# Blood and nerve supply of the oral cavity Transcript

The oral cavity, or mouth, though quite small, is supplied by a dense network of nerves and blood vessels. The nerve supply comes from the branches of six cranial nerves, namely the trigeminal nerve, facial nerve, glossopharyngeal nerve, vagus nerve, and the hypoglossal nerve. The blood supply comes from the branches of the external carotid artery, and the veins drain into the internal and external jugular veins.

First off, let's start with the arteries. The arterial supply comes from the branches of the external carotid artery: the lingual artery, facial artery, and the maxillary artery. The lingual artery is the second branch of the external carotid artery and arises at the level of the greater cornu of the hyoid bone. It runs upwards and medially until it reaches the greater cornu, and then dips downwards beneath the posterior belly of digastric and stylohyoid muscles, creating a loop over the hypoglossal nerve. The lingual artery then ascends almost vertically upwards to reach the tongue's inferior surface and continues as its terminal branch, the deep lingual artery, which supplies the anterior two-thirds of the tongue.

The lingual artery gives off four branches: the suprahyoid artery, the dorsal lingual artery, the deep lingual artery, and the sublingual artery. The suprahyoid artery runs along the hyoid bone and supplies the omohyoid, sternothyroid, and thyrohyoid muscles. The dorsal lingual artery supplies the posterior one-third of the tongue, soft palate, palatoglossal fold, lingual tonsil, and epiglottis. The deep lingual artery supplies the tongue's ventral surface, while the sublingual artery supplies the sublingual salivary gland, the genioglossus, geniohyoid, and myelohyoid muscles, and the mandible.

Second, the facial artery arises from the external carotid artery at the level of the angle of the mandible, just above the lingual artery. It takes an S-shaped course deep to the posterior belly of digastric and stylohyoid muscles and crosses the mandible just anterior to the masseter muscle at a depression in the mandible termed the antigonial notch. The artery continues across the cheek to the angle of the mouth, giving rise to the superior and inferior labial arteries. The artery passes upwards along the side of the nose, giving rise to the lateral nasal artery, and then continues on the side of the nose as the angular artery, ending at the medial commissure of the eye. It gives off some branches to the oral cavity, including the ascending palatine artery to the soft palate, the tonsillar artery to the palatine tonsil, the submental artery to the chin and the myelohyoid muscle, and the glandular branches of the facial artery also supply the submandibular salivary gland.

Third, the maxillary artery, which is the largest terminal branch of the external carotid artery, supplies deep structures of the face, including the mandible, pterygoid, infratemporal fossa, and segments of the pterygopalatine fossa. It arises posteriorly to the condylar neck of the mandible within the parotid gland. It then exits the parotid gland and passes anteriorly between the ramus of the mandible and the sphenomandibular ligament within the infratemporal fossa. As it passes through the infratemporal fossa, the maxillary artery can be divided into three parts: the mandibular part, the pterygoid part, and the pterygopalatine part.

The mandibular part, also known as the bony part or first part, runs medially to the neck of the mandible and passes on the inferior border of the lateral pterygoid muscle and gives off the inferior alveolar artery. The inferior alveolar artery descends inferiorly following the inferior alveolar nerve and gives off a lingual and a myelohyoid branch. The small lingual branch supplies the lingual mucous membrane, while the myelohyoid branch supplies the myelohyoid muscle. Then, the inferior alveolar artery runs through the mandibular foramen to enter the mandibular canal, supplying the mandible and lower molars and premolars. Near the first premolar, the inferior alveolar artery divides into two terminal branches: the incisive branch, which supplies the incisor and canine teeth, and the mental branch, supplying the chin.

Next, the pterygoid part, also known as the muscular part or second part, runs between the temporalis and lateral pterygoid and gives branches to the muscles of mastication. The masseteric artery supplies the masseter muscle, the deep temporal arteries supply the temporalis muscle, and the pterygoid branches supply the medial and lateral pterygoid muscles. Another branch, the buccal artery, supplies the buccinator muscle, the buccal mucosa, and the skin.

Finally, the pterygopalatine part, or third part, passes from the infratemporal fossa into the pterygopalatine fossa via the terigo maxillary fissure. It gives off the descending palatine, posterior superior alveolar artery, and the infraorbital artery. The descending palatine splits into two branches: the greater palatine artery that goes to supply the hard palate and the lesser palatine branches that supply the soft palate and palatine tonsil. The posterior superior alveolar artery further divides into two or three branches, which bore through the body of the maxilla and supply premolar and molar teeth, the maxillary sinus, and associated gingiva. The infraorbital artery gives two branches to the oral cavity: the middle superior alveolar artery to the upper premolar teeth and the anterior superior alveolar artery to the maxillary air sinus and the upper canine and incisor teeth.

Moving on, the veins of the oral cavity accompany the arteries of the same name and eventually drain into the internal and external jugular veins. Some of the veins, though, take a slight detour and join into the pterygoid plexus, which is a cluster of veins located in the skull's infra-temporal fossa. These include the greater and lesser palatine veins and the sphenopalatine veins from the palate, the superior and inferior alveolar veins from the teeth and gingiva, and veins from the muscles of mastication. Eventually, the pterygoid plexus veins converge to form the maxillary vein, which drains via the branches of the retromandibular vein into the external and internal jugular veins.

With respect to lymphatic drainage, the upper teeth, gingiva, and lip lateral part of the lower lip, and the lateral portion of the anterior part of the tongue drain into the submandibular lymph nodes. The cheeks drain into the submandibular and pre-auricular lymph nodes. The central part of the lower gingiva and lip and tip of the tongue drains into the submental lymph nodes. The medial portion of the anterior two-thirds of the tongue drains into the lower deep cervical lymph nodes, and the posterior portion of the tongue drains into the superior deep cervical lymph nodes. The parotid glands drain into the superficial and deep cervical lymph nodes, whereas the submandibular glands drain into the deep cervical lymph nodes. Eventually, the deep cervical lymph nodes drain via the jugular lymphatic trunk into the thoracic duct on the left side and the internal jugular vein or brachiocephalic vein on the right side.

Now, the oral cavity's nerve supply is derived from a bunch of cranial nerves, namely the trigeminal nerve, facial nerve, glossopharyngeal nerve, vagus nerve, and the hypoglossal nerve, and a small portion of the spinal accessory nerve. The maxillary and mandibular divisions of the trigeminal nerve supply most of the oral cavity. Let's take a brief look at their branches.

The mandibular nerve comes from its branches: the buccal nerve, the mesoteric nerve, deep temporal nerves, lateral pterygoid nerve, lingual nerve, and the inferior alveolar nerve, whereas the maxillary nerve gives off the infraorbital nerve, posterior superior alveolar nerve, pharyngeal nerve, greater and lesser palatine nerves, and the nasopalatine nerve.

The upper lip gets sensory supply via the labial branches of the infraorbital nerve, and lower lip via the mental branch of the inferior alveolar nerve. The cheek gets sensory supply from the buccal branch of the mandibular nerve, whereas the muscles of the lips and cheek—the buccinator, zygomaticus major and minor, procerus, levator labia superioris, orbicularis auris, and the resorius—are all supplied by the buccal branches of the facial nerve.

Next, the upper teeth are supplied by the superior dental plexus, which is a nerve network lying above the apices of the teeth. It's formed by the anterior, middle, and posterior superior alveolar nerves. The lower teeth are supplied by the inferior dental plexus, formed by the inferior alveolar nerve. The upper gingiva are supplied by the superior alveolar nerves on the labial side, whereas the lingual side is supplied by the greater palatine and nasal palatine nerves. On the lower jaw, the gingiva is supplied by the buccal nerve and the incisive branch of the inferior alveolar nerve on the labial aspect and by the lingual nerves on the lingual aspect.

The nerve supply of the tongue comes from a few different nerves. Sensory supply to the anterior two-thirds of the tongue is supplied by the lingual nerve, a branch of the mandibular branch of the trigeminal nerve, and the taste sensation to the anterior two-thirds of the tongue is achieved through innervation from the chorda tympani nerve, a branch of the facial nerve. The glossopharyngeal nerve supplies the posterior one-third of the tongue, and the root of the tongue is supplied by the internal laryngeal branch of the superior laryngeal nerve. The tongue muscles get motor supply from the hypoglossal nerve, except for the palatoglossus muscle, which is supplied by the vagus nerve through the pharyngeal plexus. Now, the pharyngeal plexus is a nerve cluster formed by branches from the glossopharyngeal and vagus nerves. The pharyngeal plexus supplies the tonsils and soft palate muscles, except for the tensor veli palatini. Sensory supply to the soft palate comes from the lesser palatine branch of the maxillary nerve.

Finally, the hard palate is supplied by the maxillary nerve's branches: the greater palatine and nasal palatine nerves.

All right, as a quick recap, the oral cavity receives arterial supply from the lingual, facial, and maxillary branches of the external carotid artery. First, the lingual artery, the suprahyoid artery, dorsal lingual artery, the sublingual artery, and ends as the deep lingual artery. It supplies the tongue, soft palate, sublingual salivary gland, and muscles attached to the hyoid bone, and the genioglossus muscle. Second, the facial artery branches into the ascending palatine artery, the tonsillar artery, the submental artery, a few glandular branches, and the superior labial artery and inferior labial arteries. It supplies the soft palate, palatine tonsil, root of the tongue, submandibular and sublingual salivary glands, and the lips. Third, the maxillary artery can be divided into three parts. The first part, or mandibular part, gives off the inferior alveolar artery, which supplies the lower teeth, cheek, and myelohyoid muscle. In the second part, or muscular part, we have the masseteric artery to the masseter muscle, the deep temporal arteries to the temporalis muscle, and the pterygoid branches to the medial and lateral pterygoid muscles, and the buccal artery to the buccinator muscle. In the pterygopalatine, or third part, the maxillary artery also branches into the descending palatine artery, which supplies the hard palate, soft palate, and palatine tonsil. The posterior superior alveolar artery supplies the upper premolar and molars, and the infraorbital artery to the rest of the upper teeth.

The venous drainage of the oral cavity occurs via the veins that accompany the arteries of the same name and eventually drain into the internal and external jugular veins, and lymphatic drainage primarily occurs via the submandibular, submental, pre-auricular, and deep cervical lymph nodes. Finally, the nerve supply comes via the trigeminal nerve, facial nerve, glossopharyngeal nerve, vagus nerve, and the hypoglossal nerve.