

**Original article:**

## **Study of alignment of infraorbital foramen (IOF) with maxillary tooth in dry human skulls of North Indian population**

**<sup>1</sup>A. KUMAR, <sup>2</sup>P. SINHA, <sup>3</sup>A. GAHARWAR**

<sup>1</sup>ASSISTANT PROFESSOR, T.S. MISRA MEDICAL COLLEGE & HOSPITAL, LUCKNOW.

<sup>2</sup>ASSOCIATE PROFESSOR, T.S. MISRA MEDICAL COLLEGE & HOSPITAL, LUCKNOW.

<sup>3</sup>ASSISTANT PROFESSOR, DR. RAM MANOHAR LOHIA INSTITUTE OF MEDICAL SCIENCES, LUCKNOW.

\*CORRESPONDING AUTHOR- A. KUMAR, ASSISTANT PROFESSOR; Email id: dranupriya80@yahoo.in



### **ABSTRACT**

**Aims** –Infraorbital Foramen (IOF) is a constant feature on the anterior surface of body of maxilla below the orbital margin. Infraorbital nerve & vessels pass through it. IOF assumes great importance in the field of maxillo- facial surgery & dentistry as Infraorbital Nerve that passes through it is anaesthetised during these procedures. Maxillary tooth is readily visible and palpable landmark. It can be highly helpful in locating IOF. Hence a study was conducted to determine alignment of IOF with maxillary tooth.

**Methods** - The study was conducted in Deptt. of Anatomy, GSVM Medical College, Kanpur. 300 macerated dry adult human skulls of North Indian population belonging to both sexes were selected. The skull was placed in Frankfurt plane. Alignment of IOF with maxillary tooth was noted by suspending a needle with flexible wire from the center of IOF and determining the position of its tip.

**Result** -The present study found that IOF was in same line with 2<sup>nd</sup> pre- molar in 90.67% of skulls.

**Conclusion**-Thus knowledge of alignment of IOF with maxillary tooth helps in locating its position.

**Keywords:** Infraorbital foramen, infraorbital nerve, maxillary tooth, maxillo-facial surgery.

### **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]. It is interesting to note that traits such as localization of infraorbital foramen not only differs between populations of different geographical zones but also within the inhabitants of same geographic environment [11]. Furthermore, the position of infraorbital foramen in relation to maxillary teeth is shown to be varied among populations [7,8,12 ]. The morphometry of IOF plays an

important role during regional block anaesthesia techniques of Infraorbital nerve [13,14,15,16] and nerve block during surgical procedures around it.

Thus knowledge of location of this foramen from reference points in this area provides important data for:

- Local anaesthesia during rhinoplasty [17 ].
- Orientation of an acupuncture point used in trigeminal neuralgia treatment [18].
- Plastic surgery of maxillofacial area [7].
- Orbital surgery [19].
- Risk free zygoma fracture surgery [ 20].
- Localization of Infraorbital plexus.

#### **MATERIALS AND METHODS:**

The study was conducted in the Department of Anatomy, G.S.V.M. Medical College, Kanpur, Uttar Pradesh, India. 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 [21].

The measurements were taken with the help of Craniostat Needle & flexible wire Digital camera for illustration Alignment of IOF with maxillary tooth (premolar/ molar) was determined by placing skull in Frankfurt plane and suspending a needle with flexible wire in the centre of IOF & determining position of its tip.

#### **RESULTS:**

The study undertaken found that maximum number of IOF were in alignment with 2<sup>nd</sup> premolar tooth, followed by 1<sup>st</sup> premolar and then 1<sup>st</sup> molar teeth.

TABLE 1: ALIGNMENT OF IOF WITH MAXILLARY TOOTH

Side	Ist Premolar	%	2 <sup>nd</sup> Premolar	%	1 <sup>st</sup> Molar	%	Total
Right	19	6.33	270	90.0	11	3.67	300
Left	16	5.33	274	91.33	10	3.33	300



FIGURE 1: SKULL SHOWING ALIGNMENT OF IOF WITH 2<sup>nd</sup> PREMOLAR



FIGURE 2: SKULL SHOWING ALIGNMENT OF IOF WITH 1<sup>st</sup> MOLAR



FIGURE 3 : SKULL SHOWING ALIGNMENT OF IOF WITH 2<sup>nd</sup> MOLAR

#### **DISCUSSION:**

The maxillary tooth is readily visible and palpable landmark which can aid in locating the position of IOF. The present study found that IOF was most commonly in line with 2<sup>nd</sup> premolar followed by 1<sup>st</sup> premolar and 1<sup>st</sup> molar tooth. Maximum researchers found that IOF was in line with 2<sup>nd</sup> premolar tooth. The present study found this in 90.67% of skulls. It was close to result obtained by Apinhasmit, 2006 ie. 85 %. According to present study, IOF was in line with 1<sup>st</sup> premolar tooth in 5.83 % of skulls. The finding was in sync with study conducted by Aziz, 2000. In present study, 3.5% of skulls showed IOF that were in alignment with 1<sup>st</sup> molar tooth. The finding is in agreement with studies by Apinhasmit, 2006 (3.0 %) and Ilayperuma, 2010 (3.7%).

#### **CONCLUSION:**

IOF was in same line as 2<sup>nd</sup> premolar in 90 % on right side and in 91.33 % on left side. Thus, study of alignment of IOF with maxillary tooth would serve as a useful guide in locating IOF.

#### **ACKNOWLEDGEMENT:**

The study is not funded by any agency. We acknowledge our thanks to colleagues and staff who supported us during the study.

#### **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. Ilayperuma, I.; Nanayakkara, G. & Palaheptiya, N.: Morphometric analysis of the mental foramen in adult Sri Lankan Mandibles. *Int. J. Morphol.*, 2010; 27:1019-24.

12. Apinhasmit, W.; Chompoopong, S.; Methathrathip, D.; Sansuk, R. & Phetphunphiphat, W.: Supraorbital notch/foramen, infraorbital foramen and mental foramen in Thais: Anthropometric measurements and Surgical relevance. J. Med. Assoc. Thai., 2006; 89:675-82, 21:233-6.
13. 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.
14. 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.
15. 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.
16. 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.
17. Zide, B.M. & Snift R., How to block and tackle the face. Plast Reconstr Surg. 101: 2018, 1998.
18. Esper, R.S.; Yamamura, Y.; Cricenti, S.V. & Novo, N.F. Efeitos da insercao perpendicular e oblique de agulhas no ponto de acupuntura E-Z (Sibai) de forame infraorbital. Rev Paul. Acupunt., 3(2): 85-8, 1997.
19. 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.
20. Du Tolt D.F. & Nortje, C: The maxillae: Integrated and applied anatomy relevant to dentistry. SADJ. 58(8): 325-30, 2003.
21. Weiss, K.M.: On the systematic bias in skeletal sexing. AM. J. Phys Anthropol. 1942;37: 239-249

Date of Submission: 22 March 2020

Date of Peer Review: 05 April 2020

Date of Acceptance: 18 May 2020

Date of Publishing: 30 June 2020

Author Declaration: Source of support: Nil, Conflict of interest: Nil

Ethics Committee Approval obtained for this study? YES

Was informed consent obtained from the subjects involved in the study? YES

For any images presented appropriate consent has been obtained from the subjects: NA

Plagiarism Checked: Urkund Software

Author work published under a Creative Commons Attribution 4.0 International License



DOI: 10.36848/IJBAMR/2020/12225.51745