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Analysis of various accessory foramina in mandible

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***Abstract*---**Introduction: The unnamed openings present in mandible are called accessory foramina. The distribution and importance of these foramina are variable, as they may serve as a conduct for nerve fibres or blood vessels. They may be important for dental surgeon and anaesthetists in performing complete nerve block and avoiding injury to the transverse get neurovascular structures. Materials & Methods: In the present study a total of 50 dry human mandibles of unknown sex and without any gross abnormality were collected from the Department of Anatomy, Saveetha Dental College, Chennai for evaluation. With the help of Vernier Calliper and Ruler, the measurements like the length, breadth and diameter of sacral hiatus will be measured. The results obtained were analysed, tabulated and represented graphically. Results: The Accessory foramina on the internal surface of the mandible was examined.Frequency of accessory mandibular foramen in 0.5mm is 40% ,in 1.0mm is 18%, in 1.5mm is 9%. Frequency of accessory mental foramen and frequency of accessory retromolar foramen in 0.25mm is 20% and 9% respectively.Conclusion: The accessory foramina transmitting during nerve block. The local anaesthesia given during dental extraction may become complicated as branches of nerve passing through these accessory foramen escapes the drug, immediately the branches of the blood vessels tend to hemmorrhage. This suggest to give additional local anaesthesia incase of incomplete mandibular nerve blocks.

***Keywords*---**mandibular foramen, accessory foramen, local anaesthesia, neurovascular structures, dental surgeons.

Introduction

The unnamed openings of the mandible are called accessory foramina. The importance and distribution of accessory foramina in mandible are variable, as they conduct many nerve fibres or blood vessels.[1] There are three types of accessory foramina in mandible. They are accessory mental foramina, accessory mandibular foramina and accessory retromolar foramina. Accessory foramina of the internal surface of the mandible were examined.[2] The Mental foramen is located between the inferior and alveolar margins of the body of the mandible and it is present between the premolars in a vertical line with the supra orbital notch.[3] Any foramen if additional to the mental foramen is known as the accessory mental foramina.[4] Accessory mental foramina is due to the branching of mental nerve before passing through the mental foramen.[5] They are very much important for all dental surgeon and anaesthetist for achieving complete nerve block and to point out the important neurovascular bundle passing through the mental foramen.[6]

Accessory mandibular foramen is used to be the site for the spread of tumours succeeding radiotherapy in the lateral surface of the mandible.[7] So the accessory mandibular foramen is very much essential for radiotherapists when organising for the radiation therapy in the lateral region of the mandible.[8] Accessory retromolar foramen is situated in the retromolar fossa of the mandible. The triangle depression between the temporal crest and anterior border of the ramus of the mandible is known as retromolar fossa. Accessory retromolar foramen is one of the most important non-metrical anatomical variants in the mandible.[9]

Any openings in the mandible other than the sockets of the teeth, mandibular foramina, mental foramina and lingual foramen are referred as accessory mandibular foramina.[10] Anatomical variations in the position of accessory foramen (AF) are very rare but variations in the number of mental foramina have been reported with more than one AF present on one or both sides of mandible. These additional foramina located in the vicinity of AF are termed as accessory mental foramina (AMF).[11] AMF are reported to be a rare anatomical variation and has been found to transmit myelinated nerves, one or more arterioles and venules.[12] The accessory mental nerve traversing the AMF is considered to be a branch of the inferior alveolar nerve and is distributed to the mucous membranes, the skin of the corner of the mouth, and the median labial region.[13] Although AMF have been reported earlier, literature regarding its incidence and topography is sparse. The aim of the study is to determine the precise location of the accessory foramen (MF) from various anatomical landmarks such as anterior, posterior borders of mandibular ramus, angle of mandible and from mandibular notch in an Indian population.

Materials and Methods

In the present study a total of 50 dry human sacrum bones of unknown sex and without any gross abnormality will be collected from the Department of Anatomy, Saveetha Dental College, Chennai for evaluation. Mandibles with either all the teeth intact or with preserved alveolar margins were examined with magnifying glass. The number, shape and orientation of accessory foramina in mandible were

determined by visual examination. The probes having diameter 0.25mm, 0.5mm, 1.0mm and 1.5mm were used to identify the morphometric values of accessory foramina in mandible. The study was done on both the right and left sides of the mandibles. Mandibles having marked deformities or asymmetric and fractured mandibles were excluded from the study. The results obtained were analysed, tabulated and represented graphically.

Results

The presence of various accessory foramina in mandible expressed in percentage (%) is shown in Table 1. Figure 1shows the presence of various accessory foramina in mandible like, Accessory Mandibular Foramen, Accessory Retromolar Foramen, Accessory Mental Foramen. Accessory foramina on the internal surface of the mandible were examined. Frequency of accessory mandibular foramen in 0.5mm is 40%, in 1.0mm is 18%, in 1.5mm is 9%. Frequency of accessory mental foramen and frequency of accessory retromolar foramen is 0.25mm is 20% and 9% respectively. The study was done on both the right and left sides of the mandible.

ACCESSORY FORAMINA IN MANDIBLE	0.25mm	%	0.5mm	%	1.0mm	%	1.5mm	%
Accessory mandibular foramen			20	40	9	18	3	9
Accessory mental foramen	10	20						
Accessory retromolar foramen	3	9						

Table 1: Shows the presence of various accessory foramina in mandible expressed in percentage (%).

Figure 1: Photographs showing the presence of various accessory foramina in mandible. (A) Accessory Mandibular Foramen; (B) Accessory Retromolar Foramen; (C) Accessory Mental Foramen.

Discussion

The passage of blood vessels and nerves makes the AMF clinically important. The embryological basis of the occurrence of the AMF has been described in the literature.[14] During development, initially there are three inferior alveolar nerves, which innervate each of the 3 groups of the mandibular teeth. Later, there is a fusion of these nerves and a single inferior alveolar nerve is formed.[15] Accessory mental foramen was observed in 20% of mandibles.[16] The commonest position was near the main mental foramen opposite the 2nd premolar and 1st molar. Knowledge will be helpful in preventing damage to the accessory mental nerve. Retromolar foramen was observed in 9% mandible. They performed the dissection of retromolar canal in Japanese cadavers and found that the artery running within the retromolar canal was a branch from the inferior alveolar artery. It ran forward through the canal and joined the branches of the buccal and facial artery.[17] The nerve in the retromolar canal was a branch from the trunk of incidence and position of accessory foramina should be considered to avoid nerve damage and incomplete nerve blocks in various surgical procedures. These foramina may also be used to give additional locoregional anesthesia in case of failed mandibular blocks. Knowledge of the commonest positions will be beneficial for oncologists and oromaxillofacial surgeons in planning graft implants.The cancellous nature should be kept in mind to avoid damage to the neurovascular bundle passing through the retromolar foramen during routine anesthetic, surgical, and implantation procedures of the mandible.[18]

Alma Voljevica, Elvira Talovic conducted a study on morphological and morphometric analysis of the shape, position, number and size of mental foramen on human mandibles. The study showed that bilateral mental foramina were presented in all 150 mandibles. In the majority of mandibles, the MF was located between the first and second premolar (20.3%) or on the level of the root of the second premolar (60.3%), midway between the inferior margin and the alveolar

margin of the mandible. Most of the mental foramina were oval in shape (83.3%). An AMF was present in four mandibles (2.7%) on the right side.[19,20]

Conclusion

Macroscopic observations revealed that presence of accessory foramina in most of the investigated mandibles. The anatomical variability of incidence in positions of accessory foramina should be considered as they may be used to give additional local anaesthesia. In conclusion, it can be stated that macroscopic observations revealed the presence of accessory foramina in most of the investigated mandibles. The anatomical variability of incidence and position of accessory foramina should be considered to avoid nerve damage and incomplete nerve blocks in various surgical procedures. These foramina may also be used to give additional locoregional anesthesia in case of failed mandibular blocks. Knowledge of the commonest positions will be beneficial for oncologists and oromaxillofacial surgeons in planning graft implants.

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