Unit 17: Temporal and Infratemporal Fossa

Dissection Instructions:

The temporal and infratemporal regions contain the masticatory osteofascial compartment (Plates 4; 7.44). It contains the four major muscles of mastication, the mandibular division of the trigeminal nerve, the maxillary artery and pterygoid plexus of veins. The four muscles of mastication are the masseter, temporalis, lateral pterygoid and medial pterygoid muscles. The masseter has already been studied, but review it location, origin, insertion, and action.

Clean and study the temporal fascia (Plates 22, 50; 7.7, 7.11B, 7.45). It covers the temporal fossa, attaching to the superior temporal line and the zygomatic arch. The attachment to the zygomatic arch is by two layers, one attaching to the outer surface of the arch and the other to the inner surface. The space between the two layers is filled with fat and a few small vessels. This fascia is very stout and serves as part of the origin of the temporalis muscle. Carefully reflect the temporal fascia upwards, leaving it attach superiorly for demonstration.

Clean and study the temporalis muscle (Plates 50; 7.8, 7.45, 7.46). It takes origin from the temporal fossa on its deep surface and from the temporal fascia on its superficial surface. It is fan shaped and inserts on the anterior border and deep surface of the coronoid process of the mandible. The most posterior fibers run almost horizontally and thus can retract the mandible. Some of its deepest fibers anteriorly insert almost as low as the last molar tooth. The temporalis muscle works with the masseter and medial pterygoid muscles in closing the jaws.

If the parotid gland has not been completely removed on both sides, it must be done now (Plates 21; 7.43). Try to preserve the major branches of the facial nerve for review.

Take your probe and explore the attachments of the zygomatic arch. Carefully cut the attachments of the arch anterior and posterior to the origin of the masseter muscle. Avoid cutting into the orbit or temporomandibular joint. The nerve supply to the masseter muscle comes from the mandibular division of the trigeminal nerve, through the infratemporal fossa and through the notch between the coronoid process and condylar process of the mandible (Plates 50; 7.44). When the zygomatic arch has been cut, carefully begin to roll the arch downward and dissect on the deep surface of the masseter muscle to locate its nerve and blood supply. When they have been found, cut a square of masseter muscle containing them from the rest of the muscle. Then reflect the arch and muscle downward. The upper portion of the mandible will now be exposed. Explore the insertion of the temporalis muscle on the coronoid process. Cut the coronoid process, including as much of the temporalis insertion as possible, without cutting structures deep to the mandible. Reflect the temporalis muscle upwards, exposing the infratemporal fossa.

The inferior alveolar nerve of the mandibular division of the trigeminal nerve descends from the foramen ovale to enter the mandibular foramen. Insert a blade of your forceps deep to the neck of the mandible and slide it downward until it reaches the lingula of the mandible. This will mark the level of entrance of the inferior alveolar nerve into the mandible. Cut through the neck of the mandible immediately below the temporomandibular joint and insertion of the lateral pterygoid muscle and cut through the ramus of the mandible immediately above the mandibular foramen without cutting the inferior alveolar nerve and vessels. Clean the vessels and nerves on the surface of the lateral and medial pterygoid muscles as the muscles are cleaned (Plates 36, 42, 67; 7.47- 7.49). The pterygoid plexus of veins is located here, but they can be removed (Plate 66). The plexus can drain posteriorly into the maxillary vein, anteriorly into the deep facial vein, or deep into the inferior ophthalmic vein. The
maxillary artery may pass superficial or deep to the lateral pterygoid muscle, therefore the arrangement of its branches may differ from person to person (Plates 36, 65; 7.47, 7.58). The branches of the maxillary artery tend to follow the branches of the mandibular division of the trigeminal nerve, so these will be described first nerve (Plates 42, 67; 7.47, 7.49). Lift up the temporalis muscle and look for the anterior and posterior deep temporal nerves and vessels entering the deep surface of the temporalis muscle. These nerves appear above the lateral pterygoid muscle. Also appearing above the lateral pterygoid muscle is the nerve to the masseter muscle, which is joined by the vessels of the same name. Appearing between the two heads of the lateral pterygoid muscle is the buccal nerve, a sensory nerve supplying both inner and outer surfaces of the cheek (Plate 41; 7.48). The inferior alveolar and lingual branches of the mandibular division appear below the lateral pterygoid muscle. The inferior alveolar nerve is posterior and gives off the nerve to the mylohyoid muscle before it enters the mandibular foramen. The lingual nerve lies anterior and descends to the tongue.

The lateral pterygoid muscle arises from the infratemporal surface of the greater wing of the sphenoid bone (superior head) and from the lateral surface of the lateral pterygoid plate (inferior head) (Plates 51; 7.47). The two heads unite as they insert on the capsule of the temporomandibular joint, the fibrocartilaginous disk within the joint and the neck of the mandible (Plates 51; 7.48, 7.51, Table 7.9 and figures-p. 662). Of the four muscles in this compartment, the lateral pterygoid muscle is the only one which opens the mouth.

The medial pterygoid muscle arises primarily from the medial surface of the lateral pterygoid plate, but also has a small origin from the tubercle of the maxilla near the last molar tooth (Plates 51; 7.47, 7.63, 7.72). It inserts on the medial surface of the angle of the mandible opposite the masseter muscle on the lateral surface.

If the maxillary artery passes superficial to the lateral pterygoid muscle, clean it and its branches (Plates 36, 65; 7.47A&B, 7.48). The maxillary artery is one of the terminal branches of the external carotid, beginning deep to the neck of the mandible. The artery is divided into three parts by its relationship to the lateral pterygoid muscle. Its first portion, the mandibular part, extends from its origin until it reaches the lateral pterygoid muscle. Its second part is the pterygoid portion and continues until it reaches the pterygomaxillary fissure. The third part is the pterygopalatine part, which will be studied later. The first part, the mandibular portion gives off two small arteries to the ear, the deep auricular and the anterior tympanic. These vessels may be important to the otolaryngologist, but may be skipped in this dissection. The middle meningeal artery is the major arterial supply to the dura mater. It travels deep to the lateral pterygoid muscle to enter the foramen spinosum of the sphenoid bone. Its continuation will be seen in the next unit. The accessory meningeal artery may be a branch of the middle meningeal or it may branch from the maxillary artery. It passes through the foramen ovale with the mandibular division.

The second part of the maxillary artery, the pterygoid portion, supplies blood to the muscles of mastication and to the cheek. The masseteric artery was seen entering the masseter muscle above the ramus of the mandible. Anterior and posterior deep temporal branches supply the temporalis muscle. The medial and lateral pterygoid muscles each receive short branches. A buccal branch also accompanies the buccal branch of the mandibular nerve.

If the maxillary artery runs deep to the lateral pterygoid muscle, then study the temporomandibular joint (Plates 14, 36, 51; 7.50, 7.5, Table and figures-p. 662, Table 7.10 and figures-p663). This joint is a synovial joint with a fibrocartilaginous disk dividing it into two separate cavities. It is surrounded by a capsule which is strengthened on its lateral surface by additional collagen bundles forming the lateral ligament. Two accessory ligaments some distance away help support this joint. They are the sphenomandibular and stylomandibular ligaments. The former extends from the...
spine of the sphenoid bone to the lingula of the mandible and the latter extends from the styloid process to the angle of the mandible. When the head of the mandible moves forward as the mouth is opened, the disk moves forward also. The disk is thicker around its perimeter than it is in the center and is more vascular posteriorly. The joint is innervated anteriorly and laterally by the nerve to the masseter muscle and posteriorly and medially by the auriculotemporal nerve. Disarticulate the temporomandibular joint, retaining the insertion of the lateral pterygoid muscle to the capsule and neck of the mandible. Reflect the head of the mandible and lateral pterygoid muscle forward, exposing the deepest portion of the infratemporal fossa.

Clean the lingual and inferior alveolar nerves superiorly, and locate the chorda tympani nerve as it joins the lingual nerve from posterior and superior (Plates 36, 42; 7.47, 7.49). The chorda tympani nerve is a branch of the facial nerve which traverses the middle ear cavity to enter the infratemporal fossa through the petrotympanic fissure. It carries taste fibers from the anterior two-thirds of the tongue and preganglionic parasympathetic fibers for the submandibular and sublingual ganglion (Plates 127; 7.78, 9.12). The cell bodies of the preganglionic fibers are located in the superior salivatory nucleus in the brain stem and the fibers of the post-ganglionic neurons from the submandibular ganglion are distributed to the submandibular, sublingual and other glands in the mouth region.

Locate again the middle meningeal artery (Plate 36; 7.47) and trace it from the maxillary artery to the foramen spinosum. Remember that the artery passes between two roots of the auriculotemporal nerve as the nerve leaves the mandibular division. Now trace the auriculotemporal nerve posteriorly to the parotid gland and up to the temporal region. Look for the nerves to the lateral pterygoid and medial pterygoid muscles. The latter nerve may arise from the deep surface of the mandibular division and pass through the otic ganglion. The otic ganglion is located just below the foramen ovale and medial (deep) to the mandibular division. The preganglionic fibers reaching the otic ganglion are from the glossohypopharyngeal nerve. These fibers leave the glossohypopharyngeal nerve just below the jugular foramen as the tympanic branch, pass into the middle ear cavity, form the tympanic plexus, and enter the middle cranial fossa as the lesser petrosal nerve. They synapse with neurons in the otic ganglion for innervation of the parotid gland. Review all the branches of the mandibular division of the trigeminal nerve and note their relationships to the lateral and medial pterygoid muscles and their anatomic relationships with the parasympathetic nerves and ganglia (Plates 116, 125; 7.48, Table 9.8 and figures-pp. 810, 813).

Be sure to identify all of the following in this unit:

- temporal fascia
- temporals muscle
- nerve supply to masseter muscle
- masseter muscle
- coronoid process of mandible
- condylar process of mandible
- zygomatic arch
- inferior alveolar nerve
- mandibular foramen
- lingula of mandible
- pterygoid plexus of veins
- maxillary artery
- lateral pterygoid muscle
- anterior deep temporal nerve & vessels
- posterior deep temporal nerve & vessels
- buccal nerve
- medial pterygoid muscle
- pterygomaxillary fissure
- deep auricular artery
- anterior tympanic artery
- middle meningeal artery
- massetereic artery
- temporomandibular joint
- sphenomandibular ligament
- stylomandibular ligament
- lingual nerve
- chorda tympani nerve
- petrotympanic fissure
- otic ganglion

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