

## CLINICAL SIGNIFICANCE OF THE SUPPLEMENTARY INNERVATION OF THE LOWER TEETH: A DISSECTION STUDY OF THE LINGUAL NERVE

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*ABSTRACT: Clinical problems in obtaining complete anesthesia after inferior alveolar nerve block have led the authors to suspect that the lingual nerve plays a special role on the lower tooth sensation. A dissection study of the gingival branches of this nerve was undertaken to prove whether or not the assumption is correct. The results of this study indicate that a neural pathway via the lingual nerve is not available for the transmission of sensory information arising from dental structures.*

*KEY-WORDS: Tooth, innervation; lingual nerve; descriptive anatomy.*

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### INTRODUCTION

One of the explanations for clinical problems in achieving deep pulpal analgesia of the lower teeth is the supplementary nerve supply through the lingual nerve, which would be conveyed by accessory foramina on the lingual surface of the mandible<sup>3, 4, 5, 6, 7, 9, 13, 14, 17</sup>. This suspicion is somewhat reasonable, since it was once demonstrated that sensorial fibers of the mylohyoid nerve may enter the mandible through retromental foramina to supply the pulp of the incisors<sup>8, 19</sup>. However, a recent study failed to show terminal branches of the transverse cervical nerve entering the mandible as had long been supposed<sup>2</sup>. So, the accessory mandibular foramina may function as a portal of entry for supplementary innervation of some teeth, but they may also be merely nutrient canals.

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Anyway, the significance of these foramina relative to mandibular anesthesia keeps being the source of much speculation. The supposition that the lingual nerve also mediates sensory information from the mandibular teeth remains up to now. No studies have really shown the entry of this nerve into the mandible, but some clinical evidences reinforce the hypothesis. With this in mind, we undertook this study to provide a better account of the location of the gingival branches of the lingual nerve.

## **MATERIAL AND METHODS**

Thirty cadavers of adult individuals of both sexes, with their mandibles total or partially dentate, were examined with the aid of a dissecting microscope. They belonged to a dissection-room collection and were embalmed in a 10% formalin solution.

The heads were sawed on the mid-line to permit free access to the lingual nerve through the sublingual region of each hemi-head. The lingual nerve was traced in an anterior direction after recognition of its trunk just behind the last molar tooth. As the nerve coursed somewhat superficial across the floor of the mouth only the mucous membrane needed to be removed. For more accurate tracing of smaller gingival branches they were observed under x 25 magnification.

## **RESULTS**

After its downward course along the medial surface of the mandibular ramus, the lingual nerve enters the mouth between the medial pterygoid muscle and the ramus. In the posterior part of the oral cavity beneath the mucous membrane it is quite superficial. As it reaches the side of the tongue, it passes between the hyoglossus muscle and the submandibular gland. At this point a bunch of posterior gingival rami usually pass lateralward to reach the lingual gingiva of the lower molar teeth. While the main stem runs toward the tongue, where it splits into several branches, its sublingual ramus usually gives off numerous twigs to the gingiva of the rest of the lower teeth. Sometimes the proper lingual nerve trunk provides all the rami for the entire lingual gingiva.

Close inspection shows that the finer rami divide into the gum or pierce it to reach the periosteum. Some foramina were identified on the mandible, some of which were traversed by vessels. No passageway of branches from the lingual nerve through the foramina was observed in any instance.

## **DISCUSSION**

The old assumption that the lingual nerve may also provided fibers to the teeth remained for many years and was sometimes evoked in the decade<sup>4, 13</sup>. The presence of small foramina on the lingual plate of the mandibular body led the authors to judge that neural branches would enter the mandible through this via to be

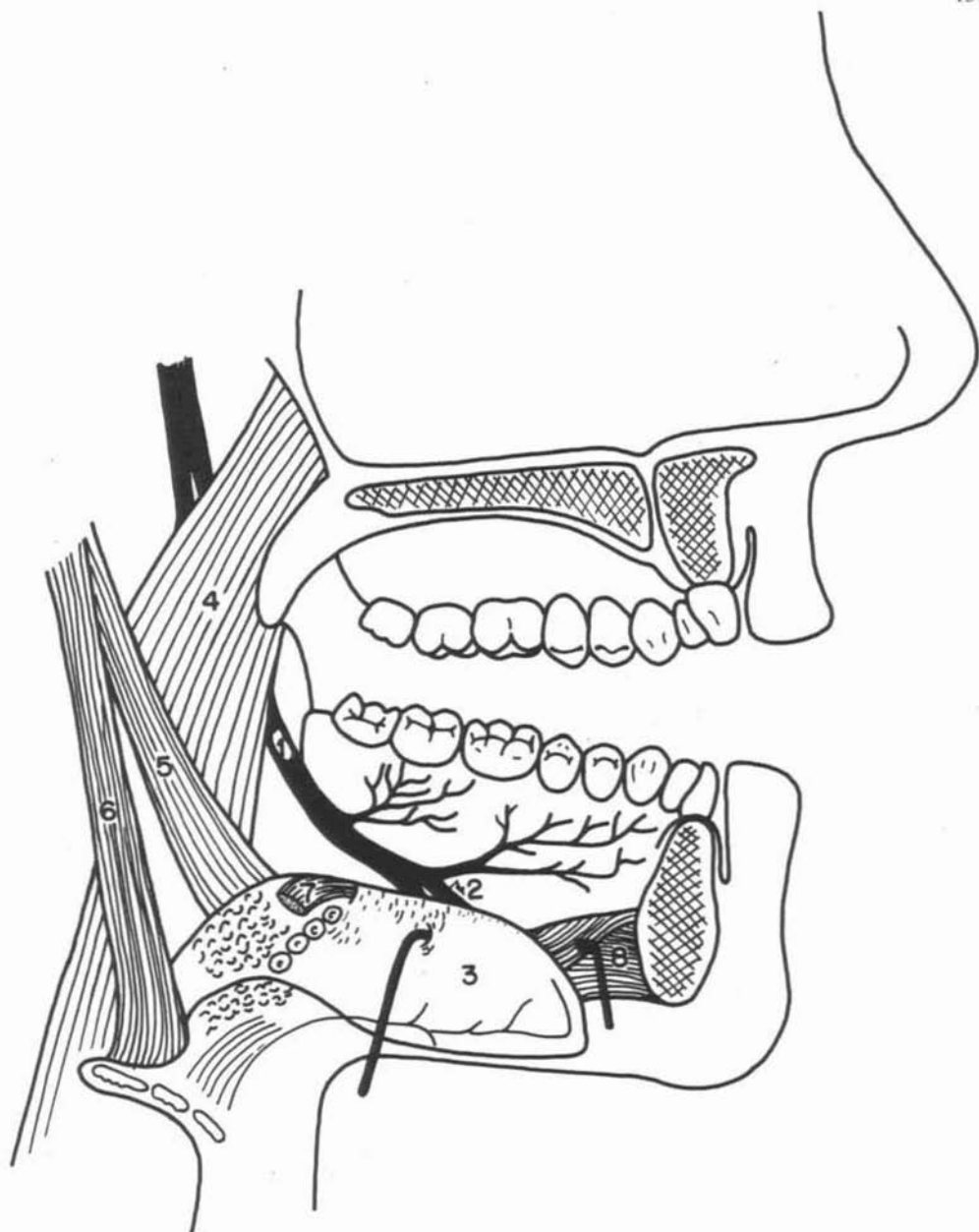


FIG. 1- Two bunches of gingival rami, one posterior one anterior, are given off both by the lingual nerve and the sublingual nerve.

1, lingual nerve; 2, sublingual nerve; 3, tongue; 4, medial pterygoid muscle; 5, styloglossus muscle; 6, stylopharyngeus muscle; 7, palatoglossus muscle; 8, genioglossus muscle.

distributed with the inferior alveolar nerve. This hypothesis was reinforced by clinical evidences in which accessory infiltration near the lingual plate of the mandible is sometimes effective as complementary anesthesia<sup>5, 14, 17</sup>.

In spite of these signs of supplementary innervation, it was demonstrated in this study that the lingual nerve is not one of the nerves involved. No previous studies have shown the entry of this nerve into the mandible through dissections. In fact, no special effort was made to find if it enters the mandible or not. The authors just judge to be possible its entrance but did not demonstrate it. For the other hand, arterial vessels have often been recognized entering the bone; they are subdivisions either of the submental or the sublingual artery<sup>1, 11, 12, 16, 18</sup>.

In some instance the anesthetic solution does not block effectively neural transmission of sensory stimuli from teeth when it is injected close to mandibular foramen. In a case like that, Stewart & Wilson<sup>17</sup> reported disappearance of residual pain through lingual nerve block at the point it reaches the floor of the mouth. Similar procedure following failure of the inferior alveolar block was described by Rood<sup>14</sup>. In his 79 cases of failure, a subsequent lingual nerve block showed to be effective to achieve freedom from pain in 2 cases. This odd circumstance is an unsolved problem because (1) routine inferior alveolar nerve injection must include the lingual nerve anyway and (2) innervation of the teeth from lingual nerve was dismissed by us. So, it remains enigmatic how the alternative injection was successful. Was the mylohyoid nerve providentially injected in the floor of the mouth? Was the occasional nerve of the retromolar foramen and canal<sup>10, 15</sup> blocked at this point? Did the anesthetic solution enter the mandible via vascular foramina and reach the inferior alveolar nerve, which had not been effectively blocked?

## CONCLUSION

The hypothesis that the lingual nerve participates in the supply of mandibular teeth in man, appears to be unfounded.

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MINARELLI, A. M. et al. Significação clínica da inervação suplementar dos dentes inferiores: estudo anatômico do nervo lingual. *Rev. Odont. UNESP*, São Paulo, v. 20, p. 137-142, 1991.

*RESUMO: Tendo em vista as opiniões divergentes, encontradas na literatura, sobre a possível participação do nervo lingual na inervação de dentes inferiores, foi proposta uma tentativa de esclarecimento da questão através de um estudo laboratorial. A distribuição anatômica do nervo lingual foi pesquisada em 30 cadáveres, através de dissecações sob lupa. Os resultados indicam que nenhuma ramificação penetra na mandíbula através dos chamados forames vasculares; portanto, a hipótese da participação do nervo lingual no suprimento de dentes parece estar descartada.*

*UNITERMOS: Dentes, inervação; nervo lingual; anatomia descritiva.*

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