Research Paper

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Asymmetry of Morphometric Measurements in Infra Orbital Foramen of Adult Dry Skulls

Medical Science

KEYWORDS : Infra orbital Foramen, Infra orbital Margin, Asymmetry index, dry skull

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ABSTRACT

Aim: To Analyse the Morphometric measurements and the Asymmetry of Infra orbital foramen in adult dry skulls.

Methodology: The study carried out measuring skulls for the Infra orbital foramen (IOF) for its shape, direction and distance between IOF and Infra Orbital Margin using visual observation. The Asymmetry Index was calculated for each Parameter using the specific formula.

Results: From the results, it can be suggested that variation in shape was presented to be in more proportion on the right side with oval shape though statistically not significant. For the direction it can be suggested that infero-medial shape to be in more proportion in the both sides which was statistically significant. The distance was presented to be 6.8mm and 6.9mm for right and left side respectively with no significant difference between right and left side. On analysing the asymmetry of the shape, direction and distance it was observed that asymmetry index was high for circular shape, Medial direction and IOF – IOM measurement. Conclusion: Thus results may help the professionals specially Surgeons, Anaesthetists and Dentist to be aware of craniofacial asymmetry to have a successful clinical practice.

INTRODUCTION

Cranio facial asymmetry seems to be a common feature in any population. The degree of asymmetry and the cause of asymmetry have the clinical significance. The Cranio facial symmetry is considered ideal; on the other hand the asymmetry reflects developmental instability which may be due to genetic and environmental factors. Number of studies in the concept reported inconclusive results[1]. In the anatomy of human skull the Infra Orbital Foramen (IOF) was an opening in the maxillary bone of skull situated below the orbit. It allows passage for infra orbital nerve and vessels[2]. The infra orbital foramen forms the exterior end of the infra orbital canal and communicates with the infra orbital groove. Infraorbital foramen is located close to important anatomical structures like orbit, nose, Oromaxillary sinuses and upper teeth. The knowledge of anatomical characteristics of the location, shapes, directions and number of accessory foramina have clinical implications in the infraorbital nerve block. This information should be kept in mind during local anaesthetic planning for surgeries in the field of Dentistry, Anaesthesia, Ophthalmology and Surgery. Information about foramina size and symmetry was becoming increasingly important with advancements in endoscopic and radiological techniques. The exact location of infra orbital foramen becomes essential in locating the infra orbital nerve for nerve block purpose. The infra orbital nerve was a sensory nerve that supplies the skin of upper cheek, mucosa of maxillary sinus, maxillary incisor, canine and premolar teeth and associated gingival, the skin of inferior eyelid, part of nose and the skin and the mucosa of upper lip[3] . Infra orbital block was a therapeutic procedure done to relieve intractable pain due to trigeminal neuralgia, and to accomplish regional anaesthesia in maxilla-facial region to perform any surgical, diagnostic and other invasive procedures. Understanding the importance of exact location of infra orbital foramen, its asymmetry was essential to perform for any surgical procedures, anaesthetic nerve blocks and to prevent complications during clinical procedures. Based on these aspects the present study was designed to analyse the shape, direction, distance and the asymmetry of the distance between infraorbital foramen(IOF) and infra orbital margin(IOM).

MATERIALS AND METHODS

The study carried out measuring the fifty dry adult human skulls from the Department of Anatomy of ACS Medical College. Damaged skulls were excluded. Infra orbital foramen on right and left sides of skull were measured for its shape, direction and distance between IOF and IOM. The shape was measured by direct visual observation. The direction of IOF was determined by using a probe in the direction of opening of IOF. The distance between IOF and IOM is measured from IOF to the point in IOM where Zygomatico Maxillary Suture meets, by using divider and measuring scales. The asymmetry index is calculated for each Parameter using the specific formula[2]

Asymmetry Index-[(Right Side – Left Side) / Right Side] x 100

The negative Value indicates that left side value is higher than the right side. For the calculation of Asymmetry index negative sign is excluded. The collected data was analysed for its statistical significance.

DATA ANALYSIS AND RESULTS

Analysis of shape and direction is calculated using Chi square and Distance is analysed for significance using student't test.

I. Analysis of Shape- The oval and circular shape were taken in to consideration.

Table-1: Analysis of Shape of Infra Orbital Foramen

Groups	Right side N/%	Left side N/%
Oval	30/60	25/50
Circular	20/40	25/50
P value	0.0713	1.0000

Table – 2: Asymmetry in Shape of Infra Orbital Foramen

Groups	Oval N/%	Circular N/%
Right side	30/60	20/40
Left side	25/50	25/50
|R-L|	5/10%	5/10%
P value	0.421	0.421
Asymmetry index	16.66	25

On analysis of shape 60% of skulls presented with oval and 40% with circular in the right side which was statistically not significant. For the left side both shapes were observed to be in same proportion which was also statistically not significant. The right and left asymmetry appeared to be 10% which is also statistically not significant. The asymmetry index was 16.66 for oval shape and 25 for circular. The circular presented high asymmetry index

which suggests that circular shape was observed to be in more proportion in left side. Oval shape observed to be in more proportion in right side.

II. Analysis of Direction – The Infero medial and Medial Directions were taken in to consideration.

Table – 3: Direction OF Infra orbital foramen

Groups	Right side N/%	Left side N/%
Infero-medial	40/80	36/73
Medial	10/20	14/27
P value	<0.0001*	<0.0001*

Table -4: Asymmetry of Direction of Infra Orbital Foramen

Groups	Infero-medial N/%	Medial N/%
Right side	40/80	10/20
Left side	36/73	14/27
|R-L|	4/7%	4/7%
P value	0.482	0.482
Asymmetry index	10	40

On analysis of Direction, 80% of skulls presented with Infero-medial direction and 20% with medial direction in the right side which was statistically significant with p value <0.0001. 73% of skulls presented to be Infero medial and 27% was medial in the left side which was statistically significant with p value <0.0001. The asymmetry of direction presented to be 7%. The Asymmetry index for Infero-medial direction was 10 and Medial direction was 40. The medial direction observed to have high Asymmetry Index which suggests that medial direction to be in high proportion in the left side when compared to the infero-medial direction which was observed to be in high proportion in right side.

III. Analysis of Direction – the distance between IOF and IOM was taken in to Consideration.

Table – 5: Distance Between Infra Orbital Foramen and Infra Orbital Margin

Distance	Right	Left	Asymmetry Index Mean±SD
Mean ±SD	6.776±1.431	6.926±1.059	6.3204±7.941
SEM	0.202	0.149	1.123
N	50	50	50
P value	0.5527		

The Mean Distance between IOF and IOM was 6.8 mm and 6.9 mm for the right and left side respectively. The difference between the right and left distance was statistically not significant. The Asymmetry index was calculated by the mean distance of right and left side. The Asymmetry index was presented to be 6.32 which were observed to be high and not reported elsewhere.

DISCUSSION

On observation of the results, it can be suggested that variation in shape was presented to be in more proportion on the right side with oval shape though statistically not significant. For the direction it can be suggested that infero-medial shape to be in more proportion in the both sides which was statistically significant. The distance was presented to be 6.8mm and 6.9mm for right and left side respectively with no significant difference between right and left side. On analysing the asymmetry of the shape, direction and distance it was observed that asymmetry index was high for circular shape when compared to Oval, asymmetry index of Medial direction was high when compared to Infero Medial direction, and the asymmetry index of distance was observed to be high for IOF – IOM measurement, which was not reported yet. Marcelle Rossi[2] 2003 reported statistically significant craniofacial asymmetry in foetuses and infants (before dentition). Ilayperuma[3], 2010 reported that the shape of IOF was oval in 57.41% and circular in 31.48% which is in agreement with the present study. Boopathi S[4], 2010, reported oval shape in 53% and circular in 24.37% of skull which supports the present study. The study done by Kazkayasi[5],2001 reported about 30% oval, and 40% circular in shape which is not in agreement with the present study which suggests racial differences. Ilayperuma[3] 2010 and Apinhasmit W[6], 2006 reported infero-medial direction of IOF to be in more proportion which is in agreement with the results of present study. Varshney R[7], 2013 reported the distance between IOF and IOM to be 7.73 mm on right side and 7.81 mm on left side. According to Hussain[8], 2012 the mean distance between the infra orbital foramen and the infra orbital margin was 7.13+1.78mm, on right side it was 7.06+1.81mm and 7.20+1.71mm on left. The variations in distance may reflect the racial differences.

CONCLUSION

It can be concluded that the findings of the present study should be kept in mind during any clinical procedure to avoid any kind of complications. The results will help the professionals to localise the foramen and facilitate surgical, anaesthetic and other invasive procedures. It also emphasizes the anatomical knowledge of IOF which in turn reduce the risk and complications during surgical procedures. The clinicians especially Surgeons, Anaesthetists and Dentist should be aware about the craniofacial asymmetry to have a successful clinical practice.

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