http://dx.doi.org/10.30651/jqm.v6i1.10530

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Case Report

An anomalous neural interconnection between the Lingual and Mylohyoid Nerves

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ARTICLE INFO

Submitted : *27th October 2021*
Accepted : *5th December 2021*
Published : *25th January 2022*

Keywords:

Lingual nerve, Mylohyoid nerve, Interconnection, Neural Loop

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ABSTRACT

The interconnection between the lingual nerve (LN) and the hypoglossal nerve, the LN and the inferior alveolar nerve (IAN), and the LN and the mylohyoid nerve (MHN) has already been documented in the literature. Despite the fact that variations in the course of the MHN in regard to the mandible are regularly observed, they have yet to be well documented in the anatomical or surgical literature. This anatomical variety necessitates that surgeons and anesthesiologists who routinely perform oro-surgical interventions and nerve blocks in the face for various neuralgias enhance their knowledge and awareness in order to avoid unintended nerve injury. In the present case report, we observed an aberrant neural loop connecting LN and MHN, as well as anatomical insight into an integrated component of MH along with LN in addition to the motor component.

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INTRODUCTION

The mylohyoid nerve (MHN) is a branch of the inferior alveolar nerve (IAN), which rises above the mandibular foramen (Potu et al., 2010). The MH supplies motor innervation to the mylohyoid and anterior belly of the digastric muscle (Clark et al., n.d.). The mylohyoid muscle plays an essential role in chewing, swallowing, respiration, and phonation (Ren & Mu, 2005). The lingual nerve (LN) is a branch of the posterior division of the mandibular nerve. It is sensory to the anterior 2/3rd of the tongue (Kumar et al., 2021).

Lingual nerve lesion is a common side effect of several oral and maxillofacial surgery surgeries (LN). It may be injured during third molar extraction, periodontal treatments, mandibular trauma management, and excision of neoplastic tumors due to its anatomical placement (Behnia et al., 2000; S Y Kim et al., 2004). A needle puncture during local anesthesia or suture may also cause LN injury. The leading cause of this issue is the LN's anatomic variability and surgeons' difficulty pinpointing its precise position (Behnia et al., 2000).

Previous literature has reported communication between LN and hypoglossal nerve (Kumar et al., 2021), LN and IAN (Sandoval et al., 2009), and also LN and MHN (Jha & Khorwal, 2018; Potu et al., 2010; Sato et al., 2004; Thotakura et al., 2013). Although variations in the course of the MHN in relation to the mandible are frequently found during routine dissection, they have not been satisfactorily described in the anatomical or surgical literature (Kim et al.,2004). In the present case report, we discovered an aberrant neural loop connecting LN and MHN, as well as anatomical insight into an integrated component of MH along with LN in addition to the motor component.

CASE REPORT

In this case report presented, a 65-year-old male cadaver was dissected following preservation in a 10% formalin solution. The lateral side of the face was gently dissected by lifting up the parotid gland with the duct, then the masseter muscle was reflected, and a portion of the ramus of the mandible was cut and removed to approach the infratemporal fossa, where the lingual nerve, inferior alveolar nerve, and mylohyoid nerve were exposed. While tracing the IAN and MHN, an unusually narrow neural connection between the MHN and LN was noticed (Figure 1).

In the left side, the MHN gave a short communicative branch that joined the LN (second part) around the level of the intermediate tendon of the digastric muscle. The distance between the place where the connecting branch emerged from the mylohyoid and the origin of the mylohyoid from IAN was 29.4 mm. The length of the communicating branch which extended from MHN to LN was 31.7 mm.

Measurements was recorded using a Vernier caliper. The MHN and LN followed their typical path and branching pattern. No additional variation was discovered along the course of IAN or LN origin and its branches.

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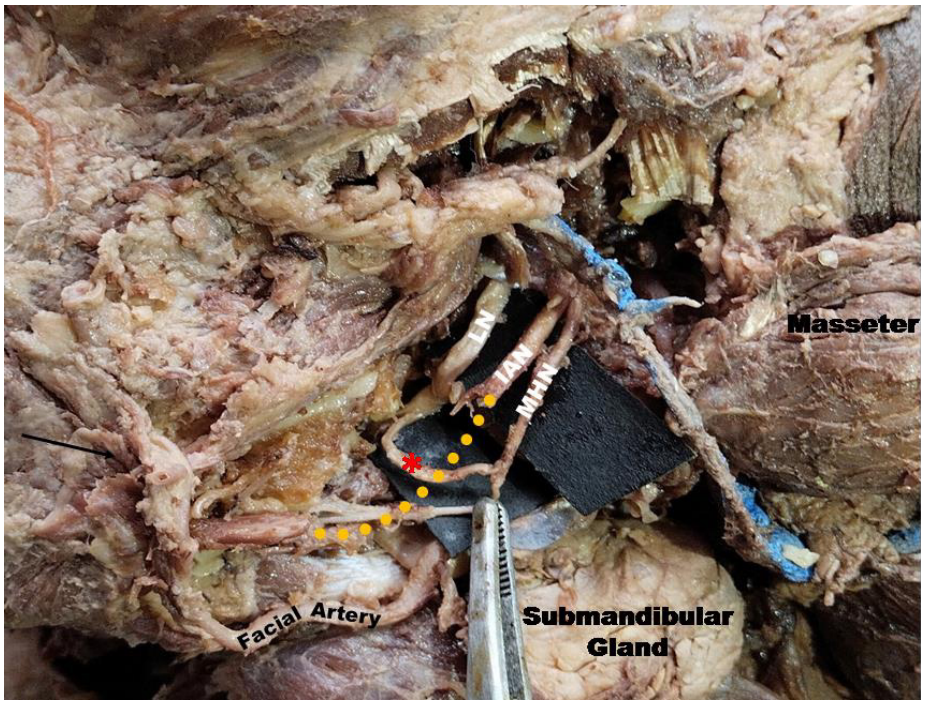

Figure 1. showing the nerve interconnection between MHN and LN (Asterisk *). LN- Lingual nerve, MHN- Mylohyoid nerve, IAN- Inferior alveolar nerve.

DISCUSSION

Previous studies have reported the incidence of neural interconnection between IAN and LN, justifying this communication as the cause for insufficient mandibular anesthesia (Kim et al.,2004). According to Kumar JM et al. (2021), the course of the lingual nerve could be studied under three distinct segments. The first segment extends from the root to the third molar tooth; the Second segment from the third molar tooth to the point where branches branch off to the submandibular ganglion; and the third segment from the end of the second segment to the point where it enters the tongue. We observed the communicating nerve loop in relation to the second segment of the LN.

Variation in the mylohyoid nerve might occur at the point of origin, along its course, or at the level of innervations. The MHN origin variant has been described in the literature. In 10% of instances, the MHN arises from the trunk of the mandibular nerve (Kumar et al., 2011), and in some instances, it arises as two roots, one root from the mandibular nerve and another from IAN (Nayak & Soumya, 2020). In addition to that, it may arise as a branch of the glossopharyngeal nerve or lingual nerve (Tubbs et al., 2016) as well as within the mandibular canal (Nayak and Soumya, 2020). It's possible that the inferior alveolar nerve can supply an additional MHN (Jha & Khorwal, 2018).

The nerve may take a variety of paths, including its passage through lingual foramina in the midline of the mandible. It may have a various course running in the mandibular canal and exiting through a foramen (Choi et al., 2019), it may pass through accessory foramen below premolars and end by supplying premolar teeth (Benett and Townsend, 2001) or communicate with the lingual nerve close to the digastric tendon (Sato et al., 2004). Innervations of MHN may differ in the following ways: 60% of patients may have premolar, canine, and incisor teeth that are innervated by this nerve

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(Heasman & Beynon, 1986). It may also innervate the submandibular gland (Varol et al., 2009) and the lower lip as cutaneous innervation (Benett & Townsend, 2001), as well as the skin of the submental region as Valentins nerve (Choi et al., 2019), and the mylohyoid muscle as duplicated innervation (Jha & Khorwal, 2018).

During our literature research, we discovered that the findings of one study suggested the presence of both motor and sensory neurons in MHN (Frommer & Monroe, 1972). Because of the aforementioned reason, a traditional inferior alveolar block may be inefficient in inducing mandibular anesthesia, as is evident in the current case report (Jha & Khorwal, 2018). The incidence of neural interconnection between MHN and LN may vary from 1.45% to 46.3%, in addition to a few case reports documenting them as isolated incidental cadaveric findings (Table 1). The highest incidence of this anomalous loop has been reported by Kameda et al. (46.3%) followed by Racz et al. (33.3%). The latter also coined the term sublingual curl for this loop.

nerve is susceptible to injury during tooth extraction and other dental procedures due to its proximity to the molar tooth (second part of LN). By providing additional innervation, this communication loop may function as a healing point for the lingual nerve once it has been injured (Racz Vl et al., 1981; Al-amery et al., 2016). As per a literature review, this communicating branch has a developmental basis and is implicated in coordinating tongue movements with suprahyoid muscles through proprioceptive impulses from the mylohyoid muscle to the lingual nerve.

Table 1. Incidence of interconnection between mylohyoid and lingual nerve in different studies

Authors, Year	No of specimens	Gender	Side	Incidence
Kameda et al., 1952	160 Specimens	-	-	46.3%
Racz et al., 1981	48 Specimens	-	-	33.3%
S Y Kim et al., 2004	32 Specimens	-	-	08%
Sato et al., 2004	413 Specimens	Male: 2 Female: 4	Bilateral	1.45%
Sandoval et al., 2009	01 cadaver	Male	Unilateral	Case report
Potu et al., 2010	01 cadaver	Male	Unilateral	Case report
Thotakura et al., 2013	36 Specimens	Male Female	Bilateral Unilateral	8.33%
Kaur et al., 2014	01 cadaver	Male	Bilateral	Case report
Sinha et al., 2014	01 cadaver	Female	Unilateral	Case report
Kumari S et al, 2015	01 cadaver	Male	Bilateral	Case report
Premakumari & Dnyaneshwar, 2018	40 Specimens	-	Bilateral	2.5
Jha & Khorwal., 2018	01 cadaver	Male	Unilateral	Case report
Present report, 2021	01 cadaver	Male	Unilateral	Case report

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CONCLUSION

Most neural interconnections involving the MHN and LN have been documented as case reports. Very few studies are available. Hence, more studies need to be carried out to elucidate the true incidence of the above said neural interconnection. This anatomical variety necessitates that surgeons and anesthesiologists who routinely perform oro-surgical interventions and nerve blocks in the face for various neuralgias enhance their knowledge and awareness to avoid unintended nerve injury.

REFERENCES

Al-amery, S. M., Nambiar, P., Naidu, M., & Ngeow, W. C. (2016). Variation in Lingual Nerve Course : A Human Cadaveric Study. PLOS one. 1–20. https://doi.org/10.1371/journal.pone.0162773

Behnia, H., Kheradvar, A., & Shahrokhi, M. (2000). An Anatomic Study of the Lingual in the Third Molar Region Nerve. J Oral Maxillofac Surg, 58, 649–651.

Bennett, S., & Townsend, G. (2001). Distribution of the mylohyoid nerve: anatomical variability and clinical implications. Australian Endodontic Journal, 27(3), 109-111.

Chan, H., Leong, D. J. M., Fu, J., Yeh, C., Tatarakis, N., & Wang, H. (2009). The Significance of the Lingual Nerve During Periodontal / Implant Surgery. J Periodontol. 81(3), 3–8. https://doi.org/10.1902/jop.2009.090506.

Choi, P., Iwanaga, J., Dupont, G., Oskouian, R. J., & Tubbs, R. S. (2019). Clinical anatomy of the nerve to the mylohyoid. Anatomy & cell biology, 52(1), 12-16.

Clark, S., Reader, A., Beck, M., & William, J. (1999). Anesthetic efficacy of the mylohyoid nerve block and combination inferior alveolar nerve block / mylohyoid nerve block. Oral Surgery Oral Medicine Oral Pathology. 557–563.

Frommer, J., & Monroe, C. W. (1972). T h e possible role of th e m ylohyoid nerve in m andibular posterior tooth sensation. J AM Dent Assoc, 85, 113–117. https://doi.org/10.14219/jada.archive.1972.0285

Heasman, P. A., & Beynon, A. D. (1987). Quantitative and spectrum analysis of human mylohyoid nerves. Journal of anatomy,151, 45.

Jha, S., & Khorwal, G. (2018). A rare case of accessory nerve to mylohyoid communucating with lingual nerve and its clinical implications. Int J Anat Res 2018, 6(3.2), 5550–5553. https://doi.org/10.16965/ijar.2018.279.

Kameda K. Uber den N. (1952). Mandibularis bei Japanern. Acta Anatomica Nigataénsia sectionis Anatomicae Universitais Niggataénsis. 28:1-24.

Kaur, H. S., Jit, S., Bajwa, S., Kalyan, G. S., & Singh, M. (2014). Bilateral communication between the mylohyoid and lingual nerves : Clinical implications. Archives of Medicine and Health Sciences. 2(27), 217–219. https://doi.org/10.4103/2321-4848.144345.

Kumar, J. M., Kaur, C. P., & Kumar, A. M. (2021). Lingual Nerve Course and Its Communication with Hypoglossal Nerve : Variations in Cadavers in Western India. International Journal of Health and Clinical Research. 4(5), 117–122.

Kumar, S., Kumar, C. J., Bhat, S., & Kumar, A. (2011). Anatomical study of the unusual origin of a nerve to the mylohyoid muscle and its clinical relevance. British Journal of Oral and Maxillofacial Surgery, 49(5), e14-e15.

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Kumari, Shobha;, Atulya prasad; Subratanag;, J. B. R. kumari. (2015). Unusual bilateral communication between the various branches of posterior division of mandibular nerve : its clinical significance. IOSR Journal of Dental and Medical Sciences, 14(8), 36–39. https://doi.org/10.9790/0853-14813639.

Nayak, S. B., & Soumya, K. V. (2020). Mylohyoid foramen of mandible: a rare exit point of intra-mandibular origin of nerve to mylohyoid. Anatomy & cell biology, 53(1), 114.

Potu, B. K., Silva, S. S. D., Thejodhar, P., & Jattanna, N. C. (2010). An unusual communication between the mylohyoid and lingual nerves in man : Its significance in lingual nerve injury. Indian J Dent Res. 21(1), 20–21. https://doi.org/10.4103/0970-9290.62792

Premakumari, C. R., & Dnyaneshwar. (2018). Variations in origin , course and distribution of lingual nerve : A cadaveric study. IJCAP. 5(3), 357–360. https://doi.org/10.18231/2394-2126.2018.0083

Racz VL, Maros T, Seres-Sturm L. (1981). Anatomical variations of the nervus alveolaris inferior and their importance for the practice. Anat Anz. 149:239-332.

Ren, M., & Mu, L. (2005). Intrinsic Properties of the Adult Human Mylohyoid Muscle : Neural Organization , Fiber-Type Distribution , and Myosin Heavy Chain Expression. Dysphagia, 20, 182–194. https://doi.org/10.1007/s00455-005-0015-z

S Y Kim., K S Hu., H Chung, & E W Le., H J Kim. (2004). Topographic anatomy of the lingual nerve and variations in communication pattern of the mandibular nerve branches. Surg Radiol Anat, 26, 128–135. https://doi.org/10.1007/s00276-003-0179-x

Sandoval, M. C., Lopez, F. B., & Suazo, G. . (2009). An Unusual Relationship Between the Inferior Alveolar Nerve , Lingual Nerve and Maxillary Artery. Int. j. Odontostomet, 3(1), 51–53.

Sato, I., Sunohara, M., Ueno, R., & Yoshida, S. (2004). Branch of Mylohyoid and Lingual Nerves on Submandibular and Submental Triangles.Okajimas Folia Anat. Jpn. 81, 45–48.

Sinha, P., Tamang, B. K., & Sarda, R. K. (2014). Communication between Mylohyoid and Lingual Nerve : An Anatomical Variation. JCDR. 8(4), 8–9. https://doi.org/10.7860/JCDR/2014/7560.4223

Thotakura, B., Rajendran, S. S., Gnanasundaram, V., & Subramaniam, A. (2013). Variations in the posterior division branches of the mandibular nerve in human cadavers. Singapore Med J 54(3), 149–151. https://doi.org/10.11622/smedj.2013051.

Tubbs, R. S., Shoja, M. M., & Loukas, M. (Eds.). (2016). Bergman's comprehensive encyclopedia of human anatomic variation. John Wiley & Sons.

Varol, A., Sencimen, M., Kocabiyik, N., Gulses, A., & Ozan, H. (2009). Clinical and anatomical aspects of possible mylohyoid nerve injury during genioplasties. International journal of oral and maxillofacial surgery, 38(10), 1084-1087.