



ORIGINAL RESEARCH PAPER

Anatomy

STUDY OF PRESENCE OF ACCESSORY INFRAORBITAL FORAMEN (AIOF) IN DRY HUMAN SKULLS OF NORTH INDIAN POPULATION

KEY WORDS: Infraorbital Foramen, Accessory Infraorbital Foramen, Skull.

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ABSTRACT

Introduction -IOF is a constant feature on the anterior surface of body of maxilla below the orbital margin. Infraorbital nerve (ION) & vessels pass through it .IOF assumes great importance in the field of Maxillo- facial surgery & dentistry as ION is anaesthetised during these procedures.

Aims & Objective: Presence of accessory IOF affects the process of nerve block as a branch of the nerve, may pass through it. Hence a study was conducted to determine the presence of accessory IOF.

Method: The study was conducted in Department of Anatomy, G.S.V.M. Medical College, Kanpur.300 macerated dry adult human skulls of north Indian population belonging to both sexes were selected. Numbers of accessory IOF was determined by direct inspection.

Result: The present study found 10.7% of skulls have accessory IOF.

Conclusion: Thus knowledge of presence of Accessory IOF plays an important role in nerve block which, if ignored, would result in anesthetic failure & injury to nerve.

INTRODUCTION

Infraorbital Foramen (IOF) is a constant feature on the anterior surface of body of maxilla present bilaterally 0.5 to 1 cm. below infraorbital margin (1,2).

Infraorbital artery which is a branch of third part of Maxillary artery exits through IOF. Its branches mainly supply structures in maxillary region.

Infraorbital nerve is a continuation of Maxillary nerve, second division of Trigeminal nerve (3,4) . The terminal branches of Infraorbital nerve leave the infraorbital foramen. These supply skin of lower eyelid, conjunctiva, lateral surface of external nose, cheek and upper lip including skin, mucous membrane and gum (3,4,5,6,7,8,9,10).

The morphometry of IOF plays an important role during regional block anaesthesia techniques of Infraorbital nerve (11,,12,13,14) and nerve block during surgical procedures around it.

Another foramen referred to as Accessory Infraorbital Foramen (AIOF) may be present close to IOF (3,4,5,6,7,8,15,9,10).The frequency of AIOF is between 2.2 to 18.2% (16,17,18,19,20,21,22,7,8,23,24).

A branch of Infraorbital nerve may pass through it. This fact should be taken into consideration during surgical intervention. If ignored, it may result in injury to nerve and failure of anaesthesia and nerve block.

AIMS & OBJECTIVES

A branch of Infraorbital nerve may pass through AIOF. This fact should be taken into consideration during surgical intervention. If ignored, it may result in injury to nerve and failure of anaesthesia and nerve block.

Thus, a study was conducted to determine the presence of Accessory Infraorbital Foramen.

MATERIAL & METHODS

The study was conducted in the Department of Anatomy, G. S. V. M. Medical College, Kanpur, Uttar Pradesh, India.

A. 300 macerated dry adult human skulls of North Indian population belonging to both sexes were selected. Age, sex

and race were not considered . The skulls of children were not considered. Because of great amount of error in attempting sex differentiation, it was decided not to differentiate skulls by sex (25).

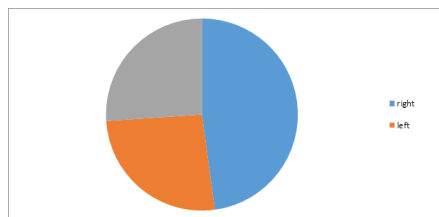
B. Number and location of Accessory Infraorbital foramen was determined by direct inspection.

C. Digital camera was used for taking photographs.

RESULT

S. NO.	SIDE	NO. OF SKULLS WITH ONE AIOF	%
1	Right	11	3.67
2	Left	6	2.0
3	Bilateral	6	2.0

- 1 skull ie .33% had 2 AIOF on right side and 1 AIOF on left side.



OBSERVATION OF ACCESSORY IOF BY DIRECT INSPECTION



Unilateral AIOF



Bilateral AIOF

DISCUSSION

Knowledge of presence of AIOF is very important to surgeons. A branch of Infraorbital nerve may pass through it. Ignorance about the presence of AIOF may cause injury to the nerve during procedures around maxillofacial region. It may result in sensory deficit in the area of supply of that nerve.

The presence of AIOF is also important for anaesthetists. If not taken into account, it may result in failure of nerve block and anaesthesia (26, 15).

Multiple IOF have been associated with branching of nerves during development and may explain cases of failure during infiltrative anaesthesia for maxillofacial procedures (9).

The present study found 10.7% of skulls have AIOF, frequenting to right side which was in sync with studies by Hindy, 1993 (10.0%); Elias, 2004 (10.0%) ; Sarla Devi, 2011 (9.6%).

The present findings were in contrast to the results obtained by Apinhasmit, 2006 (3.8%) ; Gour, 2003-2006 (4.0%) ; Ilayperuma, 2010 (3.7%).

All the AIOF observed in present study were located superomedial to IOF. The result is in agreement with studies by Saylam et al., 1999 (79.6%) and Tezer et al., 2011 (93.3%).

CONCLUSION

Thus, from the above study, we can safely conclude that knowledge of presence of AIOF is very important for surgeon as well as anaesthetist. If ignored, it may result in nerve injury and failure of nerve block during procedures in maxillofacial region.

REFERENCES

1. Gardner, E.; Gray, D.J. & O'Hailly, R.: *Anatomia: estudo regional do corpo humano*. 4 Ed, Cap 55, 629 Rio de Janeiro, Guanabara Koogan, 1975.
2. Williams, P.L.; Warwick, R.; Dyson, M. & Bannister, L.H.: *Gray's Anatomy* 37 th Ed., New York, Churchill Livingstone, 1989.
3. Moore, K.L.: *Anatomia Orientada para O Clinico*; 3 rd edicao, cap 09, 782-83, 1992.
4. Moore K.L.: *Anatomia Orientada para O Clinico*; 3 rd edicao, cap 07, 578-91, 600-01, 1992.
5. Danko, I. & Hang, R.H.: *An Experimental Investigation of the Safe Distance for Internal Orbital Dissection*. *J. Oral Maxillofac. Surg.* 1998;56:749-52.
6. Canan, S.; Asim, O.M.; Okan, B.; Ozek, C. & Alper, M.: *Anatomic Variations of Infraorbital Foramen*. *Annals of Plastic Surgery*. 1999;43(6):613-617.
7. Aziz, S.R.; Marchena, J.M. & Puran, A.: *Anatomic Characteristics of the infraorbital foramen: a cadaver study*. *J. Oral Maxillofac. Surg.*, 2000;58:992-6.
8. Kazkayasi, M.; Ergin, A.; Ersoy, M.; Bengi, O.; Tekdemir, I. & Elhan, A.: *Certain anatomic relations and the precise morphometry of the infraorbital foramen-canal and groove: an anatomical and cephalometric study*. *Laryngoscope*, 2001;111(4):609-14, pt 1.
9. Cutright, B.; Quillopa, N. & Schubert, W.: *An anthropometric analysis of the key foramina for maxillofacial surgery*, 2003;61:354-7.
10. Kazkayasi, M.; Ergin, A.; Ersoy, M.; Tekdemir, I. & Elhan, A.: *Microscopic anatomy of the infraorbital canal, nerve and foramen*. *Otolaryngol, Head neck Surg.*, 2003;129:692-701.
11. Salomao, J.I.S.; Salomao, J.A.S. and Salomao Costa, R.C.S.: *New Anatomic intraoral reference for the anaesthetic blocking of the anterior and middle maxillary alveolar nerves (infraorbital block)*. *Brazilian Dental Journal*, 1990; 1:31-36.
12. Chung, M.S.; Kim, H.J. Kang, H.S. & Chung, I.H.: *Locational relationship of supraorbital notch or foramen and infraorbital and mental foramina in Koreans*. *Acta Anat*. 1995;154:162-6.
13. Goto, F.; Ishikazi, K.; Yoshikawa, D.; Obata, H.; Arii, H. & Terada, M.: *The long lasting effects of peripheral nerve blocks for trigeminal neuralgia using a high concentration of tetracaine dissolved in bupivacaine*. *Pain*, 1999; 79 (1): 101, 103.
14. Radwan, I.A.M.; Saito, S. and Goto, F.: *High concentration tetracaine for the management of trigeminal neuralgia: quantitative assessment of sensory function after peripheral nerve block*. *The clinical journal of pain*, 2001; 17: 323-326.
15. Karakas, P.; Bozkir, M.G. & Oguz, O.: *Morphometric measurements from various reference points in the orbit of male Caucasians*. *Surg. Radiol. Anat.*, 2002-03;24(6):358-62.
16. Berry, A.C. and Berry, R.J.: *Epigenetic variation in the human cranium*. *Journal of Anatomy*. 1967; vol. 101, n.2, p.361-379.
17. Kadanoff, F.D.; Mutanoff, S.T. and Jordanov, J.: *Über die Hauptöffnungen resp. incisurae des Gesichtsschädels*. *Morphologisches Jahrbuch*, 1970; (115): 405-407; 102-118.
18. Finnegan, M.: *Population definition on the North West Coast by analysis of discrete character variation*. Boulder: University of Colorado. 1972 (Dissertation).
19. Guadarrama, L.A. de los caracteres c.: *Estudio Nacional Autonoma de Mexico*,

- 1973 (Tesis Mestro an raneanas discontinuos en la poblacion de Tlatilco, Mexico Universidad Antropologia).
20. Berry, A. C.: *Factors affecting the incidence of non-metrical skeletal variants*. *J. Anat.*, 1975;120:519-35.
21. Hindy, A.M. and Abdel Raouf, F.: *A study of infraorbital foramen, canal and nerve in adult Egyptians*. *Egypt. Dent. J.* 1993;39(4):573-80.
22. Saylam, C.; Asim, O.M.; Okan, B.; Ozek, C. & Alper, M.: *Anatomic Variations of the Infraorbital Foramen*. *Annals of Plastic Surgery*. 1999;43(6):613-617.
23. Bressan, C.; Geuna, S.; Malerba, G.: *Descriptive and Topographic anatomy of the accessory infraorbital foramen. Clinical implications in maxillary surgery*. *Minerva Stomatol* 2004; 53:495-505.
24. Elias, M.G.; Silva, R.B.; Pimentel, M.L.: *Morphometric analysis of infraorbital foramen and accessories foramina in Brazilian skulls*. *Int. J. Morphol.*, 2004;22: 273-8, n.4.
25. Weiss, K.M.: *On the systematic bias in skeletal sexing*. *AM. J. Phys Anthropol.* 1942;37:239-249.
26. Triandafilidi, E.; Anagnostopoulo, S. & Soumila, M.: *The infraorbital foramen (the position of infraorbital foramen in man)*. *Odontostomatol. Proodos.*, 1990; 44:87-91.
27. Sarla Devi, K.V.; Udhaya, K.; Deepti Shastri: *Infraorbital Foramen in South Indian Population: Anthropometric Measurements and Their Clinical Relevance*. 2011.
28. Apinhasmit, W.; Chompoopong, S.; Methathrathip, D.; Sansuk, R. & Phetphunphiphat, W.: *Supraorbital notch/ foramen, ifraorbital foramen and mental foramen in Thais: Anthropometric measurements and Surgical relevance*. *J. Med. Assoc. Thai.*, 2006;89:675-82, 21:233-6.
29. Gour, K.K.; Nair, S.; Trivedi, G.N.; Gupta, S.D.: *Anthropometric Measurements of Infraorbital foramen in dried human skulls*. *Int. J. Biol. Med. Res.* 2003-2006; (3):3.
30. Ilayperuma, I.; Nanayakkara, G. & Palaheptiya, N.: *Morphometric analysis of the mental foramen in adult Sri Lankan Mandibles*. *Int. J. Morphol.*, 2010; 27:1019-24.
31. Tezer, M.; Ozturk, A.; Akgul, M.; Gayretli, O. & Kale, A.: *Anatomic and morphometric features of the accessory infraorbital foramen*. *J. Morphol. Sci.*, 2011;28 (2):95-97.