

Unusual Communication between Nerve to Mylohyoid and Lingual Nerve and, its Clinical Significance- A Cadaveric Study

BALI SHARMA¹, ROMA PATEL², SWAPNA PARATE³, NEHA SAINI⁴

ABSTRACT

Introduction: The nerve to mylohyoid is a branch of inferior alveolar nerve which arises just above the mandibular foramen. There is occasionally communicating branch between nerve to mylohyoid and lingual nerve. Knowledge of such variations has significance during oral and submandibular surgery.

Aim: To detect and describe the existence and occurrence of anatomical variations in the innervation pattern of the nerve to mylohyoid by using the dissection technique.

Materials and Methods: An observational study was carried out from January 2022 to April 2022 in a total of 15 embalmed and formalin-fixed cadavers in the Laboratory of Anatomy of SMBT Medical College, Nashik, Maharashtra. The nerve to the mylohyoid and lingual nerve were cleared and observed for any unusual communication between the two, if any.

Results: In 13 (86.67%) cadavers, classical (normal) anatomical presentation of the nerve to mylohyoid was observed, whereas, in two male (13.33%) cadavers, the presence of communicating branch between the nerve to mylohyoid and lingual nerve was observed. In both the cadavers, the communicating branch was unilateral, in one cadaver on the right-side, and in the second cadaver same variation was noted on the left-side.

Conclusion: The existence of communication between the nerve to mylohyoid and the lingual nerve is thought to be responsible for inadequate mandibular anesthesia. Through this study, surgeons will be aware of this variance, to explain unexpected findings in nerve injury following oral procedures.

Keywords: Inferior alveolar nerve, Mandibular anaesthesia, Mandibular foramen, Submandibular surgery

INTRODUCTION

The nerve to mylohyoid normally is a branch of the inferior alveolar nerve, which arises from posterior division of mandibular nerve. Nerve to mylohyoid arises above the mandibular foramen [1]. The nerve to mylohyoid pierces the sphenomandibular ligament comes above the mandibular foramen. Further, it moves forward in the mylohyoid groove, which is located on the medial surface of the ramus of the mandible. The nerve courses anteriorly parallel to the mylohyoid muscle appears in digastric triangle. Here, it gives motor innervation to the mylohyoid and anterior belly of the digastric muscles [2].

Nerve to mylohyoid is typically regarded as a motor nerve. It also gives off a cutaneous nerve. The sensory supply of the lower surface of the chin is provided by this cutaneous branch. The nerve to mylohyoid also provides sensory nerves to the first molar's mesial root [3]. However, it has been discovered that there may be an aberrant link between this nerve and the lingual nerve, which is secretomotor to the submandibular and sublingual salivary glands and sensory to the tongue [4,5]. It is well known that this information is of academic interest and also of practical value for Maxillofacial and Oral Surgeons. Due to its position, it may sustain damage during the removal of the third molar, periodontal treatments, the management of mandibular trauma, and the excision of neoplastic tumours [6]. Communication between nerve to mylohyoid and lingual nerve has been documented as case report by many authors [7-9]. But very few original studies are documented [6,10-12]. The percentage of presence of this communicating branch was 33.3% and authors named it as the "mylohyoid or sublingual curl" [11,13]. Hence, the aim of this study was to establish the existence of a connecting branch between the mylohyoid and lingual nerves and to examine the clinical and surgical ramifications of this finding.

MATERIALS AND METHODS

An observational study was carried from January 2022 to April 2022 in a total of 15 properly embalmed and formalin-fixed cadavers in the Laboratory of Anatomy during routine dissection practice for undergraduates of SMBT Medical College, Nashik, Maharashtra.

Inclusion criteria: All the available cadavers irrespective of gender were included in the study which did not have any visible external abnormalities in their head and neck region.

Exclusion criteria: The cadavers previously operated in the infratemporal and face region, which may prevent the cadaveric analysis were excluded from this study.

Procedure

Scissors (pointed, blunt, curved, 4" and 6" size), Scalpel (blade no. 23), Forceps (plane and tooth), Thread, Divider, Chisel, and hammer were the instruments used in the dissection.

Step 1- First the skin of infratemporal fossa was reflected laterally. Then the masseter muscle was cleared from its origin to insertion and was reflected inferolaterally.

Step 2- Two cuts were given to mandible, one was horizontal which starts from root of condylar process to coronoid process and second was made at the junction of ramus and body of mandible. The cut bony part was reflected laterally.

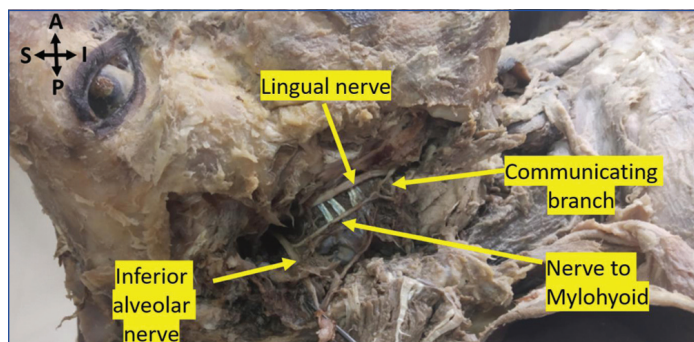
Step 3- The various branches of mandibular nerve with muscles of mastication were identified. The nerve to mylohyoid and lingual nerve were cleared and observed for any communication between the two, if any [14].

STATISTICAL ANALYSIS

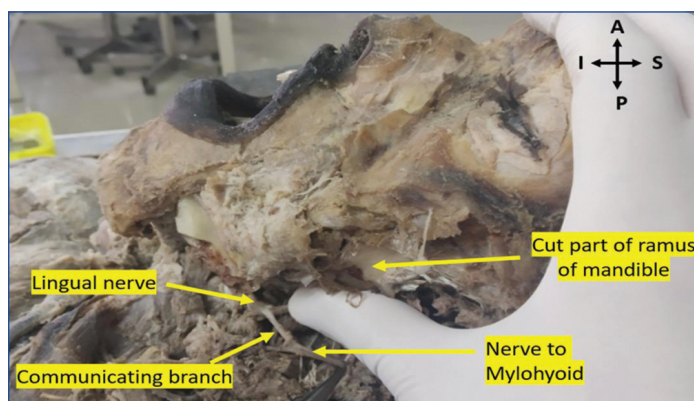
The findings were photographed, recorded and the data was analysed in terms of frequency and percentage.

RESULTS

It was found that 13 cadavers (86.67%) were having normal innervation pattern, two male cadavers (13.33%) were showing presence of communicating branch which connects the nerve to mylohyoid and lingual nerve. In both the cadavers, the communicating branch was unilateral, in one cadaver on right-side [Table/Fig-1] and in second cadaver same variation was noted on left-side [Table/Fig-2]. In both the cases, the communicating branch was at the level of intermediate tendon of digastric muscle. The nerve to mylohyoid followed its normal course and no other anatomical variations were found in the origin of inferior alveolar or the lingual nerves.



[Table/Fig-1]: Lateral view of the head showing right mandibular nerve branches. The communication between right nerve to mylohyoid and right lingual nerve. (Cadaver-1), A:anterior; P: posterior; S: superior; I: inferior.



[Table/Fig-2]: Lateral view of the head showing left mandibular nerve branches. The communication between left nerve to mylohyoid and left lingual nerve. (Cadaver-2), A:anterior; P: posterior; S: superior; I: inferior.

DISCUSSION

Communicating branch between the mylohyoid and lingual nerves is not regularly mentioned in the anatomical textbooks and less explored in the literature. It may vary in different population.

Kameda K and Uber den N found the presence of communicating branch in 46.3%, but in current study it was 13.33% [10]. Kim SY et al., reported 08% connection between these nerves [11].

The posterior division branches of the mandibular nerve were found to vary in 4 (11.1%) of the 36 specimens examined in the study by Thotakura B et al., [Table/Fig-3] [6,10-12]. In two samples, there was communication between the mylohyoid nerve and the lingual nerve. The communicating branch in one of these two specimens was discovered to be bilateral [6].

In the case study done by Kaur HS et al., a communicating branch was found bilaterally. On the right-side, mylohyoid nerve gave a communicating branch to the lingual nerve beyond the level of mandibular foramen close to the intermediate tendon of digastric muscle as in our study, whereas on the left-side it was given at the level of mandibular foramen before the intermediate tendon of the digastric muscle [15].

In their case report, Panchal P et al., and Khizer Hussain Afroze M et al., discovered a communicating branch between mylohyoid and lingual nerve beyond the level of mandibular foramen close to the intermediate tendon of digastric muscle [7,16]. Sinha P et al., also

Author's name	Year of study	Place	Sample size	Prevalence of presence of communication between nerve to mylohyoid and lingual nerve
Kameda K and Uber den N [10]	1952	-	160 specimens	46.3%
Kim SY et al., [11]	2004	Korea	32 specimens	8 %
Sato I et al., [12]	2004	Japan	413 specimens	1.45%
Thotakura B et al., [6]	2013	-	36 specimens	11.1%
Present study	2023	Maharashtra, India	15 cadavers	13.33%

[Table/Fig-3]: Comparison in prevalence of communicating branch between mylohyoid and lingual nerve among the different authors.

found the communication between nerve to mylohyoid and lingual nerve at the level of junction of anterior belly of digastric muscle with its intermediate tendon which was similar to this study [8].

In a case study carried out by Jha S et al., they found an accessory nerve to mylohyoid. This accessory nerve have a communicating branch with lingual nerve [9]. In the study conducted by Premakumari CR and Dnyaneshwar it was found that the mylohyoid nerve was connected with the submandibular ganglion by two roots (anterior and posterior) and thus supplying submandibular gland. Later the mylohyoid nerve was found to join the lingual nerve and supplied mylohyoid muscle through lingual nerve. There was a communicating branch between lingual nerve and mylohyoid nerve [17].

The presence of this type of nerve communication, described in this study would help in the lingual nerve function recovery, since the mylohyoid nerve would be contributing to the sensory innervation of the tongue [18]. Although the mylohyoid nerve is typically thought of as a motor, it also contains a sensory component that extends through the cutaneous branch beyond the mylohyoid and digastric muscles, by way of cutaneous branch [19]. The mylohyoid nerve might have a role in the sensory innervation of the chin [20]. Also, the mylohyoid muscle plays an important role in chewing, swallowing, respiration, and phonation [21].

Because of a very close relationship of lingual nerve with the third molar tooth, it makes it susceptible to injury during the third molar extraction. The mylohyoid nerve damage can also occur as a result of an excision of the submandibular salivary gland [22-25]. Without a lingual nerve lesion, there will be an impairment of tongue sensation if the nerve to mylohyoid lesion is too proximal to the communication branch as described in this study.

Importantly, the submandibular and submental triangles (in which communication between the lingual and nerve to mylohyoid may occur) are involved in the removal of lower molar teeth, excision of the salivary gland, transplantation of flaps, and other common procedures. It is, therefore, crucial to be clear about relevant structures. The procedures like resection of the salivary gland and the transplantation of flaps involve the submandibular and submental triangles (where connection between the lingual and mylohyoid nerve may occur). Therefore, it is essential to understand the pertinent structures [26].

Removing the soft tissue pedicle attached to the mental spine during genioplasties can harm the sensory and motor branches of the nerve to mylohyoid. Therefore, in order to prevent complications during chin osteotomy and dissection procedures, the surgeons must be aware of variations in mylohyoid nerve branches and their communications [9].

Limitation(s)

Due to lack of time and availability of cadavers, findings of very few cadavers could be included.

CONCLUSION(S)

This study described the presence of a communicating branch between the nerve to mylohyoid and lingual nerves in two male cadavers. This unusual communication between the nerve to mylohyoid and lingual nerve may be one reason for incomplete mandibular anaesthesia and for neuropathy. Additionally, it should be considered in dental procedures and during radical neck dissections to minimise postoperative complications.

Acknowledgement

Authors are thankful to the teaching and non teaching staff of Department of Anatomy, SMBT Medical College, Nashik, Maharashtra for their full co-operation and support as and when required.

REFERENCES

- [1] Wilson S, Johns P, Fuller PM. The inferior alveolar and mylohyoid nerves: an anatomic study and relationship to local anesthesia of the anterior mandibular teeth. *Journal of the American Dental Association* (1939). 1984;108(3):350-52.
- [2] Dutta AK. *Essentials of Human Anatomy part II (Head and Neck)*, 5th ed. Calcutta: current book international; 2009. Pp. 146
- [3] Clark S, Reader A, Beck M, Meyers WJ. Anesthetic efficacy of the mylohyoid nerve block and combination inferior alveolar nerve block/mylohyoid nerve block. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology*. 1999;87(5):557-63.
- [4] Jablonski NG, Cheng CM, Cheng LC, Cheung HM. Unusual origins of the buccal and mylohyoid nerves. *Oral Surgery, Oral Medicine, Oral Pathology*. 1985;60(5):487-88.
- [5] Varol A, Sencimen M, Kocabiyik N, Gulses A, Ozan HA. Clinical and anatomical aspects of possible mylohyoid nerve injury during genioplasties. *International Journal of Oral and Maxillofacial Surgery*. 2009;38(10):1084-87.
- [6] Thotakura B, Rajendran SS, Gnanasundaram V, Subramaniam A. Variations in the posterior division branches of the mandibular nerve in human cadavers. *Singapore Med J*. 2013;54(3):149-51.
- [7] Panchal P, Britto J, Prasad A. Unusual communication between the mylohyoid nerve and lingual nerve in a north indian male cadaver: its clinical significance. *Int J Anat Res*. 2017;5(2.3):3927-29.
- [8] Sinha P, Tamang BK, Sarda RK. Communication between Mylohyoid and Lingual Nerve: an anatomical variation. *Journal of Clinical and Diagnostic Research: JCDR*. 2014;8(4):AD01-AD02.
- [9] Jha S, Khorwal G. A rare case of accessory nerve to mylohyoid communicating with lingual nerve and its clinical implications. *Int J Anat Res*. 2018;6(3.2):5550-53.
- [10] Kameda K. Uber den N. mandibularis bei Japanern. *Acta Instituti Anatomici Niigatensis*. 1952;28:15-37.
- [11] Kim SY, Hu KS, Chung IH, Lee EW, Kim HJ. Topographic anatomy of the lingual nerve and variations in communication pattern of the mandibular nerve branches. *Surgical and Radiologic Anatomy*. 2004;26(2):128-35.
- [12] Sato I, Sunohara M, Ueno R, Yoshida S. Branch of mylohyoid and lingual nerves on submandibular and submental triangles. *Okajimas Folia Anatomica Japonica*. 2004;81(2.3):45-48.
- [13] Rácz L, Maros T. The anatomic variants of the lingual nerve in human (author's transl). *Anatomischer Anzeiger*. 1981;149(1):64-71.
- [14] Romanes GJ editor. *Cunningham's manual of practical anatomy*. 15th edition. Oxford New York Tokyo: Oxford University Press, 1986;3:119-23
- [15] Kaur HS, U, Bajwa SS, Kalyan GS, Singh M. Bilateral communication between the mylohyoid and lingual nerves: Clinical implications. *Arch Med Health Sci*. 2014;2:217.
- [16] Khizer Hussain Afroze M, Sangeeta M, Pagutharivu P. An anomalous neural interconnection between the lingual and mylohyoid nerves. *Qanun Medika-Medical Journal Faculty of Medicine Muhammadiyah Surabaya*. 2022;6(1):01-07.
- [17] Premakumari CR, Dnyaneshwar. Variations in origin, course and distribution of lingual nerve : A cadaveric study. *IJCAP*. 2018;5(3):357-60.
- [18] Reinhart TC. Re: Anatomical variation of the position of the lingual nerve. *Journal of Periodontology*. 1990;61(5):305-06.
- [19] Frommer J, Mele FA, Monroe CW. The possible role of the mylohyoid nerve in mandibular posterior tooth sensation. *The Journal of the American Dental Association*. 1972;85(1):113-17.
- [20] Guyot L, Layoun W, Richard O, Cheynet F, Gola R. Alteration of chin sensibility due to damage of the cutaneous branch of the mylohyoid nerve during genioplasty. *Journal of Oral and Maxillofacial Surgery*. 2002;60(11):1371-73.
- [21] Ren M, Mu L. Intrinsic properties of the adult human mylohyoid muscle: Neural organization, Fiber-type distribution, and myosin heavy chain Expression. *Dysphagia*. 2005;20(3):182-94.
- [22] Behnia H, Kheradvar A, Shahrokhi M. An anatomic study of the lingual nerve in the third molar region. *Journal of Oral and Maxillofacial Surgery*. 2000;58(6):649-51.
- [23] Fazan VP, Rodrigues Filho OA, Matamata F. Communication between the mylohyoid and lingual nerves: clinical implications. *International Journal of Morphology*. 2007;25(3):561-64.
- [24] Adjei SS, Hammersley N. Mylohyoid nerve damage due to excision of the submandibular salivary gland. *J Oral Maxillofac Surg*. 1989;27(3):209-11.
- [25] Potu BK, Pulakunta T, Ray B, Rao MS, Bhat KM, D'silva SS, Nayak SR. Unusual communication between the lingual nerve and mylohyoid nerves in a South Indian male cadaver: its clinical significance. *Rom J Morphol Embryol*. 2009;50(1):145-46.
- [26] Zhan C, Yuan Z, Qu R, Zou L, He S, Li Z, et al. Should we pay attention to the aberrant nerve communication between the lingual and mylohyoid nerves? *British Journal of Oral and Maxillofacial Surgery*. 2019;57(4):317-22.

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Anatomy, SMBT Medical College, Nashik, Maharashtra, India.
2. Associate Professor, Department of Anatomy, Kiran Medical College, Surat, Gujarat, India.
3. Professor and Head, Department of Anatomy, SMBT Medical College, Nashik, Maharashtra, India.
4. Ph.D. Scholar, Department of Anatomy, SMS Medical College, Jaipur, Rajasthan, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Roma Patel,
Associate Professor, Department of Anatomy, Kiran Medical College, Surat,
Gujarat, India.
E-mail: drroma30@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Oct 15, 2022
- Manual Googling: Jan 04, 2023
- iThenticate Software: Jan 13, 2023 (8%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? No
- Was informed consent obtained from the subjects involved in the study? No
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Oct 14, 2022**
Date of Peer Review: **Dec 01, 2022**
Date of Acceptance: **Jan 14, 2023**
Date of Publishing: **Jul 01, 2023**