



NERVE TO LATERAL PTERYGOID AS A BRANCH FROM INFERIOR ALVEOLAR NERVE: A CLINICOANATOMIC PERSPECTIVE

Anatomy

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ABSTRACT

Surgeries of lower jaw entails a detailed knowledge of the anatomy and variations of structures present in the area. Inferior Alveolar nerve [IAN] is of paramount importance when it comes to instilling anaesthetics in dental surgeries involving the lower jaw. Variations of this nerve can result in a surgical mishap even in the hands of a skilled Surgeon. The present study describes anomalous branching pattern of inferior alveolar nerve encountered during routine dissection of head and neck region. The clinical and the embryological basis of the variation are discussed. Anomalous branching pattern as seen in the present case has an embryological explanation and are of crucial significance to dental surgeons and anesthetist in their clinical endeavors.

KEYWORDS

Inferior alveolar nerve, Lateral pterygoid, Nerve block

INTRODUCTION

Surgeries of base of the skull often necessitates lateral approach through the infratemporal region. [1]. Infratemporal region contains important neurovascular structures like mandibular nerve and maxillary vessels.

Mandibular nerve is a mixed nerve arise from trigeminal nerve as its third and inferior most division. Soon it gives rise to multiple branches through its two divisions. All branches except Inferior Alveolar nerve [IAN], are either purely motor or sensory in nature. IAN, a mixed nerve is of prime importance for dental surgeons as far as choice of nerve for giving anaesthesia in lower jaw surgery is concerned. Orientation regarding its abnormal branching pattern is a must to be able to appreciate the cause of failed treatment for trigeminal neuralgia and compression symptoms like tingling, numbness, regional pain and headache. Infact, Knowledge of normal and variant anatomy of the mandibular nerve and its branches is also crucial for maxillofacial surgeons to accomplish adequate and effective nerve block and also to seek insight into the complications following anaesthesia.

Present study attempts to report a variation in which an additional branch supplying the lateral pterygoid muscle was arising from the IAN. The clinico-anatomic relevance and embryological basis of the variation are discussed.

CASE STUDY

Routine cadaveric dissection session of the head and neck region in a 58 year old male in the department of anatomy, VMMC and Safdarjung Hospital, New-Delhi was performed with a lateral approach to Infratemporal region after resection of the ramus of the mandible. Dissection revealed an unusual branch from inferior alveolar nerve emerging just before IAN entered the mandibular foramen. This seemed to be an additional branch from IAN, which emerged proximal to the nerve to mylohyoid and was present bilaterally. It lay superficial to the lateral pterygoid and ran upward for around 3 cm on it. The nerve terminated by entering the lateral pterygoid muscle from its superficial surface. It was related to maxillary artery posteroinferiorly and lingual nerve anterosuperiorly [Fig 1].



FIG1: Right infratemporal region (Lateral view)

IAN: Inferior alveolar nerve, LP: Lateral pterygoid, M: Mandibular ramus, MN: Nerve to mylohyoid, *: Variant nerve

DISCUSSION

Anatomical knowledge of mandibular nerve and its branches is essential for diagnosis and treatment of maxillofacial disease.

The mandibular nerve descends from the cranial cavity to the uppermost part of the infratemporal fossa. It traverses the foramen ovale, where the sensory root joins the motor root to form a mixed nerve. Below the foramen ovale, the mandibular nerve divides into anterior and posterior divisions. **Anterior division** is principally motor to the muscles of mastication, and gives only one sensory nerve ie buccal nerve. The **posterior division** is predominantly sensory and gives rise to the auriculotemporal, inferior alveolar, and lingual nerves. [3]

The **inferior alveolar nerve** usually originates deep to lateral pterygoid muscle and courses inferiorly on the surface of medial pterygoid. After giving the mylohyoid nerve it courses within the mandibular canal. The inferior alveolar nerve is sensory to all of the lower teeth on that side where as the mylohyoid nerve follows a more medial course running along the mylohyoid groove on medial surface of mandible and ends by supplying mylohyoid muscle and anterior belly of digastric. IAN finally emerges from the mental foramen on the anterior aspect of the chin to supply the skin in that region. [3]

Literature reports the presence of numerous extraosseous [before entering mandibular canal] as well as multiple intraosseous branches [with in the canal] of the inferior alveolar nerve [4]. Presence of such variant branching pattern is of chief concern for the successful accomplishment of surgical procedures and anesthesia in dental and maxillofacial exercises [5]. Present study also depicts one such unique case where a variant recurrent branch originated from the alveolar inferior nerve before its entrance into mandibular foramen and terminated by entering in the lateral pterygoid muscle.

Neural variations of infratemporal region are explained by various theories such as abnormal migration of neuroblasts and myoblasts during embryogenesis [6] The mandibular nerve and its braches are embryologically, derived from the neural crest cells in the cephalic region which than migrate ventrally through the mesoderm of the 1st mandibular arch. This migration occurs under the influence of F-spondin and T-cadherin liberated from the caudal somites. Variable levels of these molecules resulting in inhibition of normal neural crest cell migration may lead to variations in these nerves. [7]. Basis this, possible reason for the recurrent variant branch seen in the present case could be attributed to aberrant or reverse migration of the neural crest cells.

Numerous variations concerning IAN, lingual nerve, auriculotemporal nerve have been reported so far [8]. Authors have observed the presence of various collateral branches during its infratemporal course [9, 10]. Such collateral branches may join anterior or posterior division of mandibular nerve. Usually these branches are associated with accessory mandibular foramina and mandibular canals [4]. Muralaedarhan, Veeramani and Chand [6], reported that during the absence of accessory foramina, such branches innervate the LPM and after supplying the following muscle it may terminate by even joining the main trunk of mandibular nerve, its divisions or any of its branches. Present case report depicts the absence of any accessory foramina in the mandible and the additional recurrent branch terminated by passing through the upper head of the LPM and supplying it.

Few authors [11] suggested that such variant nerve may carry of motor fibres and/or sensory fibres. They further suggested that infections and malignancies of pterygomandibular and infratemporal region might influence these variations.

Awareness about the normal as well as variant position, course and branches of the IAN is crucial for the appropriate local anaesthesia, dental treatments, oncology and reconstructive surgeries [12,13]. Any deviation from normal anatomy can lead to unanticipated iatrogenic injuries.

The knowledge of variation in branching pattern of inferior alveolar nerve marks its importance in various surgical interventions especially restorative procedures as the nerve & its branches are frequently used for local anesthesia. Dentist experiencing problem anesthetizing patient with a particular technique should perform detailed investigations using radiographs and other diagnostic tests as it could be because of variation in branches. Insufficient knowledge in this region can also lead to insufficient pain management

The inferior alveolar nerve block is most commonly used technique for local anesthesia while performing surgical and restorative procedures in the mandible. Hence anatomical variations that are commonly present should be emphasized while documenting them in the literature. When the failure of Halstead [conventional] technique of the IAN occurs, and Gow-Gates technique of nerve block is performed surgeon should take care of such variant branch if present as well, since these accessory nerve lies in the route of Gow-Gates and Vazirani-Akinosi techniques of the inferior alveolar nerve block & may get traumatized during the nerve block [14]

CONCLUSIONS

Anomalous branching pattern as seen in the present case has an embryological explanation and are of crucial significance to dental surgeons and anesthetist in there clinical endeavours.

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