Case Report

An anomalous neural interconnection between the Lingual and Mylohyoid Nerves

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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.
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 MHN 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.
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.
(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.

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


Case Report

Tidak ada data pasti tentang kejadian diabetes insipidus pada pasien dengan cedera otak traumatis pertama setelah cedera. Salah satu komplikasi dari cedera otak yang parah adalah diabetes insipidus.

Cedera otak berat traumatis adalah cedera fatal, dengan tingkat kematian hingga 50%. Sekitar 1,5 korban dari cedera otak berat meninggal dunia. Diagnosis diberikan pada pasien dengan cedera otak yang mengalami hipovolemia, polyuria, dan hipernatremia. Dalam kasus ini, pasien diperawati di Unit Intensif (ICU) selama 5 hari. Diabetes insipidus sering ditemui pada pasien dengan cedera otak, dengan prevalensi sebesar 1,5%.

Keywords:
Diabetes insipidus, brain injury, polyuria, hypovolemia, hipernatremia.

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