



MORPHOMETRIC STUDY OF INFRA ORBITAL FORAMEN IN DRY ADULT SKULLS AND ITS SURGICAL RELEVANCE

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Abstract: Infra orbital foramen (IOF) is an opening in the maxillary bone of skull located below the infra orbital margin (IOM) of the orbit. The study was conducted to determine the distance between infra orbital foramen and infra orbital margin, accessory infra orbital foramen in dry adult skulls with the aim of improving the efficiency in clinical situations such as maxillofacial surgeries and infra orbital nerve block. A total of one hundred dry human skulls were measured using vernier caliper by using sagittal and transverse measures. The general mean distance of IOF from IOM was 6.69 ± 2.86 mm (ranged from 3 to 11 mm). The accessory IOFs were observed in 10.1% of the skulls (including both the sides). The knowledge of the distances from surgically encountered anatomic landmarks may be of assistance in locating these important maxillofacial neurologic structures during many procedures. This information may play an even more important role as new techniques for minimally invasive surgery are developed. Understanding the location of these foramina will also assist the clinician in performing local anesthetic blocks.

Keywords: Morphometry, Infra Orbital Foramen, Infra Orbital Margin, Maxillo Facial Surgery.

INTRODUCTION

In human anatomy, the infra orbital foramen (IOF) is an opening in the maxillary bone of the skull located below the infra orbital margin (IOM) of the orbit (eye socket). It allows passage for the infra orbital artery, vein, and nerve. The infra orbital foramina is used as a pressure point to test the sensitivity of the infra orbital nerve. The precise location of infra orbital foramen is essential in various clinical and surgical procedures such as maxilla facial surgeries, infra orbital nerve block and exact location of infra orbital foramen has subject of interest of research works. Infra orbital nerve block through infra orbital foramen and canal is used to anesthetize the lower eyelid, upper lip, lateral nose, upper teeth and related gingivae. Knowledge of exact shape, location and direction of infra orbital foramen is importance to decrease anesthetic complications. The present study was conducted on dry human skulls to determine the distance between infra orbital foramen and infra orbital margin, accessory infra orbital foramen in dry adult skulls. The presence of accessory infra orbital foramen may be difficult during anesthetization of the region innervated by infra orbital nerve.

MATERIALS AND METHODS

A total of one hundred dry human skulls were collected in Alluri Sitarama Raju Academy of Medical Sciences, (ASRAM) measured by using vernier caliper by using bilateral measures (Sagittal and transverse measures).

The position of infra orbital foramen was determined by Sagittal measure through a sagittal plane passing through centre of infra orbital foramen parallel to median sagittal plane from Infra orbital margin up to superior margin of Infra orbital foramen (Fig.1) and Transverse measure through from lateral margin of pyriformis opening until medial margin of infra orbital foramen (Fig.2).

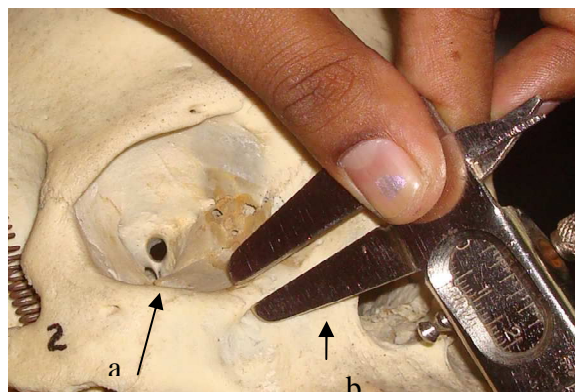


Fig.1: Sagittal measuring the distance between IOM and IOF Using by vernier caliper.

a- Infra orbital margin

b- Infra orbital foramen.

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Fig.2: Transverse measure from lateral margin of pyriformis Opening to medial margin of infra orbital margin.

- a-infra orbital foramen
- b-pyriformis opening medial margin.

The measurements were done on both the sides of the skulls to the nearest margin of the infra orbital foramen. The mean, standard deviation, maximum and minimum values were calculated for each of the measurements and comparison of mean values of the right and left sides was made by using vernier caliper. The shape, direction of infra orbital foramen and number of accessory infra orbital foramen were also observed on both the sides of all the skulls.

RESULTS

Infra orbital foramen was present in all the skulls. The mean distance of infra orbital margin from the infra orbital foramen (Table.1) was 6.69±2.86mm (the distance of IOM from the IOF had a wide range varying from 3-11mm).

Table.1: The range, mean distance of IOM from IOF (Sagittal measure-all distances are in mm)

Sagittal measure	Right side		Left side		Normal Mean distance
	Range	Mean distance	Range	Mean distance	
IOM-IOF	3-11	6.12 ± 1.43	3-11	6.53 ± 1.53	6.69 ± 2.86

The mean distance of pyriformis Opening to medial margin of infra orbital margin (Table 2) was 28.81±07.02 (the distance of medial margin of IOM to pyriformis opening had a wide range varying from 24-34).

Table.2: The range, mean distance of pyriformis Opening to medial margin of infra orbital margin (transverse measure- all distances are in mm)

Transverse measure	Right side		Left side		Normal Mean distance
	Range	Mean distance	Range	Mean distance	
medial margin of IOM to pyriformis opening	21-32	16.58 ± 2.37	21-33	16.38 ± 2.25	28.81 ± 07.02

Number of accessory infraorbital foramina:

The largest or prominent foramen considered as a main foramen and others are accessory foramen. Accessory infra orbital foramen found in 5 skulls, of which in 3 skulls it was bilateral (fig 3), unilateral accessory foramina in 2 skulls (fig 4), In 1 skull there were 2 accessory foramina on left side (fig 5). Mostly the accessory foramen were located medial to the main infra orbital foramen.

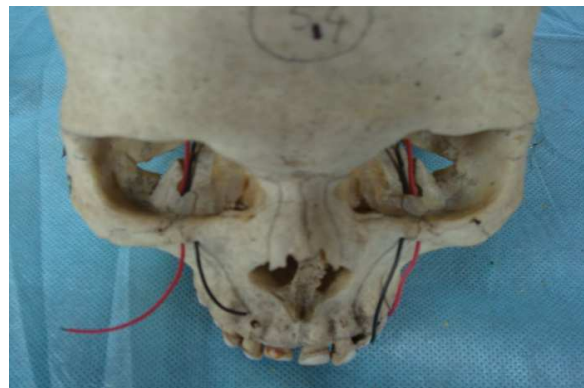


Fig.3: Probes showing bilateral accessory foramen Medial to infra orbital foramen



Fig.4: Probes showing right side one accessory foramen Medial to infra orbital foramen

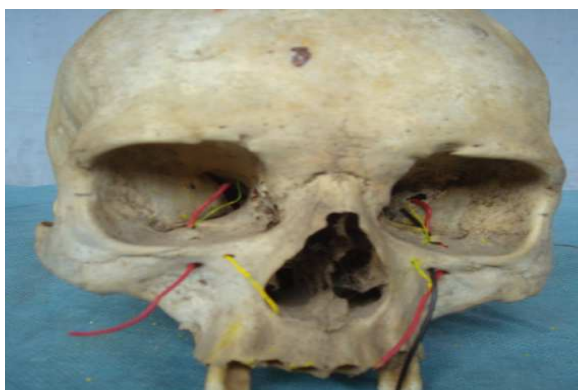


Fig.5: Probes showing right side 1 accessory foramen and left side 2 accessory foramen medial to infra orbital margin

DISCUSSION

The knowledge of exact location IOF and the course of infra orbital nerve is necessary for various clinical procedures such as maxillofacial surgeries, regional anesthesia to determine the acupuncture point in case of treating trigeminal neuralgia. IOF is also an important in orbital surgeries and is an important surgical access to maxillary sinus (Caldwell-luc operations). In present study the average distance of IOM from IOF was 6.69mm, which is compare to that reported by Silva (6.8) and karakas *et al.*, (6.70), but was lower than reported by chung (8.60) canan (8.30 in women and 10.90 in men) and Aziz (7.80 in women and 8.50 in men). Another important fact is of clinical significance is the presence of location of accessory IOF. Multiple accessory foramens were reported in various studies like Gruber, Berry, Kadanoff, and Bergman Kazkayasi.

CONCLUSION

Knowledge of the position of infraorbital foramen is very useful to maxillofacial surgeons as in reduction of LEFORT'S FRACTURE, Dentists and for regional block anesthesia Morphometric measures and presence of accessory foramina must be considered to reduce the risks. Knowledge from surgically encountered anatomic land marks may assist surgeons to localize the foramen avoiding injury to neuro vascular bundle and facilitate surgical, local anesthetic and other invasive procedures.

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