

# A typical Communicating Pattern between Branches of Mandibular Nerve: Clinical Significance & Review.

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## ABSTRACT

The posterior division of the mandibular nerve is known to have three branches in the infra temporal fossa namely lingual, inferior alveolar and auriculotemporal nerves. These branches mainly innervate oral and temporomandibular structures like tongue, lower gingiva, mandibular bone, teeth, and part of the lower lip, chin and salivary glands. We describe a case with unusual communications between these branches. The knowledge of any unusual communications among these branches is highly significant due to the various treatment procedures undertaken in the region.

**Keywords:** lingual nerve, inferior alveolar nerve, auriculotemporal nerve.

## INTRODUCTION

Mandibular nerve, a mixed nerve, is the largest terminal branch of trigeminal. It exits from the skull through the foramen ovale, passing between tensor veli palatini and lateral pterygoid. It immediately divides into small anterior and large posterior trunk. Branches of the posterior division, namely lingual (L), inferior alveolar (IAN) and the auriculotemporal nerve (ATN), are important, as they innervate oral and temporomandibular structures involved in mastication, salivation, speech and taste sensations.<sup>[1]</sup>

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Infratemporal fossa houses the mandibular nerve and its branches. It is one of the areas for a lateral surgical approach to the base of the skull<sup>[2]</sup>, so the knowledge of any unusual communications among these branches is highly significant due to the various treatment procedures undertaken in the region.

## CASE REPORT

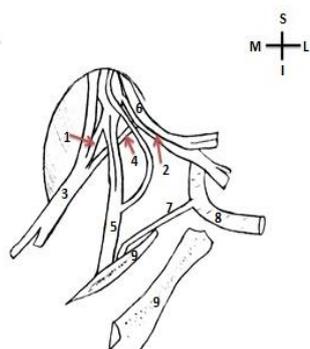
During routine dissection of the left infratemporal

region of seventy five year old male cadaver in Department of Anatomy, University College of Medical Sciences & Guru Teg Bahadur Hospital, Delhi, unusual communications between the branches of the posterior division of mandibular nerve was observed. For exposing the mandibular nerve and its branches, the muscles- temporalis and masseter, and the coronoid process of the mandible were dissected and reflected. While the buccal nerve was seen exiting between the two heads of lateral pterygoid, the lingual and the inferior alveolar nerve was seen to emerge under the lower border of the lateral pterygoid muscle. The inferior alveolar nerve also gave its usual branch to supply mylohyoid muscle before entering the mandibular foramen along with inferior alveolar vessels. On close inspection, after reflection of the lateral pterygoid muscle, communicating branches were observed between the IAN, LN and ATN. An anomalous medial communicating (1) branch was seen arising from medial aspect of the trunk of the inferior alveolar nerve. This nerve descended antero-inferiorly and medially to join the posterior aspect of the lingual nerve. The union of these nerves was proximal to the joining of chorda tympani to lingual nerve another variant lateral communicating (2) branch was observed arising from the lateral aspect of inferior alveolar nerve coursing postero-inferiorly and appeared to unite with ATN and subsequently separate from it. Together the ATN and 2 then entered the parotid gland. Another branch, AT (anomalous twig) arose from the IAN near its origin from the mandibular

nerve and rejoined the IAN in the mandibular foramen [Figure 1 & 2]. The right infratemporal region was normal.



**Figure 1:** A dissected specimen of left side head and neck region showing LN: lingual nerve, CT: chorda tympani, IAN: inferior alveolar nerve, ATN: auriculotemporal nerve, MA: maxillary artery and IAA: inferior alveolar artery. The Medial Communicating branch(1) between LN and IAN, and the lateral Communicating branch(2) between IAN and ATN are also observed.



**Figure 2:** Schematic representation of the dissected specimen of left side infratemporal fossa showing the: 1: Medial Communicating branch Lingual nerve, 2: lateral Communicating branch, 3: Lingual nerve, 4: Chorda tympani, 5: Inferior alveolar nerve, 6: Auriculotemporal nerve, 7: Inferior alveolar artery 8: Maxillary artery and 9: Cut edge of mandible.

## DISCUSSION

We report a unique and a rare case of anomalous communications between the inferior alveolar nerve and the two other sensory branches of posterior division of mandibular nerve- the lingual and auriculotemporal nerves. Communications between the IAN and LN, and IAN and ATN separately have been reported.<sup>[3]</sup> But we present a unique case where the IAN communicates with LN and ATN. Thotakura et al.<sup>[4]</sup> observed communication between the auriculotemporal and inferior alveolar nerve in two out of four specimens. Anil et al.<sup>[5]</sup> observed the communicating branch between

auriculotemporal nerve and inferior alveolar nerve in four specimens out of 32 specimens dissected. Communication between IAN and ATN are postulated to be roots of origin of ATN.<sup>[6]</sup> There are reports of ATN with as many as five root variants. The ATN in the present case has three roots of origin. Komarnitki et al.<sup>[6]</sup> also found a similar three roots variant of ATN to be present in one third of all adult and fetal specimens studied. Such roots, when found are postulated to convey postganglionic fibres from the otic ganglion to the IAN through the ATN.<sup>[7]</sup> Variations in the anatomy of ATN are particularly important in surgeries in the infratemporal fossa and dental anesthesia. Understanding of the variations of ATN has a role in explaining the mechanism of neuralgia<sup>[8]</sup> and migraine headaches.<sup>[9]</sup>

LN is known to communicate with IAN and its branch nerve to mylohyoid.<sup>[4,10]</sup> This anomalous communication may result in transfer of fibers between the nerves. It is well known that the variations in the branching pattern of the mandibular nerve frequently account for the failure to obtain adequate local anesthesia in routine oral and dental procedures, and also for unexpected injuries to branches of these nerves during surgeries. A thorough knowledge of the relevant anatomy is therefore important. The presence of such communicating nerves among the posterior division branches of the mandibular nerve is thought to serve as an alternative route for maintaining the functional integrity of the structures innervated by it.

Embryologically, the mandibular nerve and its branches are derived from the neural crest cells in the cephalic region.<sup>[11]</sup> The cells of the neural crest migrate ventrally through the mesoderm of the mandibular arch. This neural crest cell migration is inhibited by F-spondin and T-cadherin which are liberated from the caudal somites and may lead to variations in these nerves. Any inhibition of neural crest cells from normal migration is believed to be the reason for having abnormal branches of the mandibular nerve. The mobility of three nerves will be markedly restricted due to their communication. Present variation may add to some knowledge to the cranial base anatomy and in understanding complex clinical neuralgias affecting this region. Pain from a disease of mandibular tooth or tongue is referred to the distribution of auriculotemporal nerve.

## CONCLUSION

The knowledge of any unusual communications among these branches is highly significant due to the various treatment procedures undertaken in the region.

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