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INCIDENCE OF ACCESSORY MENTAL FORAMEN IN MANDIBLE AND ITS CLINICAL SIGNIFICANCE.

Anatomy

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ABSTRACT

Background: Accessory mental foramen (AMF) is addition foramen present in the body of the mandible in addition to mental foramen. The accessory branch of mental nerve passes through it. Since many surgical procedures in oral and maxillofacial surgeries involve mental region, so knowledge of its anatomical variation is very important for the surgeon. The aim of this study was to find the incidence, location, and morphology of AMF.

Material and Methods: Study was carried out on 50 (33 male, 17 female) adult dry mandible of North Indian population in the Department of Anatomy, AIIMS Patna. Incidence, morphology and topographical relation to the teeth of the mandible and mental foramen were noted.

Result: Incidence of AMF was 10 %, all foramen were round in shape, and Average size of AMF was 1.36mm. AMF lies 3.07mm away from mental foramen. On the right side, the most common position of AMF is antero-inferior to mental foramen. The most common position of AMF in relation to mandibular teeth on the right side was below the apex of 1st premolar in all cases while on the left side it was situated below the apex of 2nd premolar in 75%, and in between the 1st and 2nd premolar in 25% cases.

Conclusion: Knowledge of AMF will help the anaesthetist for complete nerve block and also for surgery in the mandibular region to prevent mental nerve injury.

KEYWORDS

Accessory mental foramen, Incidence, Mandible, Mental foramen.

Introduction

A small foramen situated in the anterolateral aspect of the body of the mandible is known as mental foramen. The mental foramen, from which the mental neurovascular bundle emerges, lies below either the interval between the premolar teeth or the 2nd premolar tooth, midway between the upper and lower borders of the body.[1]The mental foramen is usually single in human when it is double or multiple, the additional foramen is termed accessory mental foramen (AMF). An accessory mental foramen is reported to be rare, with a prevalence ranging from 1.4 to 10 %.[2,3,4]. The mental nerve separates into several fasciculi at the 12th gestational week and the mental foramen is incompletely developed at that time. It has been suggested that separation of the mental nerve earlier than the formation of the mental foramen could be a reason for the formation of the accessory mental foramen.[5]. Accessory mental foramen transmits the accessory branch of the mental nerve during dental surgery local anaesthesia is given near mental foramen, so knowledge of AMF will be helpful to achieve complete anaesthesia. The knowledge will also prevent injury of an accessory mental nerve during the surgical procedure such as mandibular rehabilitation after trauma or tumours and other oral and maxillofacial surgery.

Aim and objective

To find the shape, size, and incidence of the accessory mental foramen. Knowledge of incidence, location, and morphology of accessory mental foramen is important to prevent neurovascular injury during anaesthetic procedure, oral and maxillofacial surgery.

Material and Methods

The study was conducted in 50 adult dried mandibles of which 33 were males &17 were females gender differentiation was done by examining the angle of the mandible in the Department of Anatomy AIIMS Patna. Inclusion criteria were human mandible and complete mandible. Exclusion criteria were deformed and broken mandible.
Following Parameter were observed:

- Shape, Side, Diameter and Location and its relation to mandibular teeth.
- Relation and Distance between AMF and MF.
- The distance of AMF from various bony landmarks i.e. from symphysis menti, the Posterior margin of the ramus of mandible, Alveolar crest, and base of mandible.

All parameters were measured by digital Venire caliper (range: 0 – 150mm, accuracy: 0.03 mm) reading was taken 3 times and mean were taken to increase the reliability of the result.

Observation

Out of 50 mandibles, AMF was present in 5 mandibles so the incidence was 10%. It was unilateral in 8% mandibles out of which in 6% it was on the left side while in 2% cases it was on the right side and bilateral in2% cases. The shapes of all the foramen were round. The average size of AMF was 1.36mm ranging from 0.99 mm –1.78mm. Mean distance of AMF from MF was 3.07mm ranging from 1.42 mm –5.04 mm.

Figure 1: Showing AMF on left side.

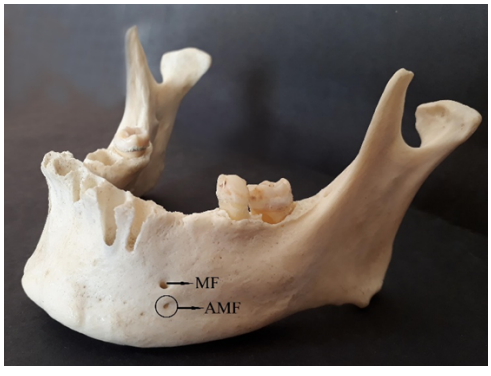


Figure 2: Showing AMF on Right side.

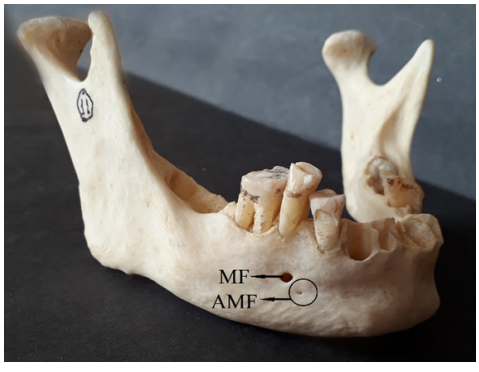
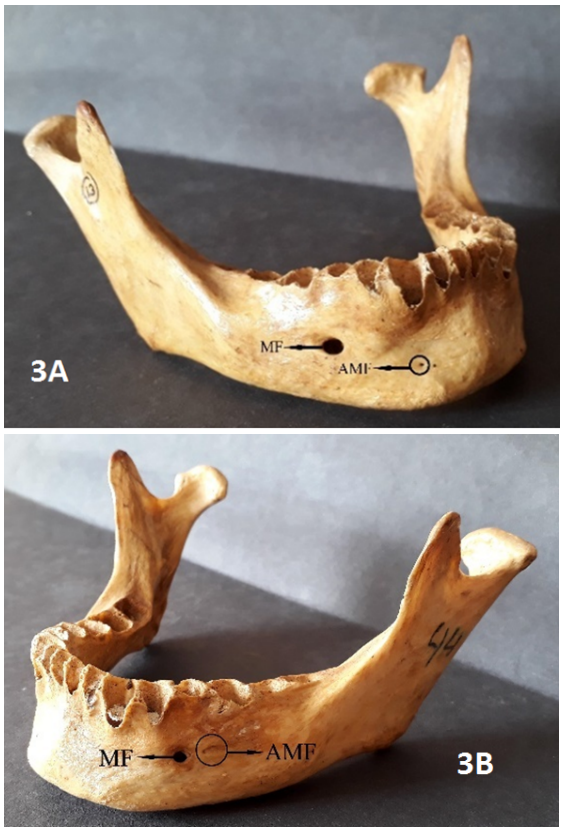


Figure 3A & 3B: Showing Mandible with Bilateral AMF.



Location of AMF in relation to mandibular teeth: On the right side, all AMF were situated below the apex of the first premolar. On the left side 75% AMF was situated below the apex of the second premolar, and in 25% cases situated in between the apex of first and second premolar teeth.

Location of AMF in relation to Mental Foramen: On the right side, 100% of AMF were present antero-inferior to mental foramen and on the left side, AMF was situated inferior to mental foramen in 25 %, superior in 25%, posterior in 25% and postero-inferior in 25% of the mandible.

Table 1: Showing Location of AMF with various bony landmarks

Parameters	Symphysis menti (mm)	Post. Margin of ramus of mandible (mm)	Alveolar Crest (mm)	Base of Mandible (mm)
Range	21.52 – 28.61	60.29 – 69.82	6.64 – 19.09	9.07 – 18.83
Mean	26.33	65.90	12.75	11.7
SD	2.83	4.32	4.69	4.63
S.E of mean	1.26	1.93	2.09	2.07

Discussion:
The incidence of accessory mental foramina was varied in different populations in the world. The lowest frequency of AMF was found in American Whites (1.4%) and Asian Indians (1.5%) on the contrary highest incidence of AMF was observed in African – Americans (5.7%) and Nazsa Indians (9%) by Sawyer et al[6]. Knowledge and awareness of AMF are very essential For anesthetist and surgeons for complete nerve block and to avoid intra-operative and post-operative complications.Boronat Lopez et al[7] mentioned the AMF as one of the factors implicated in regional anaesthesia failure.

Yamaguchi[8] stated that human mental foramen is incomplete until the 12th gestational weak when the mental nerve separates into several fasciculi at that site. The region for the formation of AMF is considered to be an earlier separation of mental nerve rather than the formation of mental foramen.

Table 2: Showing Incidence of Accessory mental foramen observed by different authors:

S.N	Authors	Mandible (n)	Population	Incidence
1.	Present study	50	North Indian	10%
2.	Suman et al(2017) [9]	60	South Indian	6.5%
3.	Katikireddi et al (2016)[10]	100	South Indian	2%
4.	Gupta Set al(2012)[11]	120	Gujarat	6.6%
5.	Kalendra et al(2012)[12]	193	Turkish	6.5%
6.	Singh et al (2011) [13]	100	Lucknow	13%
7.	Naitoh et al(2009) [5]	157	Japan	7%
8.	Katakami et al (2008)[14]	150	Japan	10.6%
9.	Al–Khateeb et al (2007)[15]	860	Jordanian	10%

Incidence reported from Indian population is varying from 2%- 13%. The incidence of AMF in our study is 10% which is nearer to the incidence found by Katakami et al (10.6%) [14] and Al-Khateeb et al (10%)[15], It was more than the incidence observed by Katikireddi et al(2%)[10]. The incidence of bilateral accessory mental foramen was 2% in the present study which agrees with the finding of Katikireddi et al[10].

The shape of all the AMF was round which is well correlates to the finding of Suman et al[9],Katikireddi et al[10], Paraskevas et al[16] and Singh et al[13].

Table3: Showing Sidewise comparison of incidence of AMF

S.N.	Authors	Sidewise incidence of AMF (%)	
		Right	Left
1.	Present Study	4	8
2.	Suman et al (2017)[9]	4.91	3.27
3.	Gupta et al(2012)[11]	4.16	2.50
4.	Singh et al (2011) [13]	5	8

In the present study incidence of AMF was more on the left side than on the right side. This was in contrast to the finding of Suman et al[9] and Gupta et al[11] but in accordance with the result of Singh R et al[13].

The mean diameter of AMF in the present study was 1.36mm which is close to the finding of Suman et al(1.74mm)[9], Paraskevas et al (1.09mm)[16], Kalendra et al (1.5mm)[12], Gupta et al(1mm)[11]and Singh et al(1mm)[13].

The Position of AMF in relation to various landmarks:
Toh et al[17] in their dissection based study found that the Accessory mental nerve communicated with the branches of facial and buccal nerve.

Distribution of accessory mental foramen was found to be different in three cadavers and it was found that it innervated the gingiva of molar tooth region, the mucous membrane, and skin of the corner of the mouth and the middle area of the lower lip. The different distribution of accessory mental nerve may be related to the position of AMF. The position of AMF is highly variable. Studies which determine the position of AMF in a relation to teeth of the mandible or the mental foramen show wide range of outcome. Very few data are available on the location of AMF in Indian population.

The Position of AMF in relation to teeth of mandible
In the present study all the AMF on the right side was situated on the body of mandible on the longitudinal axis of 1st premolar (100%), on the left side 75% were situated on the body of mandible on the longitudinal axis of 2nd premolar and 25% were between 1st and 2nd premolar.

Which is contrary to the finding of Suman P et al[9] in her study observed that on the right side most common position was below the apex of 2nd premolar (66.67%), followed by 1st molar (33.33%). On the left side it was situated on the body of mandible on the longitudinal axis of 1st molar (50%) and 2nd premolar in (50%) cases.

Singh R et al[13] observed that in all case on right side AMF present in between the 1st and 2nd premolar. On left side, most common location was below the apex of 1st premolar (100%).

None of the result matches with the present study.

The Position of AMF in relation to mental foramen:
In the present study 33.33% cases AMF has situated antero-inferior to

the mental foramen. It was inferior to mental foramen in 16 .67 %, superior in 16 .67% inferior in 16 .67%, posterior in 16 .67 % cases.

Katakami et al [14]in his study observed that branching and length of accessory mental nerve affect the position of AMF. He also found the most common position of AMF in relation to mental foramen was posterior and inferior.

In the present study average distance between AMF and MF was 3.07 mm which was near to the finding of Imada et al (4mm)[18], Gupta S et al(4mm)[11] and Toh et al (2.83mm) [17]. It was more than the result of Singh R et al (0.67mm)[13] and less than the Naitoh et al (6.3mm)[5].

Position of AMF in relation to peripheral mandibular landmarks

Position of AMF from Symphysis menti was 26.33 mm in present study as compared to 28.6 mm found by Suman P et al [9]. The distance of AMF from posterior border of ramus as well as from base of mandible was almost equivalent to that found by Suman P et al [9]. The distance from alveolar crest was less as compared to result of Suman P et al [9]. These measurements provide an alternative way to locate AMF on the body of the mandible.

Conclusion: Study of the incidence of accessory mental foramen is very important to localize the important neurovascular bundle passing through the mental foramen and accessory mental foramen. Knowledge of accessory mental foramen is important during anesthetics and surgical procedures involving mandibular region. Pre-operative detection of AMFs may reduce the rates of postoperative pain and paraesthesia in surgical procedures.

Conflict of interest: none.

REFERENCES

1. Standring S, Collins P, Healy JC, Wrigley C et al.(2008). Infratemporal and pterygopalatine fossae and temporomandibular joint. In Standring S. Gray's Anatomy, The anatomical basis of clinical practice (40th ed., pp. 527-546). Churchill Livengstone, Elsevier.
2. Igarashi C, Kobayashi K, Yamamoto A, Morita Y, Tanaka M. Double mental foramina of the mandible on computed tomography images: a case report. Oral radiol. 2004;20:68–71.
3. Cagirankaya LB, Kansu H. An accesory mental foramen: a case report. J Contemp Dent Pract. 2008;9(1):98–104.
4. Kieser J, Kuzmanovic D, Payne A, Dennison J, Herbison P. Patterns of emergence of the human mental nerve. Archives of Oral Biology. 2002;47:743–747.
5. Naitoh M, Hiraiwa Y, Aimiya H, GotohK, Ariji E. Accessory mental foramen assessment using cone-beam computed tomography. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2009; 107(2): 289-294.
6. Sawyer DR, Kiely ML, Pyle MA. The frequency of accessory mental foramina in four ethnic groups. Arch Oral Biol. 1998;43:417-420.
7. BoronatLópez A, Peñarrocha Diago M. Failure of loco regional anesthesia in dental practice: review of the literature. Med Oral Patol Oral Cir Bucal 2006; 11(6):E510-513.
8. Yamaguchi K. Development of the mental and its adjacent area and their histological studies. Report 2. The mid embryological stage and the latter embryological stage.1959 Shikwa Igaku 22:296-312(in Japanese)
9. Suman P , Singh S , Mahato RK . Accessory Mental Foramen-An Anatomical Variation Mental Foramen in Human Mandibles. National Journal of Basic Medical Sciences 2017;7 (4):209 -214.
10. Katikireddi RS, Setty SNRS.Incidence of accessory mental foramen in south Indian adult dried mandibles. International journal of Anatomy and research, 2016; 4(1):1916-1918.
11. Sumit Gupta, Jagdish S. Soni Study of anatomical variations and incidence of mental foramen and accessory mental foramen in dry human mandibles National journal of medical research 2012; 2(1): 28-30.
12. Kalender A ,Orhan K, Aksoy U. Evalution of the mental foramen in Turkish patients using cone beam computed tomography images reconstructed from volumetric rendering program .2012 ; Clin Anat 25 : 584- 592.
13. Singh R, Srivastav AK. Evaluation of position, shape, size and incidence of mental foramen and accessory mental foramen in Indian adult human skulls. International Journal of Exp & clinical Anat 2011;5:23-29.
14. Katakami K, Mishima A, Shiozaki K, Shimoda S , Hamada Y, Kobayashi K. Characteristics of accessory mental foramina observed on limited cone beam computed tomography images.2008;34:1441- 1445.
15. Al- Khateeb T, Al –Hadi Hamasha A, Ababneh KT .Position of mental foramen in northern regional Jordanian population. 2007; 29:231- 237.
16. Paraskevas G, Mavrodi A, Natsis K. Accessory mental foramen: an anatomical study on dry mandibles and review of literature. Oral Maxillofac Surg. 2015;19(2):177-181.
17. Toh H, Kodama J, Yanagisako M, Ohmori T. Anatomical study of the accessory mental foramen and the distribution of its nerve. Okajimas Folia Anatomy Japan.1992; 69(2-3): 85-88.
18. Imada TS, Fernandes LM, Centurion BS, de Oliveria – Santos C, Honorio HM, Rubira – Bullen IR.Accessory mental foramen : prevalence ,position and diameter assessed by cone beam computed tomography and digital panoramic radiograph. Clin Oral Implants Res 2014;25: 94-99.