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Morphometric Analysis of Supraorbital and Infraorbital Foramen in Maharastrian Skulls.

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ABSTRACT

We have undertaken the present study to conduct morphometric analysis of supraorbital and infraorbital foramen and highlight its clinical implications. 120 dry skulls of both sexes without mandible of unknown age were studied. Distance of both foramen relative to different surgical landmarks were studied. Variations were evaluated according to gender and side. The location, shape, size, direction and number of accessory foramina were observed. All measurements were taken bilaterally. Supraorbital notch was present bilaterally in 35% of skulls. Majority of skull have foramen or absent foramen on one side and notch on the other side. In 5% of the skulls foramen was present bilaterally. We conclude that knowledge of supraorbital foramen and infraorbital foramen is important in different maxillofacial surgeries and regional anaesthesia of that part.

Keywords: Supraorbital notch/foramen, Infraorbital foramen, Morphometric analysis

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INTRODUCTION

The supraorbital, and infraorbital foramen give passage for important neurovascular structures on the face. Modern surgical procedures, anaesthesia and other process like acupuncture requires a more precise understanding of the surrounding anatomy. [1] Supra-orbital notch/foramen is present at supra orbital margin (junction of medial 1/3rd and lateral 2/3rd). Supraorbital nerve and vessels passes through the foramen. Swimmer wearing goggles have also seen to have symptom of headache and neuralgia which is often more in persons having supraorbital notch rather than foramen because of nerve more exposed [2]. Infraorbital nerve is the continuation of maxillary nerve and exit through Infraorbital foramen present 1 cm below infraorbital margin. It supplies the skin of the upper cheek, the mucosa of the maxillary sinus, the maxillary incisor, canine and premolar and adjacent area of nose and upper lip. The knowledge of location and direction of infraorbital foramen are important during periorbital surgery. Seeing the clinical importance of supraorbital and infraorbital foramen we have undertaken the present study.

MATERIAL AND METHODS

One hundred and twenty (75 males and 45 females) human dry skull without mandible were taken for this study. The skulls were taken from Department of Anatomy and students of MBBS and DENTAL, Krishna Institute of Medical Sciences, Karad. Determination of gender was done by the knowledge of standard text book and with the help of two senior professors. All measurements were taken bilaterally.

Following parameters were observed

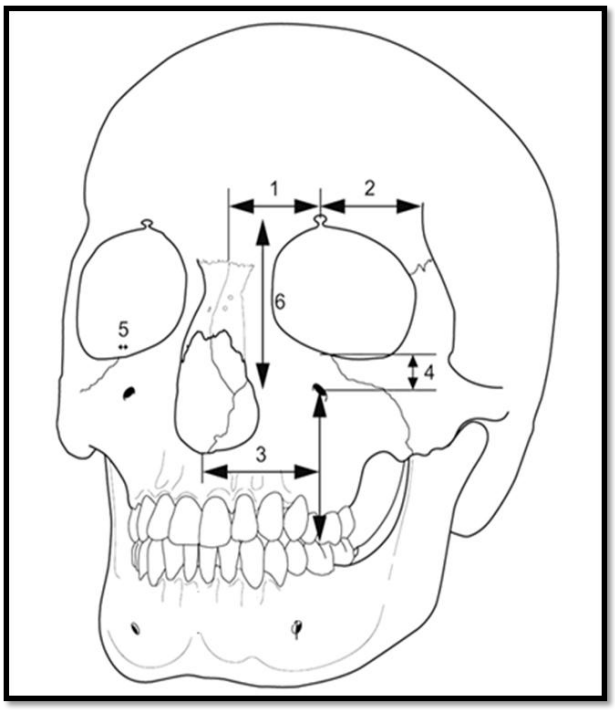
- Presence/Absences of Supraorbital notch (SON) or foramen (SOF)
- Shape and longest length of Supraorbital foramen (SOF) in mm
- Distance from nasal midline (NM) to Supraorbital notch or foramen (SOF)
- Distance from temporal crest (TC) to Supraorbital notch or foramen (SOF)
- Shape and number of Infraorbital foramen (IOF)
- Distance between Infraorbital foramen (IOF) and Maxillary midline (MM)
- Distance between infraorbital foramen (IOF) and Infraorbital rim (IOR)
- Distance between Infraorbital foramen (IOF) and Zygomaticomaxillary suture (ZMS)
- Distance between Infraorbital foramen (IOF) and Supraorbital (SOF)

All distances are measured in mm with help of ruler ,thread and digital slide caliper and analysed by GraphPad Instat software.

1& 2- Distance between SOF – NM & TC

3 & 4- Distance between IOF – MM & IOR

5 & 6- Distance between IOF – ZMS & SOF



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OBSERVATIONS AND RESULTS

Observations and results were presented in table no 1 to table no 8 and figure no 1 and 2.

Table 1: SOF/N in males (n=75)

Parameter	Frequency	Percentage
SON bilaterally	28	37.3
SOF bilaterally	9	12
SON on one side & SOF on other side	25	33.3

Table 2: SOF/N in males right and left sides (n=75 with 150 sides)

Parameter	Right	Percentage	Left	Percentage
SON /F absent	10	13.3	7	9-3
SON present	48	64	40	53.3
SOF present	17	22.6	28	37.3
SOF (round)	0	0	8	11.4
SOF (oval)	17	22.6	20	28.5

Table 3: Shape of IOF in males (n=75 with 150 sides)

Parameter	Right	Percentage	Left	Percentage
Pear	0	0	1	1.3
Round	18	24	30	40
Oval	46	61.33	40	53.3
Slit like	7	9.3	2	2.6
Semilunar	4	5.3	3	4

Table 4: SOF/N in females (n=45)

Parameter	Frequency	Percentage
SON bilaterally	17	37.7
SOF bilaterally	5	11.1
SON on one side & SOF on other side	14	31.1

Table 5: SOF/N in females right and left sides (n=45 with 90 sides)

Parameter	Right	Percentage	Left	Percentage
SON /F absent	6	13.3	5	11.1
SON present	30	66.66	24	53.3
SOF present	13	20	15	33.33
SOF (round)	2	0	2	17.77
SOF (oval)	11	35.55	13	44.44

Table 6: Shape of IOF in females (n=45)

Parameter	Right	Percentage	Left	Percentage
Round	21	46.66	21	46.6
Oval	16	35.5	15	33.3
Slit like	6	13.3	8	17.7
Semilunar	2	4.4	1	2.22

Opening of infra orbital foramina was infero medial in 55% and 52% in right and left side. In 38.75% (Rt) and 43.75 % side it was vertically down. In very few sides it was directed medially .

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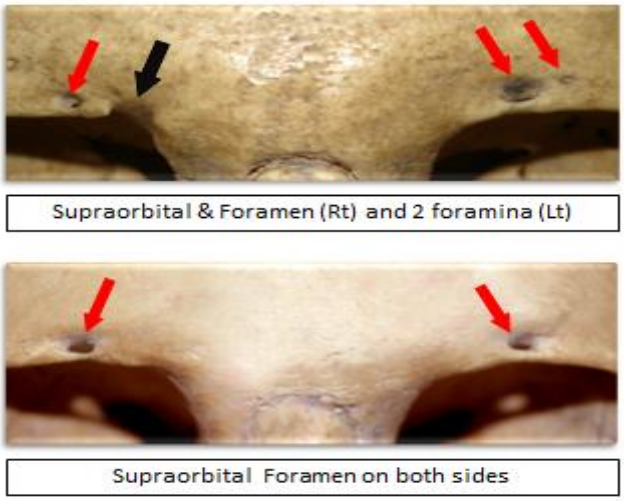

Figure 1: Supraorbital foramen

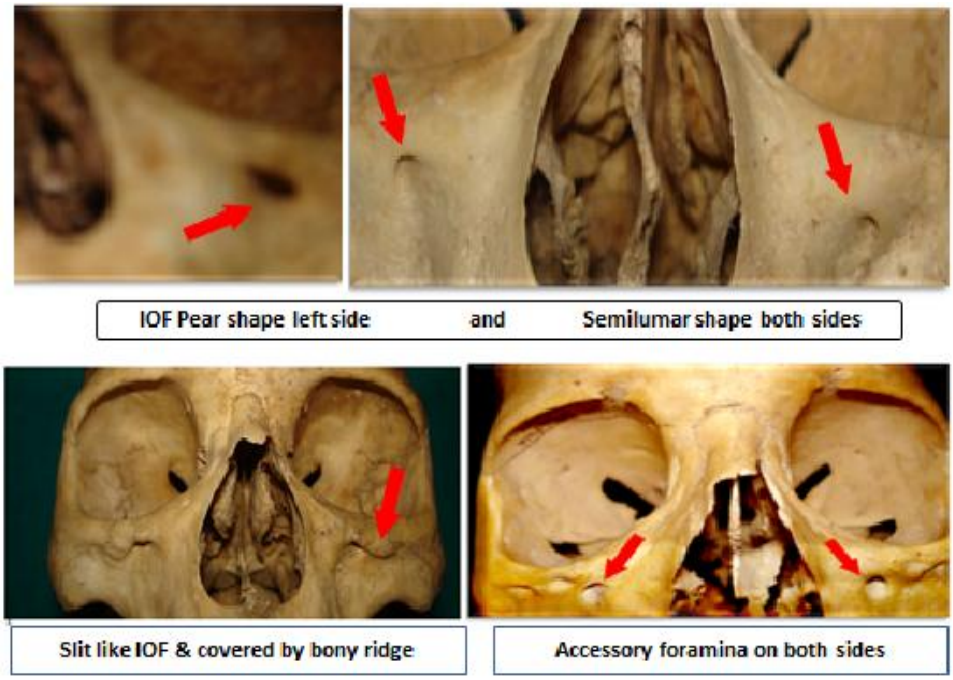

Figure 2: shapes of infraorbital foramina

Table 7: Comparison in measurements between Right and left skull

Distance between	Mean ±SD	Mean ±SD	P value
	Right	Left	
SON/F – NM	21.1±8.8	21.8± 8.1	0.5214
SON/F - TCFB	23.8±9.2	23.8±8.1	> 0.9999
IOF – MM	27.08±4.0	27.0±3.5	> 0.9999
IOF – IOR	6.7±2.3	7.0±2.1	0.2913
IOF – ZMS	12.4±3.4	12.0±2.8	0.3198
IOF - SOF	36.1±14.3	37.6±13.3	0.4001

(Data presented are mean ±SD. Test applied was Two Sample Z test. *P value <0.05 is taken as significant)

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Table 8: Comparison in measurements between Male and Female skull

Distance between	Mean ±SD	Mean ±SD	P value
	Male	Female	
SON/F – NM	21.8±7.7	20.9± 7.9	0.5419
SON/F - TCFB	20.9±7.8	23.8±6.7	0.0311*
IOF – MM	26.8±4.2	27.4±2.3	0.3124
IOF – IOR	6.7±1.8	7.1±2.3	0.3185
IOF – ZMS	12.6±3.08	11.5±2.3	0.026*
IOF - SOF	37.1±12.2	36.6±13.4	0.8379

(Data presented are mean ±SD. Test applied was Two Sample Z test. *P value <0.05 is taken as significant)

DISCUSSION

Many other authors had studied SOF and IOF in skull . Apinhasmit et al. in 2006 observed 50% of the study samples had bilateral SON, 17% had bilateral SOF and 33% had a notch on one side and a foramen on the other side, multiple supraorbital foramen was found in 8% in Thai population In 65 dry skulls [3] . Dr. S Swaminathan had observed 74 sides (52.3%) had notch, 41 sides (31.2%) had foramen. 8 sides had both notch and foramen, 6 sides found to have double foramen [4] . Tulika Gupta et al 2008, observed accessory supraorbital foramen present in 14% of skull, Sithiporn Agthong et al 2005 observed in 3.6% cases and Saylam et al 2003 in 2% cases in Turkish Crania [5]. In our study we observed accessory SOF in 9 sides . In our study 142 sides (59.16 %) had notch, 73 sides (30.41 %) had foramen , 7 sides had both notch and foramen, one side found to have double foramen are found in 120 skull (240 sides). Mexicans and Chinese showed a higher frequency of SOF than other populations [6]. Prevalence of the supraorbital notch was very high in studies of North Indian skull by (80.99 %) Nishtha et. al. 80.99% [7].

In one more study by Bruno et al. distance between SOF-NSM is 28.06 ±5.24 in male and 26 ± 3.66 in female . SOF-TCFB was 23.73±4.40 (male) and 23.49±3.66 (female). SOF-IOF and IOF-IOR distance was 43.43±3.34 (male) 42.67±3.03(female) , and 6.63±1.75(male) 6.35±1.67 (female) respectively [8] . These distances in our study are given in Table no 8.

Shape of infraorbital foramen is observed as round most commonly followed by oval, slit-like and semilunar . Dr. S Swaminathan found 73.07% infraorbital foramen as oval in shape. Among Thai skulls 50% infraorbital foramen were oval, 29% semilunar, 21% circular in shape. Fazal Ur Rehman reported only circular shape while studying foetal skull. Many author studied only infraorbital foramen [9] .Review literature by Akshay Satwik et al reported that In 2005, Agthong, Huanmanop and Chentonez,revealed that absence of infraorbital foramen in 73.7% of investigated skulls [10] . Distance of IOF to MM, IOR, ZMS and SOF in our study is shown in table 7 and table 8. The distance of IOF was 28.5mm lateral to nasal midline by Gupta [11] 27.7mm and 25 mm by Aziz and Cutright respectively but very lateral 44.07 mm by Dr swaminathan [4]. Distance between IOF-IOR in present study was similar to was Gupta, Cutright , K Reddy Dr swaminathan and Macedo, VC [12,13]. Distance between IOF –ZMS and SOF was 6.56 and 43.04 by Bruno. Distance between IOF-SOF was 45.6 by M.S. Chung [14] . Direction of infraorbital foramen was inferomedially in 55 % (Rt) and 52.5 & (Lt) This was close to the findings by Amrita [15] who reported inferiomedially (51% on right side and 50% on left side) and Boopathy S8(55% on right side and 52.50% on left side) [16].

In our study we have seen accessory IOF in only one skull, contrary to that M. G. Elias found in 50 in 210 brazilian skull. Poirier (1912 *in* Bergman *et al.*), checked the presence of 35 double foramens, two triples and one with 4 foramens.[17]

CONCLUSION

Damage of supraorbital neurovascular bundle is an important complication reported with varying frequency during anterior orbital approach, fronto-glabellar reconstruction flap, blepharospasm, and Graves disease surgery, and in supraorbital nerve block for procedures like closure of facial wounds, treatment of migraine and chronic paroxysmal hemicranias. Presence of accessory foramina may interfere with anaesthesia.[10]. Knowledge of position of infraorbital foramen is very useful to maxilla-facial surgeon as in Lefort's fracture and in regional block anaesthesia.

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