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Original Research Article

MORPHOMETRIC ANALYSIS OF INFRA ORBITAL FORAMEN IN HUMAN DRY SKULLS

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ABSTRACT

Background: Knowledge about the morphology of infraorbital foramen(IOF) is important for surgeons, dentists and anesthetists while performing maxillo-facial surgeries.

Materials and Methods: The study was conducted in 52 human dry skulls in Department of Anatomy, Coimbatore Medical College. The location, shape, sagittal and transverse diameter of infra orbital foramen were measured using Vernier calipers. The relation of infraorbital foramen to 1st premolar and presence of accessory foramina were noted.

Results: Out of 52 skulls examined, infra orbital foramen was single in 50 skulls on both sides. The sagittal distance (mean distance between infraorbital margin to superior margin of infraorbital foramen) on the right side was 3.628mm and on left side was 3.822mm. Minimum distance from infra orbital margin to superior margin of infraorbital foramen was 2.5mm and maximum was 6mm. The mean transverse measurement from lateral margin of pyriform aperture to medial margin of infra orbital foramen on right side was 7.451mm and 7.865mm on left side. The minimum distance from lateral margin of pyriform aperture to medial margin of infra orbital foramen was 11mm and maximum was 16mm. In all 52 skulls infraorbital foramen was lateral to 1st premolar except in two skulls with accessory foramen. In skull with accessory foramen, one of the accessory foramina was found to be medial to premolar. Out of 52 skulls studied, shape of the infraorbital foramen was bilaterally vertically oval in 11 skulls, bilaterally transversely oval in 18 skulls and bilaterally circular in 12 skulls, whereas in 9 skulls the infraorbital foramen was vertically oval on one side and transversely oval on the other side. Two skulls had accessory foramen. In one of the two skulls the accessory foramen was unilateral on left side. The shape of both foramina on left side was circular, whereas on right side the shape of the foramen was transversely oval. In the 2nd skull, accessory foramina were present on both sides; the shapes of all foramina were transversely oval.

Conclusion: The findings of our present study will act as a guide for the dentists, surgeons and anaesthetists in localizing infraorbital foramen for infraorbital nerve block in various surgeries.

KEY WORDS: Infraorbital foramen, Accessory infraorbital foramen, Pyriform aperture.

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INTRODUCTION

The upper jaw is contributed by both maxillae. Each maxilla presents a pyramidal shaped body and four processes, namely the zygomatic, frontal, palatine and alveolar. The body contains the maxillary sinus and presents nasal, orbital,anterior and posterior surfaces. Nasal surface represents the base. Orbital surface

forms the major part of floor of orbit. The anterior surface presents about 1cm below the infraorbital margin, the infraorbital foramen which transmits infraorbital vessels and nerve. The posterior surface forms the anterior wall of infra-temporal and pterygo-palatine fossae [1]. Knowledge about the morphology of infraorbital foramen is important for surgeons, dentists and anesthetists while performing procedures using the infraorbital foramen as a reference point.

MATERIALS AND METHODS

The study was conducted in 52 dry human skulls of unknown sex in the Department of Anatomy, Coimbatore Medical College, Coimbatore. The exact location of infra orbital foramen was measured with Vernier calipers on both sides separately. Sagittal diameter and transverse diameter were measured. Sagittal diameter was measured from inferior margin of infraorbital margin to superior margin of infraorbital foramen. Transverse diameter was measured from lateral margin of pyriform aperture to medial margin of infraorbital foramen. The relation of infraorbital foramen to 1st premolar and the shape of the infraorbital foramen were noted. Presence of any accessory foramen was also identified.

RESULTS

Out of 52 skulls of unknown sex examined, the infraorbital foramen was single in 50 skulls on both sides. Accessory foramen was present in two skulls, of which one skull had unilateral accessory foramen and in the other skull the accessory foramen was bilateral.

Out of 52 skulls studied, the shape of the infraorbital foramen was bilaterally vertically oval in 11 skulls, bilaterally transversely oval in 18 skulls and bilaterally circular in 12 skulls (Fig-1), whereas in 9 skulls the infraorbital foramen was vertically oval in one side and transversely oval in the other side (Fig-2).

The sagittal distance i.e., the mean distance between infraorbital margins to superior margin of infraorbital foramen on right side was 3.628mm and on left side was 3.822mm. The minimum distance from the infraorbital margin to superior margin of infraorbital foramen was 2.5mm (Fig-3) and the maximum was 6mm.

The mean transverse measure from the lateral margin of pyriform aperture to the medial margin of infraorbital foramen on the right side was 7.451mm and 7.865mm on the left side. The minimum distance from the lateral margin of pyriform aperture to the medial margin of infraorbital foramen was 11mm and the maximum was 16mm.

In all the 52 skulls infraorbital foramen was lateral to 1st premolar except in two skulls with accessory foramen. In skull with accessory foramen one of the accessory foramen was found to be medial to premolar.

Two skulls had accessory foramen. In one of the two skulls the accessory foramen was unilateral on left side. The shape of both the foramina on left side was circular, whereas on the right side the shape of the foramen was transversely oval (Fig-4).

In the 2ndskull with accessory foramen, the accessory foramen was present on both sides, and the shape of all the foraminas were transversely oval (Fig-5).

Fig 1: Shows bilateral circular infraorbital foramen.

Fig. 2: Shows vertically oval infra orbital foramen on the right side and transversely oval infra orbital foramen on the left side.

Fig. 3: Shows the distance between the infraorbital margin to superior border of infraorbital foramen was minimal(i.e.,) 2.5mm.

Fig. 4: Shows unilateral accessory infra orbital foramen[left side].

Fig. 5: Shows bilateral accessory infra orbital foramen.

DISCUSSION

Sagittal and the transverse measurement from the superior margin of infraorbital foramen to infraorbital margin and lateral margin of pyriform aperture to medial margin of infra orbital foramen:

According to Macedo et al [2] the mean distance between Infraorbital foramen and Infraorbital margin was 6.37mm +/- 1.69mm on right side and 6.4mm on left side, and the mean distance between infraorbital foramen and pyriform aperture was 17.6mm on right side and 17.60mm on left side.

According to Loganayaki [3] the infraorbital margin to infraorbital foramen on right side was 6.12+/-1.43mm and on the left side was 6.53+/-1.53mm. The maximum distance recorded was 12mm and minimum was 3mm.

According to Ezzeddin et al[4], the distance between infraorbital foramen and infraorbital ridge was 6.2mm on right side and 6.5mm on left side.

According to Rajani Singh et al [5], the distance between infraorbital foramen to infraorbital margin on the right side was 6.12mm and 6.19mm on left side, and the distance between infraorbital foramen and pyriform aperture on the right side was 15.31mm and 15.80mm on left side.

According to Canan et al [6], the distance between infraorbital foramen and infraorbital margin was 10.9mm in men and 8.3mm in women.

According to Shikha Sharma et al [7], distance between infraorbital foramen and infraorbital margin was 22.6mm on left side and 15.2mm on right side. The maximum distance recorded was 21mm and minimum distance was 9mm on left side. The maximum distance recorded was 21mm and minimum distance was 11mm on right side.The maximum distance between Infra orbital foramen (IOF) and Pyriform aperture (PA) was 31mm and minimum was 19mm on the left side while on the right side the maximum distance was 30mm and minimum was 19mm. The mean of the transverse distance was 26.2mm on left side and 25.8mm on right side

According to Tilak Raj et al [8], the distance between the infraorbital foramen and midpoint of infraorbital margin was 6.92mm on left side and 6.75mm on right side and the distance between infra orbital foramen and pyriform aperture was 16.14mm on left side and 15.79mm on right side. According to Isurani et al [9] the distance between infraorbital foramen and infraorbital ridge in males were 10.56mm and 9.02mm in females.

According to Elias et al [10], the distance between infraorbital foramen and infraorbital margin was 6.71mm on right side and 6.83 on left side and the distance between infraorbital foramen and pyriform aperture was 13.28mm on right side and 13.31mm on left side. According to Hussain Saheb et al [11], the mean distance between the infraorbital foramen and infraorbital margin was 7.13mm, on right side it was 7.06mm and 7.20mm on left side and the distance between infraorbital foramen and pyriform aperture was 18.13mm, 18.01mm on right side and 18.04mm on left side.

In our present study, the sagittal distance i.e., the mean distance between infraorbital margin to superior margin of infraorbital foramen on right side was 3.628mm and on left side was 3.822mm. The minimum distance from the infraorbital margin to superior margin of infraorbital foramen was 2.5mm and the maximum was 6mm.

Shape of Infraorbital foramen: According to Rajani Singh et al [5], Considering 110 sides (55skulls) incidence of Horizontally oval was 28.1% and vertically oval was 42.7% and circular type was 29%.

According to Tilak Raj et al [8], Oval shape of infraorbital foramen was more common in 71.4% of skulls on both the side.

According to Gnanagurudasen et al [12] the most common shape of infraorbital foramen was oval in 39% and semilunar in 27% followed by circular in 22% and triangular in 12%.

In our present study, out of 52 skulls studied the shape of the infraorbital foramen was bilaterally vertically oval in 11 skulls, bilaterally transversely oval in 18 skulls and bilaterally circular in 12 skulls, whereas in 9 skulls the infraorbital foramen was vertically oval in one side and transversely oval in the other side.

Relation with premolar teeth: According to Tilak Raj et al [8], 81.4% of IOF on right side and 87.1% on left side is in line with 1st premolar teeth. According to Janghu Poonam et al [13] the infraorbital foramen was present in line with 2nd premolar teeth.

In our present study in all the 52 skulls infraorbital foramen was lateral to 1st premolar except in two skulls with accessory foramen. In skull with accessory foramen one of the accessory foramen was found to be medial to 1st premolar teeth.

Presence of accessory foramen: According to Loganayaki [3] accessory foramina were present in 5 skulls in which 2 were unilateral; in 3 skulls it was bilateral and in one skull there were 2 accessory foramina on the left side.

According to Canan et al [6] Single accessory foramen was present in 11.5% of specimens and double accessory foramen was present in 1.28% of specimens.

According to Shikha Sharma et al [7], accessory foramina were present in 3 skulls of which, it was unilateral in 2 skulls and bilateral in 1 skull.

Elias et al [10] found the presence of the double IOF in 50 cases, being bilateral in 08 specimens, left and right side 21 specimens for each side.

According to Gnanagurudasan et al [12] Accessory foramen was present in 11%.

In our present study, accessory foramen was present in two skulls. In that, one skull had unilateral accessory foramen and in the other skull the accessory foramen was bilateral.

CONCLUSION

The morphometric study of the infraorbital foramen would assist dentists, surgeons and anaesthetists in localizing the infraorbital foramen for infraorbital nerve block in various surgeries. Perusal of this study before undertaking maxilla-facial surgeries and regional block anesthesia would help prevent needless errors.

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Conflicts of Interests: None

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