dysfunction), refer to Chapter 25, Oral and Maxillofacial Surgery.

## Muscles of the Head and Neck

Muscles expand and contract to make movement possible. Each muscle has an origin (fixed point) and insertion (movable point). Muscles of the head and neck include muscles of mastication, muscles of facial expression, muscles of the floor of the mouth, muscles of the tongue, muscles of the soft palate, the pharynx, and muscles of the neck.

### Muscles of Mastication

There are four pairs of muscles of mastication: **temporal muscles**, **masseter muscles**, **internal pterygoid muscles**, and **external pterygoid muscles**. These muscles



**FIGURE 7-13** Movement of the TMJ. (A) Hinge joint. (B) Gliding joint movement.

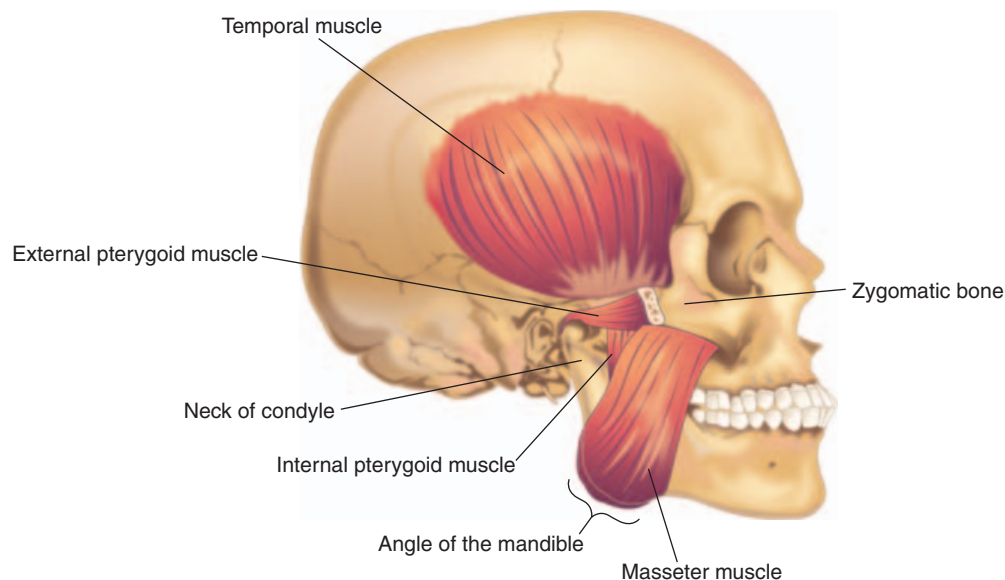
provide movement for the mandible as they protrude, retract, elevate, and provide lateral movements (Figure 7-14). Nerves to the muscles of mastication originate from the mandibular division of the trigeminal labor. The origins, insertions, and functions (distributions of nerves) of the muscles of mastication are listed in Table 7-3.

### Muscles of Facial Expression

The major muscles of facial expression include the **orbicularis oris**, **buccinator**, **mentalis**, and **zygomatic major**. These muscles allow for a wide variety of facial expressions, including smiling and whistling. The muscles of the face are innervated by the facial nerve, which is the seventh cranial nerve (Figure 7-15). The muscles of facial expression are described in Table 7-4.

### Muscles of the Tongue

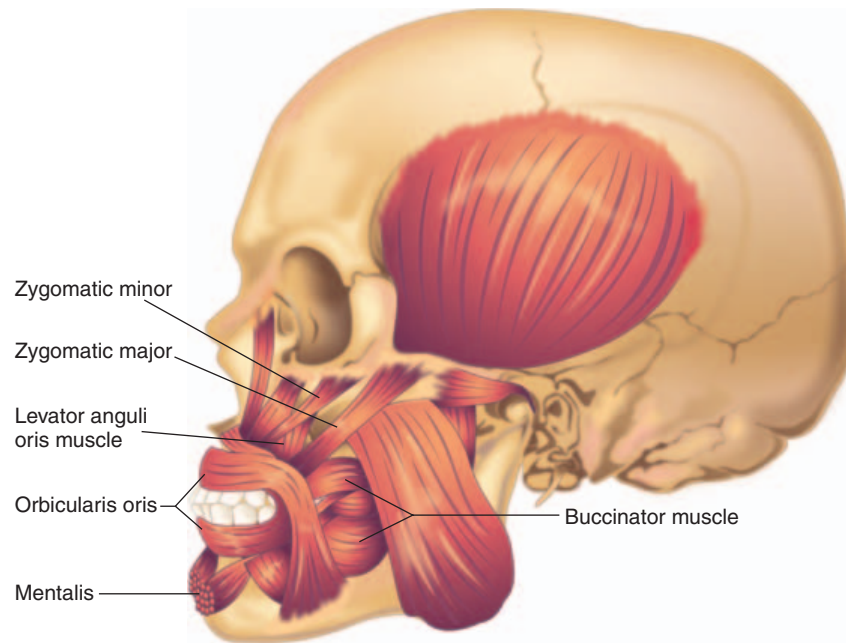
The muscles of the tongue are divided into intrinsic and extrinsic groups. The **intrinsic muscles** are all within the tongue and are responsible for shaping the tongue during speech, mastication, and swallowing. There are four **extrinsic muscles** to assist in the movement and functioning of the tongue: **genioglossus**, **hyoglossus**, **styloglossus**,



**FIGURE 7-14** Muscles of mastication. Lateral view of the internal pterygoid muscle and the external pterygoid muscle. The temporal muscle and the masseter muscle.

**TABLE 7-3** Muscles of Mastication

| Muscle                        | Origin   | Insertion  | Function   |
|-------------------------------|--|--|--|
| Temporal                      | Fan shaped across the temporal fossa of the temporal bone.   | Inserts into the coronoid process of the mandible and down the anterior border of the ramus.   | Elevates the mandible—closing the jaw. Contraction of the posterior fibers retracts the mandible.  |
| Masseter                      | Two portions: superficial portion (strong, tendinous fibers from the zygomatic process of the maxilla and from the anterior two-thirds of the lower border of the zygomatic arch) and deep portion (muscular and smaller from the medial aspect and inferior border of the posterior one-third of the zygomatic arch). | The superficial portion inserts into the angle and lower border of the mandible; the deep portion is inserted into the upper section of the ramus and the lateral surface of the coronoid process. | Strong elevator of the jaw. This muscle is easily seen when the teeth are clenched.  |
| Medial (internal) pterygoids  | Medial surface of the lateral pterygoid plate of the sphenoid bone, the lateral portion of the palatine bone, and the maxillary tuberosity.  | The medial pterygoids insert into the interior surface of the angle of the mandible (opposite the insertion of the masseter muscle).   | Elevates the mandible.   |
| Lateral (external) pterygoids | Superior portion from the lateral surface of the greater wing of the sphenoid bone; inferior portion from the lateral surface of the lateral pterygoid plate.  | Superior portion inserts into the articular capsule of the temporal mandibular joint; inferior portion inserts into the neck of the condyle of the mandible.                                       | Opens jaw by depressing the mandible. If both lateral pterygoid muscles contract, the jaw protrudes; if only one contracts, the mandible shifts laterally. |



**FIGURE 7-15** Muscles of facial expression.

**TABLE 7-4** Muscles of Facial Expression

| Muscle           | Origin  | Insertion  | Function   |
|------------------|---|--|--|
| Orbicularis oris | Complex origin—There is no skeletal attachment. The origin is from muscle fibers that surround the mouth. | Insertion is into itself and the surrounding skin.   | Closing the lips or protruding them.   |
| Buccinator       | Alveolar processes of the maxilla and the mandible and the pterygomandibular raphe.                       | Inserts into the corners of the mouth, becoming part of the muscles that surround the mouth. | Compresses the cheeks against the teeth to assist during mastication. Assists in blowing air out of the mouth. |
| Mentalis         | Incisive fossa of the mandible.   | Inserts into the skin of the chin.   | Wrinkles the skin of the chin and protrudes the lower lip.   |
| Zygomatic major  | Zygomatic bone.   | Insertion into the corners of the mouth.   | Lifts the corners of the mouth upward and backward, as in smiling.   |

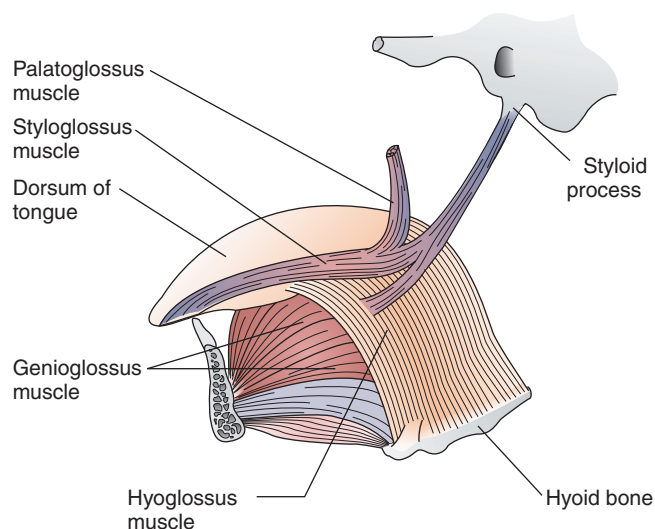
and **palatoglossus** (Figure 7-16). (The palatoglossus is discussed with the palate.) All the muscles of the tongue are innervated by the hypoglossal nerve except the palatoglossus muscle. See Table 7-5 for the origin, insertion, and function of each extrinsic muscle of the tongue.

**Hyoid Bone.** There is also a horseshoe-shaped bone lying at the base of the tongue called the **hyoid bone**.

Muscles of the tongue and the floor of the mouth attach to this bone for support (Figure 7-17).

### Muscles of the Floor of the Mouth

The muscles that form the floor of the mouth are the **digastric**, **mylohyoid**, **stylohyoid**, and **geniohyoid**. These four muscles are located between the mandible



**FIGURE 7-16** Extrinsic muscles of the tongue.

and the hyoid bone. Unlike some other muscle groups, the muscles of the floor of the mouth are innervated by distinct nerve branches (Table 7-6 and Figure 7-17).

### Muscles of the Soft Palate

There are two muscles of the soft palate, called the **palatoglossus** and **palatopharyngeal** (Table 7-7). These muscles raise the soft palate during the swallowing process (deglutition) and are both innervated by the pharyngeal plexus (Figure 7-18).

### Muscles of the Neck

The three muscles of the neck are the **platysma**, **trapezius**, and **sternocleidomastoid** (Figure 7-19). Knowing the muscles of the neck helps the dental assistant per-

form chairside functions in positions that are not tiring and will not cause injury (Table 7-8).

## Nerves of the Head and Neck

Four cranial nerves innervate the face and oral cavity: **trigeminal**, **facial**, **glossopharyngeal**, and **hypoglossal**. The largest cranial nerve and the most important to dental auxiliaries is the trigeminal nerve, because this cranial nerve innervates the maxilla and the mandible. The trigeminal nerve divides at the semi-lunar (gas-serian) ganglion into three branches: the ophthalmic nerve, maxillary nerve, and mandibular nerve.

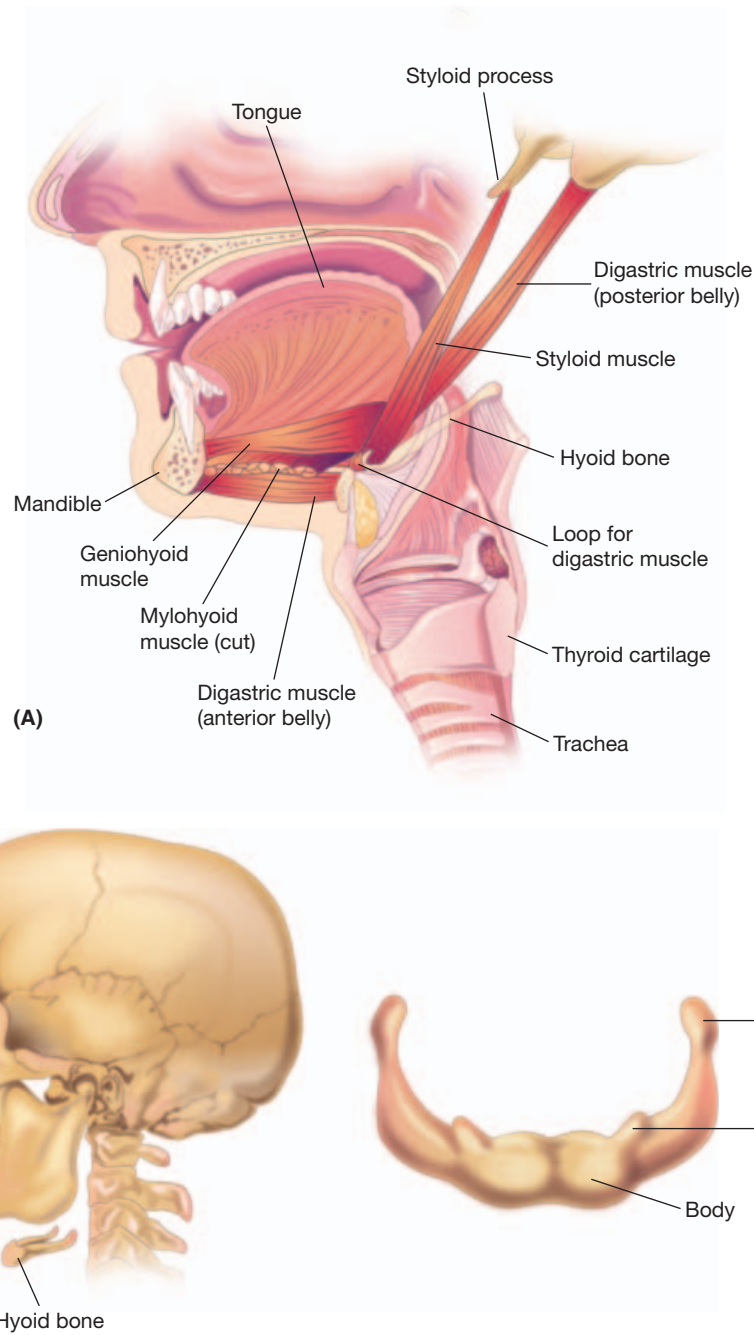
### Maxillary Branch of the Trigeminal Nerve

The **maxillary nerve branch** is a sensory nerve that innervates the nose, cheeks, palate, gingiva, maxillary teeth, maxillary sinus, tonsils, nasopharynx, and other facial structures. The maxillary nerve branch is divided into four branches: **zygomatic**, **infraorbital**, **posterior superior alveolar**, and **pterygopalatine** (Figure 7-20A).

**Pterygopalatine Nerve Branch.** After the maxillary nerve leaves the semi-lunar ganglion, one branch becomes the pterygopalatine nerve branch. This branch divides into the **greater palatine nerve**, the **lesser palatine nerve**, and the **nasopalatine nerve** (Figure 7-20B). The greater palatine nerve extends downward from the pterygopalatine nerve and reaches the palate through the greater palatine foramen. This nerve serves the soft palate, hard palate, medial gingiva, and mucous membrane as far forward as the anterior teeth. The lesser palatine nerve is a smaller branch that innervates the soft palate, uvula, and tonsils. The nasopalatine nerve extends anteriorly from the pterygopalatine nerve and exits through the incisive foramen. This nerve innervates the anterior hard palate, gingiva, mucous membrane, and the anterior teeth from the cuspids forward.

**TABLE 7-5** Extrinsic Muscles of the Tongue

| Muscle       | Origin  | Insertion  | Function   |
|--------------|---|--|--|
| Genioglossus | Genial tubercle in the center of the lingual of the mandible. | Fans out to insert in the inferior surface of the tongue and to the hyoid bone.  | Most of the work of the tongue. Protrudes the tongue and retracts or depresses the tongue. |
| Hyoglossus   | Hyoid bone.   | Runs vertically to insert in the inferior sides of the tongue.   | Mainly depresses the tongue.   |
| Styloglossus | Anterior surface of the styloid process of the temporal bone. | Part of the styloglossus inserts into the sides of the tongue while the rest of the muscle continues forward to the tip of the tongue. | Retracts the tongue and raises the tip of the tongue.                                      |



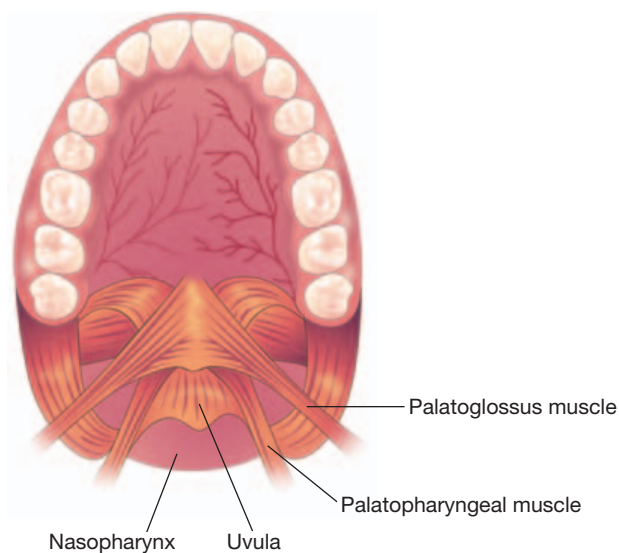
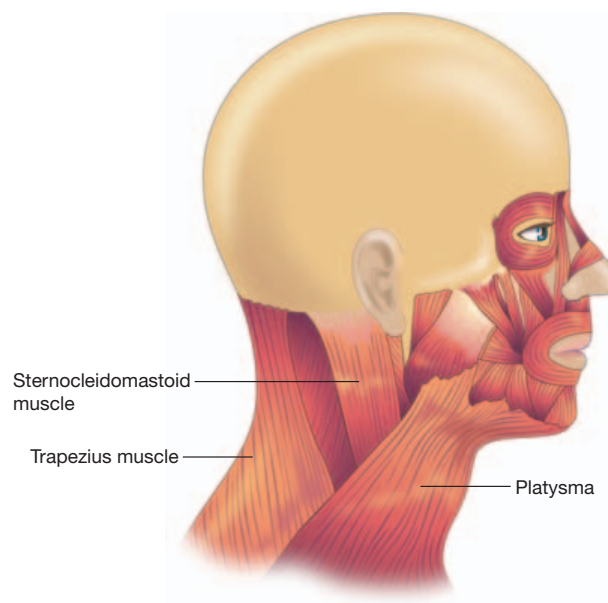
**FIGURE 7-17** (A) Muscles of the floor of the mouth. (B) The hyoid bone.

**TABLE 7-6** Muscles of the Floor of the Mouth

| Muscle     | Origin  | Insertion  | Function   |
|------------|---|--|--|
| Digastric  | There are two portions, called bellies. Posterior belly originates from the mastoid process of the temporal bone; anterior belly begins on the lingual surface of the mandible at the midline.            | Both the posterior belly and the anterior belly insert into the intermediate tendon on the hyoid bone. | Together the digastric muscles lift the hyoid bone and assist in opening the mouth; separately, the posterior belly draws the hyoid bone posteriorly and the anterior belly pulls the hyoid bone anteriorly. |
| Mylohyoid  | This muscle is composed of left and right halves that join at the midline of the mandible. From the midline, each half attaches in a fan shape to the last molar area, thus following the mylohyoid line. | Inserts into the body of the hyoid bone.   | Forms the floor of the mouth and assists in depressing the mandible and elevating the tongue.  |
| Stylohyoid | The styloid process of the temporal bone.   | Inserts into the body of the hyoid bone.   | Draws the hyoid bone superiorly and posteriorly and stabilizes it.   |
| Geniohyoid | Above the mylohyoid muscle the geniohyoid originates from the genial tubercle of the mandible.  | Inserts into the anterior portion of the hyoid bone.   | Pulls the hyoid bone and the tongue anteriorly.  |

**TABLE 7-7** Muscles of the Soft Palate

| Muscle           | Origin  | Insertion   | Function   |
|------------------|---|---|--|
| Palatoglossus    | This muscle forms the anterior arch on each side of the throat and arises from the soft palate.       | Inserts along the posterior side of the tongue.                 | Elevates the posterior portion of the tongue and narrows the fauces. |
| Palatopharyngeal | This muscle forms the posterior arch on each side of the throat and also arises from the soft palate. | Inserts into the thyroid cartilage and the wall of the pharynx. | Constricts the nasopharyngeal passage and elevates the larynx.       |

**FIGURE 7-18** Muscles of the soft palate.**FIGURE 7-19** Muscles of the neck.

**TABLE 7-8** Muscles of the Neck

| Muscle              | Origin                                   | Insertion  | Function  |
|---------------------|--|--|---|
| Platysma            | Clavicle and the shoulder.               | Inserts into the inferior border of the mandible.                        | This sheet of muscle draws down the mandible as well as the corners of the mouth and the lower lip. |
| Trapezius           | Protuberance on the occipital bone.      | Inserts into the clavicle and shoulders.                                 | This large muscle moves the head backward and laterally.  |
| Sternocleidomastoid | The top of the sternum and the clavicle. | Inserts into the mastoid process and the anterior of the occipital bone. | One on each side of the neck assists in elevating the chin.   |

**Infraorbital Nerve.** The infraorbital nerve is another branch of the maxillary nerve. Two nerves come from the infraorbital nerve before it exits through the infraorbital foramen. These are the **middle superior alveolar nerve** and the **anterior alveolar nerve**.

The middle superior alveolar nerve supplies the lateral wall of the maxillary sinus, gingiva, mesial buccal root of the first molar, and all the roots of the bicuspids (premolars). The anterior superior alveolar nerve is the next nerve to come from the infraorbital nerve. It innervates the anterior maxillary sinus, gingiva, cuspids, laterals, and central incisors.

**Posterior Superior Alveolar Nerve.** The posterior superior alveolar nerve branches downward from the maxillary nerve. It supplies the gingiva, maxillary sinus, cheeks, and maxillary molars with the exception of the mesial buccal root of the first molar, which is innervated by the middle superior alveolar nerve.

**Zygomatic Nerve** The zygomatic nerve innervates the orbicularis oculi, the area around the eye and the area around and behind the zygomatic arch.

### Mandibular Branch of the Trigeminal Nerve

The **mandibular nerve branch** is composed of both sensory and motor neurons and is the largest division of the trigeminal nerve. There are three branches of the mandibular nerve: **buccal**, **lingual**, and **inferior alveolar** (Figure 7-21).

**Buccal Nerve Branch.** The buccal nerve branch passes through the buccinator muscle to the cheek, where it innervates the buccal mucosa and buccal gingiva, as well as the buccal of the mandibular molars.

**Lingual Nerve Branch.** The lingual nerve branch descends from the mandibular nerve to the underside of the tongue and extends from the posterior to the anterior of the mouth. This nerve innervates the floor of the mouth, the ventral side of the tongue, taste buds on the anterior two-thirds of the tongue, and the lingual gingiva.

**Inferior Alveolar Nerve Branch.** The inferior alveolar nerve branch descends from the mandibular nerve and runs parallel to the lingual nerve. The first branch is the **mylohyoid nerve branch**, which supplies the mylohyoid muscle and the anterior belly of the digastric muscle. The inferior alveolar nerve then enters through the mandibular foramen and runs through the mandibular canal. Within the canal, the inferior alveolar nerve supplies the mandibular teeth (specifically the molars and the premolars), the gingiva, and the mucosa. It then subdivides into the mental nerve branch and the incisive nerve branch. The **mental nerve branch** supplies the chin and the lower lip area, and the **incisive nerve branch** innervates the anterior teeth and labial gingiva.

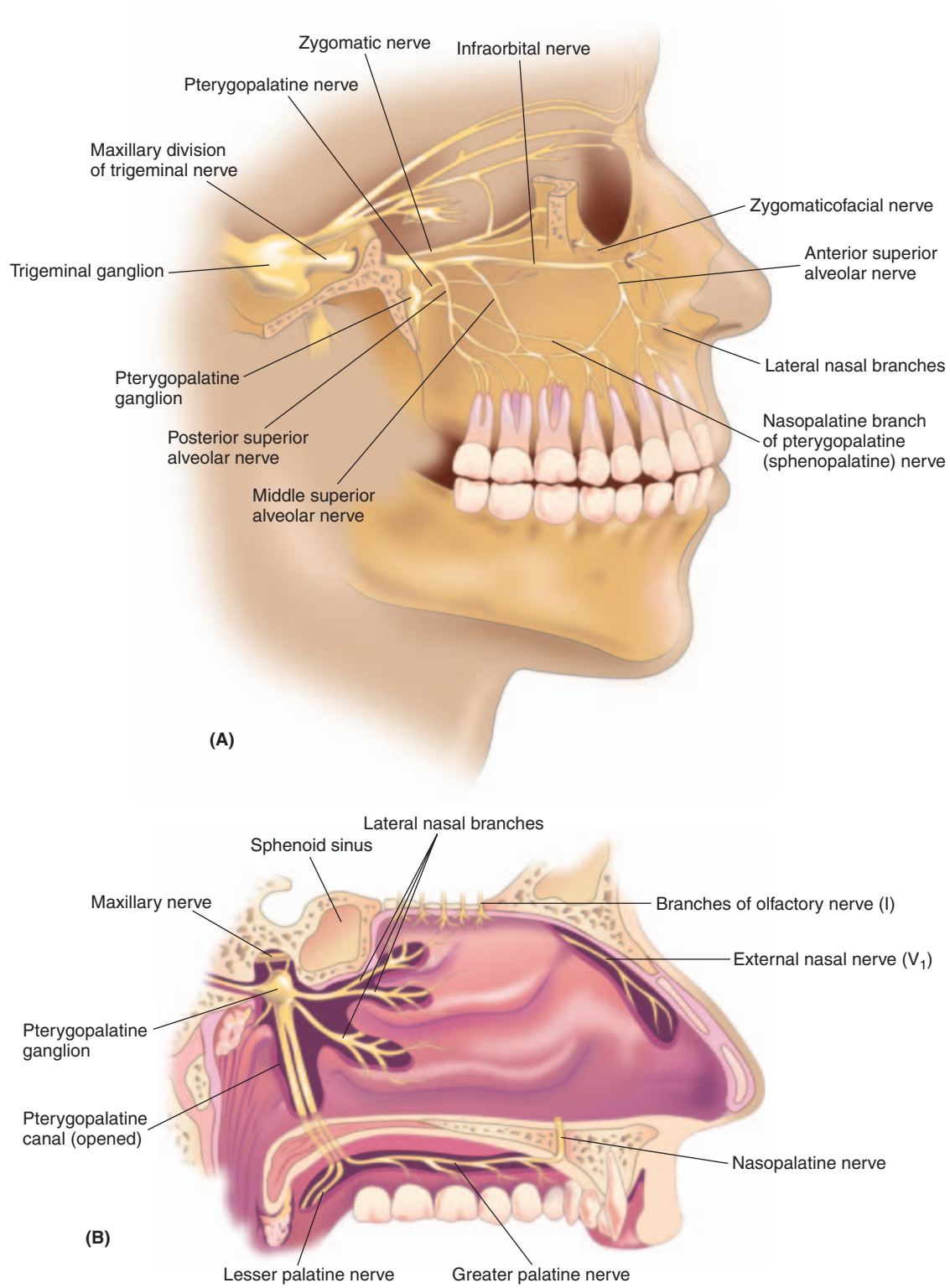
Although learning the nerves of the head and neck can be difficult to learn, this knowledge will be very helpful to the dental assistant when studying the injection sites discussed in Chapter 20. Knowledge of the location of nerves and foramen on the bones will assist the dental assistant in determining where to place topical anesthetic before a local injection is given to the patient.

## Circulation of the Head and Neck

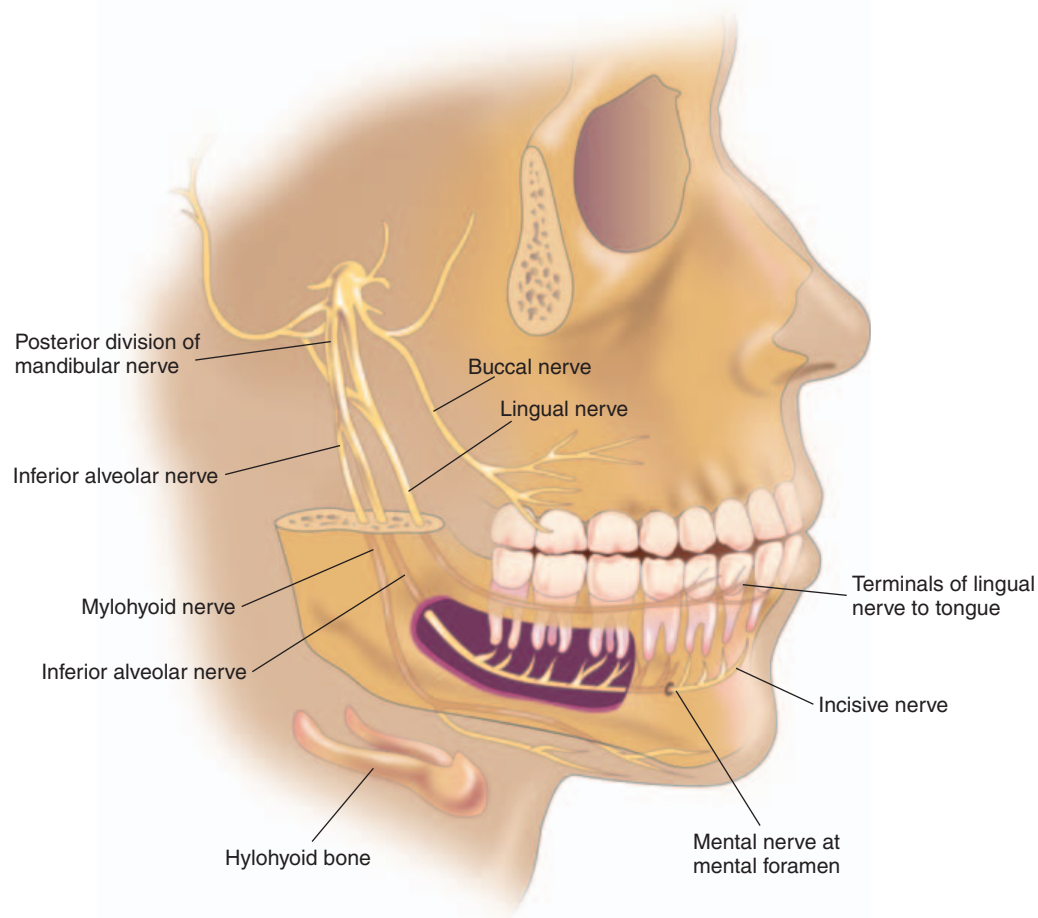
The arteries and veins of the face and oral cavity are near each other. They supply blood and nutrients to the area and drain unoxygenated blood and waste products from the area.

### Arteries of the Face and Oral Cavity

The **common carotid** supplies blood to most of the head and neck. As the common carotid ascends up the neck, it divides into the internal and external carotid arteries. The **internal carotid artery** supplies blood to the brain and eyes, while the **external carotid artery**



**FIGURE 7-20** (A) Nerves of the maxillary arch. (B) Medial view to show branches of the pterygopalatine nerve.



**FIGURE 7-21** Mandibular nerves.

supplies blood to the face and oral cavity and has many branches (Figure 7-22). (Information presented is limited to the arteries that supply the teeth, tongue, and surrounding tissues.)

### External Carotid Artery

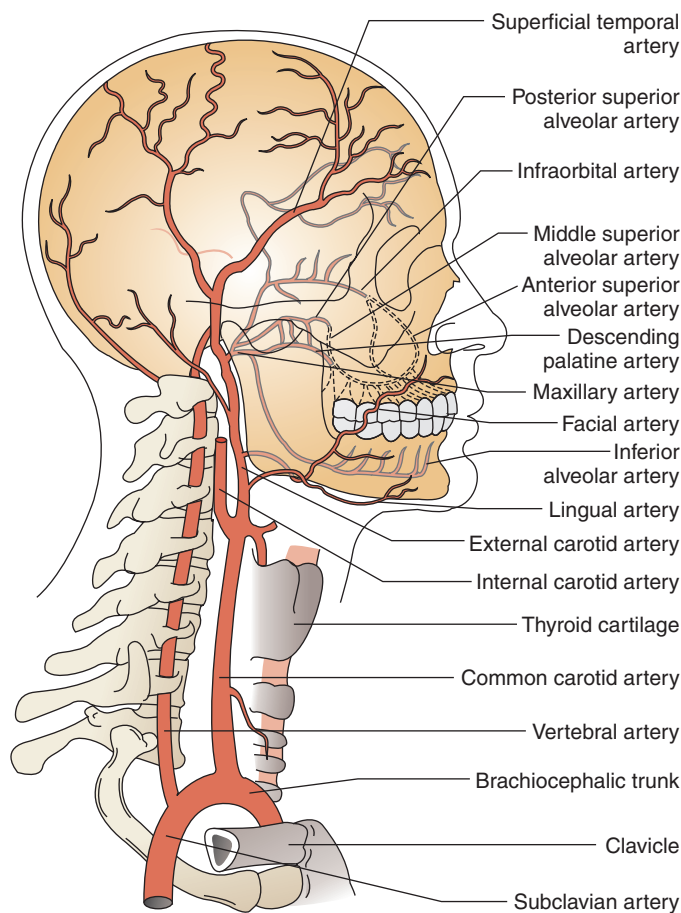
The external carotid artery branches go to the throat, tongue, face, and ears and to the wall of the cranium. Branches are named according to the areas they supply and are nearer the surface (more superficial).

**Lingual Artery.** The lingual branch is about even with the hyoid bone and has several branches that supply the entire tongue, floor of the mouth, lingual gingiva, a portion of the soft palate, and the tonsils.

**Facial Artery.** The facial artery is above the lingual artery, near the angle of the mandible. It branches across the mandible to the corners of the mouth and then upward toward the eye. The facial artery has six branches that supply the pharynx muscles, soft palate, tonsils, posterior of the tongue, submandibular gland, muscles of the face, nasal septum, nose, and eyelids.

**Maxillary Artery.** The maxillary artery is the largest of the branches of the external carotid artery. It moves anteriorly across the ramus of the mandible, near the condyle, and supplies facial structures. The maxillary artery divides into three sections: mandibular, pterygoid, and pterygopalatine.

**Mandibular Artery.** The mandibular artery is behind the ramus of the mandible and branches into five arteries. The inferior alveolar artery descends into the ramus, enters the mandibular foramen, and bifurcates around the first premolar tooth to form the incisive and the mental arteries. The mylohyoid artery and the dental arteries are additional branches. The mylohyoid artery branches off the inferior alveolar artery before entering the mandibular canal. It supplies the mylohyoid muscle. As the inferior alveolar artery travels through the mandibular canal, the dental arteries supply the roots and periodontal ligaments of the molars and premolars. The incisive arteries continue anteriorly to supply blood to the roots and periodontal ligaments of the anterior teeth. The mental artery branches off the inferior alveolar artery, and then



**FIGURE 7-22** Arteries of the face and oral cavity.

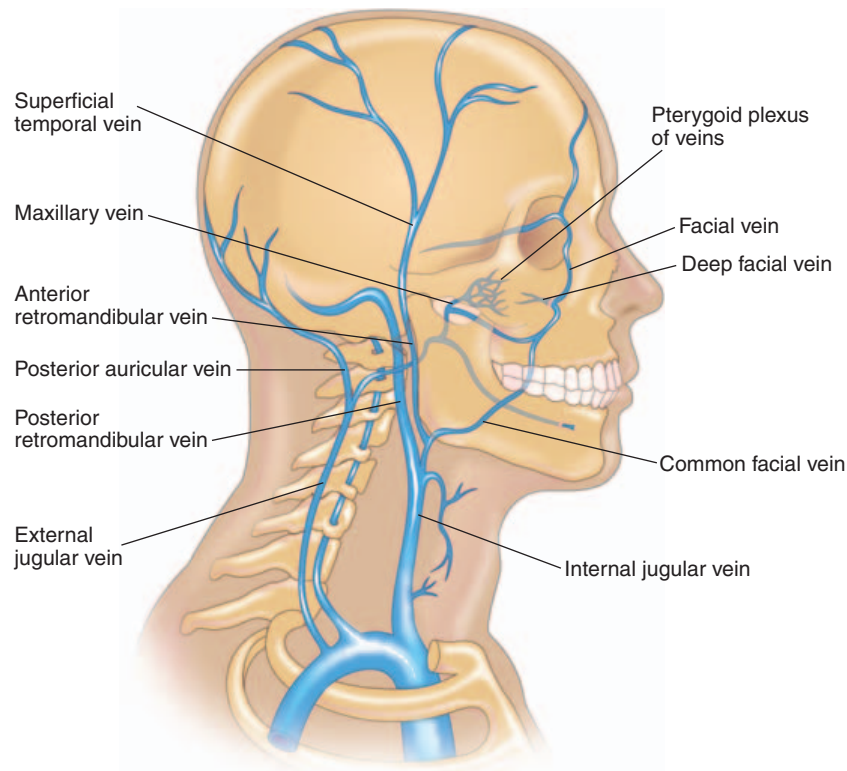
exits the mandibular canal at the mental foramen and supplies the chin and lower lip.

**Pterygoid Artery.** The **pterygoid artery** supplies blood to the temporal muscle, masseter muscle, pterygoid muscles, and buccinator muscles. The pterygopalatine artery divides into branches: **posterior superior alveolar artery**, **infraorbital artery**, **middle superior alveolar artery**, **anterior superior alveolar artery**, and **greater palatine artery**. The posterior superior alveolar artery branches from the maxillary artery and descends along the maxillary tuberosity, where it enters the posterior superior alveolar foramen. This artery supplies the maxillary sinus, maxillary molar teeth, and surrounding gingiva with blood. The infraorbital artery ascends from the maxillary artery and travels anteriorly to the infraorbital foramen, where it supplies the face with blood. From the infraorbital artery, the middle superior alveolar artery branches to the maxillary premolar teeth, and the anterior superior alveolar artery branches to supply the anterior teeth. The greater palatine artery travels through the greater palatine foramen to supply the hard palate and the maxillary lingual gingiva.

## Veins of the Face and Oral Cavity

Some of the veins of the face and oral cavity are located with corresponding arteries and have similar names. There are many variations of venous drainage, but ultimately the blood from the face and oral cavity drains into either the external jugular vein or internal jugular vein and then into the brachiocephalic vein, which flows into the superior vena cava. The veins are divided into the superficial veins and the deep veins. Only the primary veins of importance to the dental assistant are discussed (Figure 7-23).

**Superficial Veins.** The **facial vein** drains the facial structures, beginning near the eye and descending toward the mandible. One of the tributaries is the **deep facial vein**, which connects the facial vein to the pterygoid plexus of veins. Near the border of the mandible, the facial vein heads posteriorly to the angle of the mandible, where it joins with the retromandibular vein. The **retromandibular vein** is frequently formed within the parotid gland. This vein drains the maxillary artery and the superficial temporal arteries. Below the facial vein is the **lingual vein**, which drains the floor of the mouth. The tongue empties into the internal jugular vein.



**FIGURE 7-23** Veins of the face and oral cavity.

**Deep Veins.** The **maxillary vein** drains the pterygoid plexus of veins. It is a short vein that follows the maxillary artery. The **pterygoid plexus of veins** is a junction or center of veins that directly or indirectly drain a vast area, including the nasal cavity, eye, paranasal sinuses, muscles of mastication, buccinator muscle, palate, and teeth. The pterygoid plexus of veins is between the temporal and pterygoid muscles.

**Jugular Vein.** The **external jugular vein** drains the superficial veins of the face and neck into the subclavian vein. The **internal jugular vein** receives blood from the cranium, face, and neck, and drains into the brachiocephalic vein, and then into the superior vena cava, which drains into the heart.

## CHAPTER SUMMARY

As a vital team member, the dental assistant needs to be able to recognize factors that may influence the general physical health of the patient. Understanding landmarks of the oral cavity, as well as being able to describe head and neck anatomy as it relates to location of structure and function, enables the dental assistant to recognize the abnormal. For this reason, accuracy is especially important when completing the patient's dental chart. This information provides a point of comparison for future visits.

## Case Study

Pat Boyer is a thirty-five-year-old patient at Dr. Olson's office. Pat has had a series of headaches and pain during mastication (chewing). She also experiences clicking and popping when opening her mouth. These symptoms have continued for six months and seem to be worsening.

### Case Study Review

1. List the components of the head and neck affected, identifying the specific anatomy.
2. Identify the possible conditions.
3. How might the dental assistant be involved in this patient's care?

## REVIEW QUESTIONS

### Multiple Choice

- What are the raised lines of mucosal tissue that extend from the alveolar mucosa to the vestibule called?
  - Gingiva
  - Alveolar mucosa
  - Frenum
  - Papilla
- The vertical part of the mandible that articulates with the temporal bone is called the
  - oblique ridge.
  - ramus.
  - maxilla.
  - palatal.
- Which of the following are muscles of mastication?
  - Temporals, masseters, buccinators, and internal pterygoids
  - Temporal, masseters, internal pterygoids, and external pterygoids
  - Masseters, mentalis, buccinators, and external pterygoids
  - Orbicularis oris, buccinators, zygomatic major, and mentalis
- Which division of the common carotid artery supplies the face and the oral cavity?
  - External carotid artery
  - Internal carotid artery
  - Facial artery
  - Maxillary artery
- All of the following are correct statements about the veins that supply the face and the oral cavity *except*:
  - The veins correspond to the arteries and often have similar names.
  - The veins drain into the external or internal jugular vein.
  - The veins are classified as deep or superficial veins.
  - The lingual vein drains the muscles of mastication, the sinuses, and the palate.
- The parotid gland empties into the mouth through:
  - Wharton's duct
  - Sublingual duct
  - Duct of Rivinus
  - Parotid duct also known as the Stensen's duct
- The temporomandibular joint is composed of all of the following *except*:
  - Glenoid fossa of the temporal bone
  - Greater wing of the zygomatic bone
  - Articular eminence of the temporal bone
  - Condylod process of the mandible
- The \_\_\_\_\_ muscle opens the jaw by depressing the mandible.
  - Lateral (external) pterygoid
  - Medial (internal pterygoid)
  - Masseter
  - Temporal
- The mental foramen, genial tubercles, and lingual foramen are all found on the \_\_\_\_\_.
  - The maxilla
  - the mandible
  - The temporal bone
  - the nasal bone
- The common carotid:
  - Drains the blood from most of the head and neck
  - Is divided into three arteries
  - Supplies blood to most of the head and neck
  - Is a vein of the face and oral cavity

### Critical Thinking

- Which maxillary nerve is involved if a patient has a toothache on tooth #4?
- Between the bottom of the nose and the middle of the upper lip is a shallow, V-shaped depression. Identify this landmark and any developmental disturbances that occur in this area.
- Prominence of excess bone is sometimes found in the bones of the arches. What are these prominences called, and where are they located?

### Web Activities

- Go to <http://www.tmjoints.org>, click on What is TMJ?, and find out how a patient can avoid TMJ surgery. Which month has been proclaimed JAW-JOINTS-TMJ AWARENESS MONTH? Check <http://www.tmj.org>.
- Go to <http://www.bellspalsy.com> and learn about facial paralysis and its causes.
- Go to <http://www.visiblehuman.org> and view the video and animations related to mastication and facial expression.