Clinical Anatomy of the Lingual Nerve: A Review

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Purpose: Knowledge of lingual nerve anatomy is of paramount importance to dental practitioners and maxillofacial surgeons. The purpose of this article is to review lingual nerve anatomy from the cranial base to its insertion in the tongue and provide a more detailed explanation of its course to prevent procedural nerve injuries.

Materials and Methods: Fifteen human cadavers from the University of Alabama at Birmingham School of Medicine's Anatomical Donor Program were reviewed. The anatomic structures and landmarks were identified and confirmed by anatomists. Lingual nerve dissection was carried out and reviewed on 15 halved human cadaver skulls (total specimens, 28).

Results: Cadaveric dissection provides a detailed examination of the lingual nerve from the cranial base to tongue insertion. The lingual nerve receives the chorda tympani nerve approximately 1 cm below the bifurcation of the lingual and inferior alveolar nerves. The pathway of the lingual nerve is in contact with the periosteum of the mandible just behind the internal oblique ridge. The lingual nerve crosses the submandibular duct at the interproximal space between the mandibular first and second molars. The submandibular ganglion is suspended from the lingual nerve at the distal area of the second mandibular molar.

Conclusion: A zoning classification is another way to more accurately describe the lingual nerve based on close anatomic landmarks as seen in human cadaveric specimens. This system could identify particular areas of interest that might be at greater procedural risk.

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The mandibular division of the trigeminal nerve is a sensory and motor nerve descending through the foramen ovale. It carries general sensory branches to the oral cavity, face, and ears. The course of the lingual nerve from the cranial base to its insertion into the tongue has been well described.[1,2] However, this well-known pathway does not seem to prevent lingual nerve injury during head and neck surgery, specifically as it relates to oral and maxillofacial surgery. Multiple studies have cited the incidence of lingual nerve injury encountered during routine oral surgical procedures, including inferior alveolar nerve block injection, lingual flap retraction, and third molar removal.[3-11] The aim of this study was to further break down the lingual nerve into "zones" based on anatomic landmarks. Given the variability of the position of the lingual nerve from person to person, a detailed description of its average descent from the cranial base to the tongue and surrounding anatomic structures in each zone could provide the clinician with more information to avoid injuring the nerve.

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Materials and Methods

Dissections were performed on 15 human cadaveric specimens from the University of Alabama at Birmingham School of Medicine's Anatomical Donor Program. Donors ranged in age from 67 to 105 years at the time of death. Nine donors were female and 6 were male. All donors were Caucasian. Cause of death was not noted in this study. Inclusion criteria included the presence of mandibular second molars. All specimens were noted to be dental Angle Class I. The exclusion criterion was a previously cut mandibular ramus (before dissections).

The anatomic structures and landmarks were identified and confirmed by anatomists. Dissections were performed by primary and secondary investigators in the same fashion. The lingual anatomic structures and pathway were approached from the medial aspect of the mandible covering an area from the skull base to the floor of the mouth.

A mucosal incision was made in the floor of the mouth on the side to be dissected. Blunt dissection was performed while preserving the lingual nerve. The lingual nerve was located at its distal end. It was followed posteriorly to the medial pterygoid muscle. The muscle was cut to expose the lingual nerve and inferior alveolar nerve more proximally. Dissections were carried out to the cranial base to expose the lingual nerve along its length. Other notable landmarks included the chorda tympani nerve, lingula, ascending mandibular ramus, posterior mandibular border, second mandibular molar, mylohyoid muscle, submandibular duct, and submandibular ganglion.

Results

After the mandibular division of the trigeminal nerve passes through the oval foramen, it gives off the auriculotemporal, inferior alveolar, and lingual nerves in the infratemporal fossa (Fig 1). The lingual and inferior alveolar nerves descend on the medial aspect of the lateral pterygoid muscle. As 2 separate branches, the auriculotemporal nerve courses and surrounds the middle meningeal artery and then merges to form a single nerve. The lingual nerve receives the chorda tympani approximately 1 cm below the bifurcation of the lingual and inferior alveolar nerves. In this vicinity, the maxillary artery arches around the medial aspect of the mandibular condylar neck and gives off the middle meningeal artery. After branching off the maxillary artery in the infratemporal fossa, the middle meningeal artery ascends just behind the inferior alveolar nerve and runs through the loop of the auriculotemporal nerve. The middle meningeal artery continues its upward direction lateral to the chorda tympani before passing through the foramen spinosum to supply the dura mater.

After the lingual nerve separates from the inferior alveolar nerve at the superomedial part of the lateral pterygoid muscle, the lingual nerve continues its progression inferiorly. Before the lingual nerve reaches the inferior border of the lateral pterygoid muscle, the chorda tympani nerve joins the lingual nerve from a posterior direction (Fig 1).[12,13] At the level of the opening of the mandibular foramen containing the inferior alveolar nerve and artery, the lingual nerve is approximately 1 cm in front of the mandibular foramen (Fig 2).

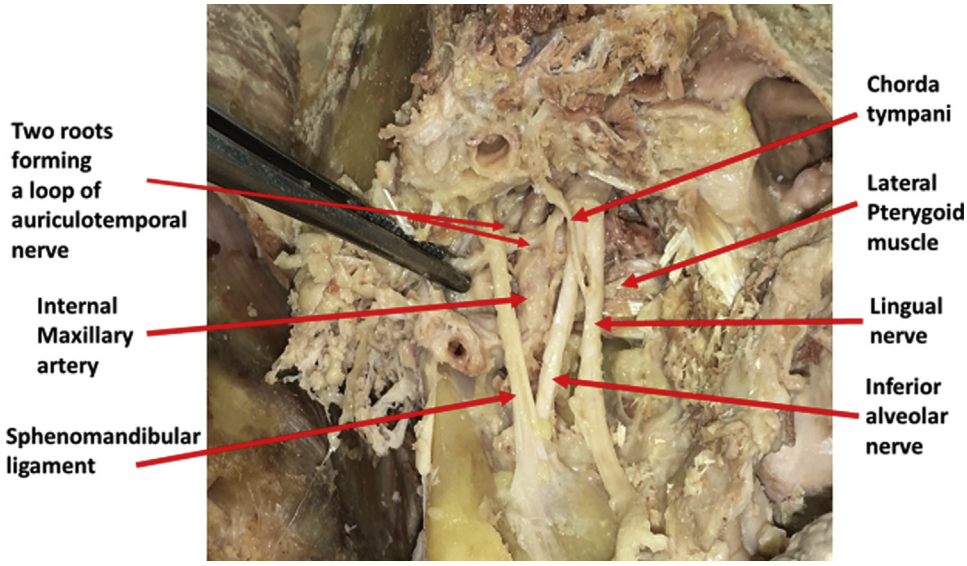

FIGURE 1. Medial view of the mandibular branch of the trigeminal nerve and the maxillary artery.

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