

Morphometric Analysis of Accessory Mental Foramen in Human Dry Mandibles

Dr. Muna Kadel,¹ Dr. Bishwo Prachanda Sedhain²

¹Department of Clinical Anatomy, KIST Medical College, Lalitpur, Nepal;

²Department of Oral and Maxillofacial Surgery, Samaj Dental Hospital, Kathmandu, Nepal

Correspondence:

Dr. Muna Kadel. Email: muna997@hotmail.com

ABSTRACT

Introduction: Mental foramen is a small opening located bilaterally in the anterolateral aspect of mandible which transmits mental nerve and vessels. Additional foramina located in the vicinity of mental foramen are termed as accessory mental foramina. The knowledge about their presence is useful to avoid post-operative complications (bleeding and sensory disturbances) during implant placement and other dental procedures.

Objective: To establish the incidence, location, shape of accessory mental foramina, and its relation to mental foramen.

Materials and Method: One hundred human dry mandibles of unknown age and sex were selected randomly. Incidence, shape, location and distance of accessory mental foramina with respect to mental foramen were determined.

Result: Out of 100 mandibles (200 sides), accessory mental foramina were present in seven (7%) mandibles with variable locations, mainly below the mesial root of first molar was seen in three (42.85%) mandibles, followed by below second premolar in two (28.6%) mandibles. The accessory mental foramina were round in shape in most of the mandibles (5, 71.42%). Mean distance of AMF from mental foramen was 7.29 mm.

Conclusion: The knowledge about incidence and location of accessory mental foramina guide the surgeon to develop safe technique to avoid injury to the neurovascular bundle.

Keywords: Accessory mental foramen; accessory mental nerve; dental implant; mental foramen; mental nerve; Nepal.

INTRODUCTION

Mental foramen (MF) is a small opening located bilaterally in the anterolateral aspect of mandible. It transmits mental nerve and vessels.¹ After emerging from the mental foramen, the mental nerve splits into three branches which innervate skin of the chin and that of the lower lip. More than one MF may be present on one or both sides of mandible. These additional foramina located in the vicinity

of MF are termed as accessory mental foramina (AMF).² Separation of mental nerve before the formation of mental foramen can be a reason for the formation of accessory mental foramen.³ AMF transmit either the accessory mental nerve, which is a branch of inferior alveolar nerve, or one of the branches of mental nerve.⁴ Supplementary blood vessels and nerves passing through AMF is important for various dental procedures like administration of local anaesthesia, dental implant

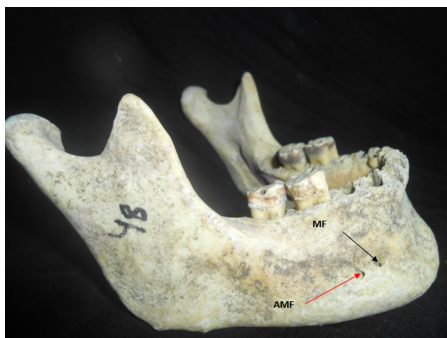


Figure 1: Mental foramen and accessory mental foramen.



Figure 2: Mental foramen and accessory mental foramen.



Figure 3: Measuring the distance between MF and AMF.

placement, etc. The knowledge about their presence can be used to avoid post-operative complications (haemorrhages and sensory disturbances) during implant installations and other dental procedures.⁵⁻⁷ This study deals with the study of morphometric parameters of AMF in detail for the first time in Nepalese population.

MATERIALS AND METHOD

This is a cross-sectional and multicenter study, which was conducted in the Department of Anatomy, KIST Medical College and Maharajgunj Medical Campus, Kathmandu in 100 dry human mandibles of unknown age and sex for a period of one year. Study was conducted after taking ethical clearance on date 31st march 2015 with IRC No: 0053/2014/15 from institutional review committee, the Head of the Department of Anatomy and other concerned authorities of both institutes. Sample size (n) was calculated by using following formula by Kish Leslie for cross sectional studies: $n = z^2 * p(1 - p)/d^2 = 86.08 = 87$

Where $z = 1.96$ (at level of confidence of 95%, $z = 1.96$); $p = 8.85\%$; $d =$ tolerated margin of error within 6%.

Hence, 100 human dry mandibles were included in sample size. All the samples were stored in a well-ventilated and dry condition for about five years. Bones were found clean without any damage. Mandibles were selected by simple random sampling method by using lottery method. Mandible of children whose mental foramen is near to the inferior border and that of old age with resorbed alveolar crest were excluded. The presence, location, shape of AMF, and its relation to MF were studied by visual examination (Figure 1, 2). The distance of AMF from MF was measured by digital vernier caliper at a measuring accuracy of 0.001 mm (Figure 3).

RESULT

Out of 100 mandibles (200 sides), AMF was present in seven mandibles (7%). Out of seven mandibles, three AMF were present on the right and four on the left side. Interestingly, none of the mandibles had bilateral accessory mental foramen. In this study, AMF in each mandible showed a variable location (Figure 4). They were observed mainly below the mesial root of first molar was three (42.8%), below second premolar was two (28.6%), between the first and second premolar was one (14.3%) and below canine was one (14.3%)

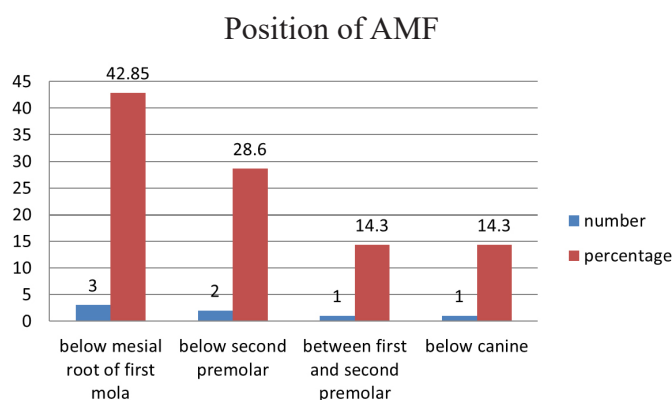


Figure 4: Position of accessory mental foramina.

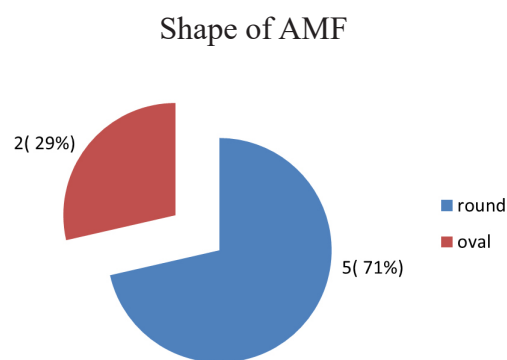


Figure 5: Pie chart showing shape of AMF.

Location of AMF in relation to MF

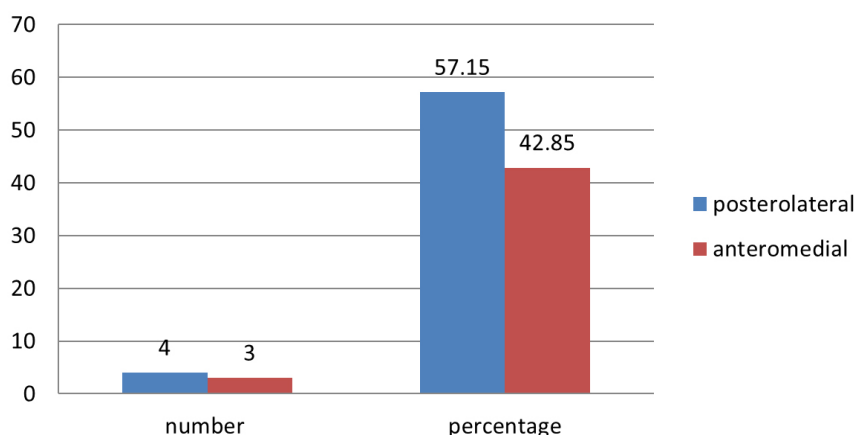


Figure 6: Location of accessory mental foramen in relation to mental foramen.

below canine was one (14.3%). The AMF was round in shape in five mandibles (71.42%) and oval in the rest (Figure 5). AMF were located either posterolateral in four (57.15%) mandibles or anteromedial in three (42.85%) mandibles in relation to mental foramen (Figure 6). Distance of AMF from mental foramen ranged from 1 mm to 12.5 mm with mean value 7.29 mm (SD=3.19 mm).

DISCUSSION

Single MF is present bilaterally in human mandibles. If it is more than one, then termed as AMF. These AMF are usually smaller in comparison to the MF and are located in the vicinity of MF.⁷ Failure to identify and protect AMF and structures passing through it may be the reason for failure to achieve an adequate level of mental nerve anaesthesia and neurosensory disturbances.⁸ AMF is a rare anatomical variation with the incidence ranging from 1.4% to 10%.⁹ Incidence of AMF is found to be variable in different populations (1.5% in Russians, 2.6% in French, 2.8% in Israeli population, 3% in Hungarians, 3.3% in Greeks, 3.6% in Egyptians, 4% in American Whites, 5.7% in American Blacks, 9.7% in Melanesians, and 12.5% in Polynesians and 8.85 in south Indians) with highest incidence in Negroes and Maori males.^{2,10,11} Present study showed the incidence of AMF is 7%.

In this study AMF were located more on left side than on right side which was similar to the findings of Rajkohila et al, Singh et al.^{2,12} The most common position of AMF was below the first molar which was supported by the findings of Singh et al and

Katikireddi et al.^{12,13} It has been reported earlier that most of AMF are located posterolaterally from MF which was in accordance to the findings of this study.^{14,15} The location of AMF in relation to MF might influence the planning of rehabilitating treatment since its presence would interfere with the dental implant procedures.¹⁶ Similar to the study of Zmysłowska et al, this study also showed none of the mandible with bilateral presence of AMF.¹⁷ In this study, the mean distance of AMF from MF was 7.29 mm which was similar to the study of Naitoh et al.¹⁵ Sample size of this study was limited due to the less availability of human dry mandibles.

CONCLUSION

The present study adds information to the literature concerning the incidence, location and morphology of accessory mental foramen in Nepalese population. Incidence of AMF is 7% and mainly found posterolateral to the mental foramen. The clinicians should be aware of the probability of existence of this AMF during any surgical procedures involving the mandibular region.

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