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STUDY OF SUPRAORBITAL FORAMEN/NOTCH IN RELATION TO NASION AND FRONTOZYGOMATIC SUTURE IN NORTH INDIAN POPULATION

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ABSTRACT

The supraorbital foramen/notch as per literature we studied so far is located at the junction of medial 1/3rd and lateral 2/3rd. But when the study was done, the location of sof/son varies in skulls of different races and locations. The location of sof/son is important as contents of the foramen/notch are important for various clinical procedures and surgeries. Thus, the study was done in human dried skulls of North Indian population. The study was done on 37 human dried skulls of North Indian population available in Department of Anatomy, ASCOMS. The distance between the nasion and sof/son and frontozygomatic suture and sof/son was done using vernier callipers. The presence of foramen and notch was studied and tabulated. The readings are then subjected to statistical analysis. The study of the 37 human dried skulls tells that SON are present more on right side (56.8%) than on the left side (35.1%). The number of SOF more on left side (62.2%) than on the right side (40.5%). The mean distance of SOF/ SON from the nasion on right side is 26.198 ± 3.174 mm and that on the left side is 25.218 ± 2.979 mm. The mean distance of SOF/SON from frontozygomatic on right side is 30.273 ± 3.259 mm and on left side is 29.775 ± 3.718 mm. The conclusion from this study is that the position of SOF/SON is not constant and varies in skulls of different races. Thus, doing surgeries where supraorbital nerves and vessels are required or SON/SOF is required need a very careful and expertise opinion before starting the procedure.

Keywords: Foramen, Notch, Skulls, Supraorbital Nerve and Vessels

INTRODUCTION

The supraorbital foramen/notch as is written in the literature is present on the supraorbital margin at the junction of medial 2/3rd and lateral 1/3rd. The contents of supraorbital foramen/notch is a neurovascular bundle. The supraorbital nerve which comes out is the main cutaneous nerve supply to the forehead. The knowledge of the location of this foramen is important in a number of procedures where supraorbital nerve is required to be blocked. This block is carried out in treatment of migraine and chronic paroxysmal hemicranias (Antonacie *et al.*, 1997). In many newborns, the distal end of the nasolacrimal duct is closed at birth. Majority of nasolacrimal duct open spontaneously after several weeks. In remaining cases, probing of the duct is done as a treatment.

The supraorbital notch/foramen is a convenient landmark for the probing procedure for nasolacrimal canal (Zwaan, 1997). Only thorough knowledge of exact localization of supraorbital nerve emergence point avoids transaction of this nerve (Beer *et al.*, 1998). The supraorbital nerve block is also required in treatment of supraorbital neuralgias, facial wounds and scar revisions. As little knowledge is given in the literature about the exact location of foramen / notch so our study is just a little effort for the location in north Indian human dried skulls.

MATERIALS AND METHODS

Material

The study is carried out on North Indian human dried skulls available in the Department of Anatomy, ASCOMS, Jammu and also from the students of 1st professional M.B.B.S., ASCOMS. In the study I studied whether the supraorbital foramen or notch is present along with number of foramen and the distance between the SOF/SON measured from nasion and frontozygomatic suture with the help of vernier callipers. The studied parameters are then subjected to statistical analysis.

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RESULTS AND DISCUSSION

Observations

Table 1: Showing the Presence of Foramen or Notch

S. No.	Right	Left
1.	N	N
2.	N	F
3.	N	F
4.	N	N
5.	N	F
6.	F	F
7.	F	F
8.	N	F
9.	N	F
10.	N	N
11.	F	F
12.	N	F
13.	1 F	2 F
14.	F	F
15.	F	F
16.	F	F
17.	N	N
18.	N	N
19.	F	F
20.	F	F
21.	N	F
22.	N	N
23.	F	N
24.	N	N
25.	N	F
26.	F	F
27.	N	N
28.	F	F
29.	N	N
30.	N	F
31.	F	F
32.	N	F
33.	F	F
34.	N	N
35.	F	N
36.	F	F
37.	N	N

Table 2: Showing the Number of Notches and Foramen on Right and Left Side

	Right Side	Left Side
Notch	21 (56.8%)	13 (35.1%)
Foramen	15 (40.5%)	23 (62.2%)

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The number of supraorbital notches on right side is 21 out of 37 skulls which is 56.8% and on left side is 13 out of 37 which is 35.1%. The number of supraorbital foramen on right side is 15 out of 37 which is 40.5% and on left side is 23 out of 37 which is 62.2%. The number of skulls in which notches are present on both sides is 11 out of 37 and foramen on both sides is 13 out of 37.

Bilateral Notch : 11 / 37

Bilateral foramen : 13 / 37

Thus, the study of the 37 human dried skulls tells that the skulls with SON on right side (56.8%) are more than skulls on the left side (35.1%). The skulls number with SOF on left side (62.2%) are more than on the right side (40.5%).

Table 3: Shows the Mean Distance of Supraorbital Foramen/ Notch from the Nasion (in mm)

S. No.	Right	Left
1.	24.56	25.90
2.	25.40	27.04
3.	26.12	23.17
4.	25.12	26.32
5.	30.04	29.16
6.	25.86	24.23
7.	23.05	21.96
8.	27.54	27.01
9.	26.02	29.51
10.	22.19	24.65
11.	24.62	21.02
12.	23.04	26.01
13.	27.32	25.20
14.	25.00	20.01
15.	24.65	25.05
16.	26.03	23.43
17.	27.05	26.51
18.	20.09	21.76
19.	34.00	32.08
20.	28.04	26.02
21.	25.15	21.02
22.	29.54	24.01
23.	30.12	29.87
24.	25.65	27.21
25.	22.45	25.01
26.	23.53	29.76
27.	31.00	25.99
28.	21.09	23.00
29.	25.87	21.09
30.	28.98	25.08
31.	31.02	28.09
32.	26.56	25.34
33.	28.54	21.56
34.	23.30	25.06
35.	26.65	21.08
36.	22.03	23.87
37.	32.09	29.98

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Table 4: Shows the Distance of Supraorbital Foramen/Notch from Frontozygomatic Suture (in mm)

S. No.	Right	Left
1.	28.04	30.10
2.	33.98	31.07
3.	25.13	28.43
4.	29.01	27.04
5.	26.36	26.05
6.	32.1	30.94
7.	33.17	32.65
8.	32.03	31.75
9.	32.2	23.8
10.	30.57	29.27
11.	27.12	32.21
12.	38.43	32.011
13.	23.62	33.09
14.	31.25	32.06
15.	29.43	21.87
16.	28.42	30.02
17.	29.09	31.75
18.	30.76	23.98
19.	29.76	21.43
20.	32.12	30.13
21.	30.02	33.54
22.	31.11	34.02
23.	34.01	32.01
24.	32.11	33.02
25.	30.98	28.65
26.	25.02	27.87
27.	32.98	29.08
28.	32.09	34.98
29.	33.98	31.09
30.	31.87	35.09
31.	32	34.78
32.	26.54	23.43
33.	30.09	32.65
34.	22.87	25.98
35.	30.8	28.76
36.	26.98	25.08
37.	34.07	32

These reading are subjected to statistical analysis and readings are tabulated below in Table 3.1

According to the table 3.1 below, the mean distance of SOF/ SON from the nasion on right side is 26.198 ± 3.174 mm and that on the left side is 25.218 ± 2.979 mm.

The mean distance of SOF/SON from frontozygomatic on right side is 30.273 ± 3.259 mm and on left side is 29.775 ± 3.718 mm.

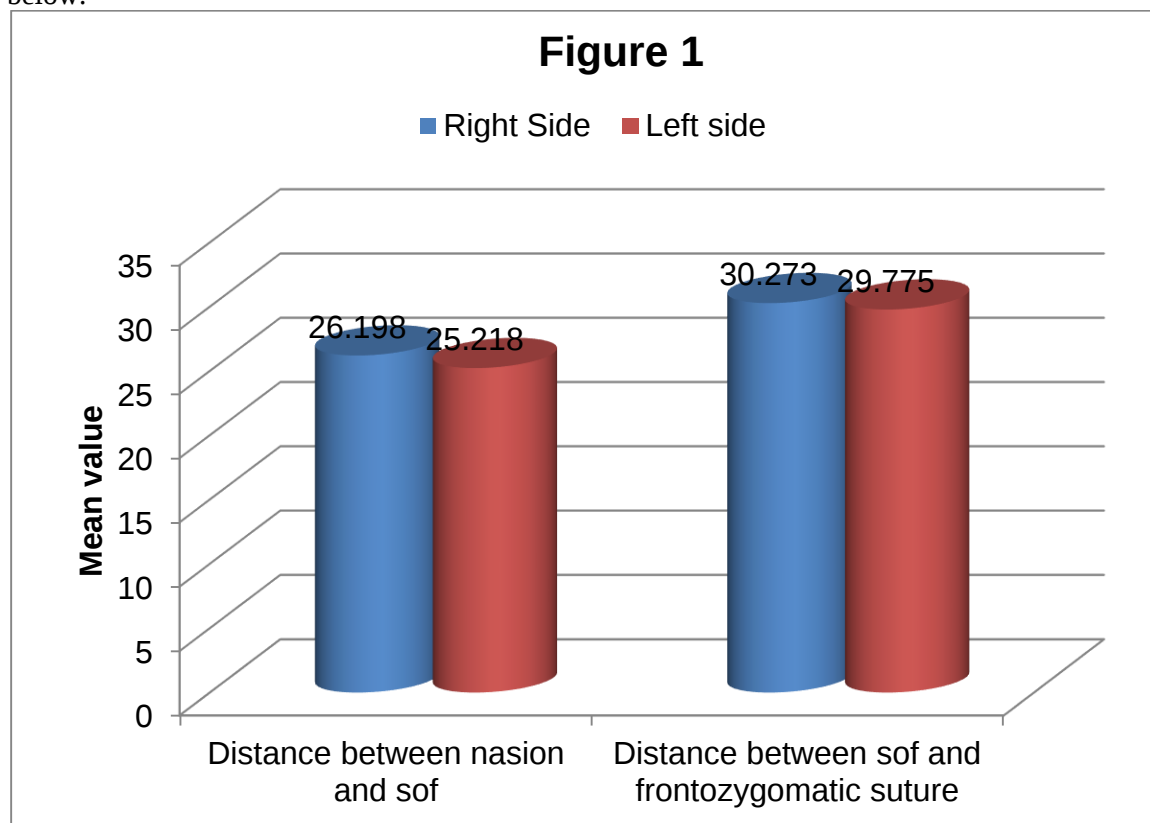
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Table 5: Showing Statistical Analysis Results

	Right Side Mean $\pm$ SD	Left Side Mean $\pm$ SD	Paired Value	'T'	P Value
Distance between Nasion and SOF	26.198 $\pm$ 3.174	25.218 $\pm$ 2.979	1.956		0.058 ^{NS}
Distance between SOF and Frontozygomatic Suture	30.273 $\pm$ 3.259	29.775 $\pm$ 3.718	0.766		0.449 ^{NS}

NS: $p > 0.05$; Not Significant

The bar diagram showing the SOF/SON and relation with nasion and frontozygomatic suture is shown below.



Discussion

The SOF/SON is situated along the supraorbital margin at the junction of medial 1/3rd with the lateral 2/3rd as per the literature we studied so far. The contents of foramen/notch are supraorbital nerves and vessels. Supraorbital nerve is the larger terminal branch of the frontal nerve, which is a branch of ophthalmic division of trigeminal nerve and it traverses through the SON/SOF and divides into medial and lateral branches to supply the palpebral filaments to the upper eyelid, conjunctiva and skin of the scalp as far back as the lambdoid suture. Supraorbital artery is a branch from the ophthalmic artery which in turn is from the internal carotid artery. It leaves the orbit through the SON/SOF, divides into superficial and deep branches to supply the skin and muscles of the upper eyelid, forehead and scalp. The supraorbital vein unites with the supratrochlear vein near the medial angle of the eye to form the facial vein.

As per the study done by us and other similar studies analyzed the location of SOF/SON is not same and varies from skull to skull. The variation in the placement of foramen/ notch is thus the main cause why cosmetic surgeons are generally reluctant to perform brow lifts and other open, as well as endoscopic

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surgical procedures in this region for fear of injuring the supraorbital nerve and subsequent sensory loss (Gupta, 2008; Rosenberg, 1998).

Table 6

	Webster <i>et al.</i> , 1986	Sinha, <i>et al.</i> , 1978	Kazkayasi <i>et al.</i> , 2008	Chung, <i>et al.</i> , 1995	Gupta, <i>et al.</i> , 2008	Trivedi <i>et al.</i> , 2010	Ashwini <i>et al.</i> , 2012	Present Study
Skulls Studied	108	400	60		79	233	83	37
Bilateral SOF	25.93%	44.25 %	41%	28.9%	45.6%	35.62%	28.91%	35.15%
Bilateral SON	49.07%	18.25 %	49%	69.9%	54.4%	21.45%	68.97%	29.72%

According to the above table, the comparison between present study and other studies revealed that bilateral sof are almost equal in study of Trivedi D.J and bilateral SON are more in percentage than Trivedi D.J. The percentage of bilateral SOF is more in Sinha D.N and is less in Chung M.S. and Webster than present study.

In these studies the differences between the percentage of SOF and SON is big and noticeable among Webster, Sinha D.N., Chung M.S., Trivedi D.J. and Ashwini LS whereas its small and almost equal in Kazkayasi *et al.*, Gupta T and present study.

Table 7: Showing Distances between Nasal Midline and SOF/SON and Frontozygomatic Suture and SOF/SON (Measurements in mm)

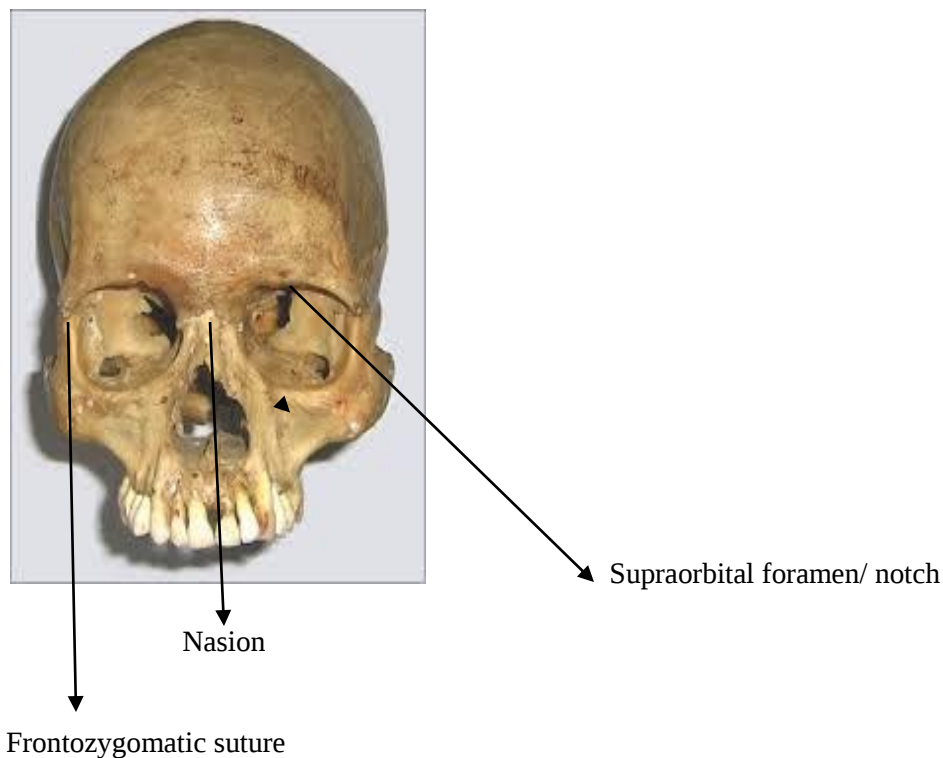
Study	Distance between Midline and SOF/SON	Nasal	Distance between Frontozygomatic Suture and SOF/SON
Gupta, 2008	23.9		
Cutright <i>et al.</i> , 2003	25.0		
Jeong <i>et al.</i> , 2010	29.0		
Cheng <i>et al.</i> , 2006	24.56		
Agthong <i>et al.</i> , 2005	24.75		
Liu <i>et al.</i> , 2011			20.55
Smith <i>et al.</i> , 2010 -			26.22
Webster <i>et al.</i> , 1986	32.02		
Chung <i>et al.</i> , 2003	22.7		
Gertude M. Beer <i>et al.</i> , 1998	31.0		
Ebraheim <i>et al.</i> , 1996	39±4		
Trivedi <i>et al.</i> , 2010	23.73(Left Side)/ 24.30 (Right Side)		
Ashwini <i>et al.</i> , 2012	22mm		28.77 (left side) 29.34 (right sde)
Present Study	25.218 ± 2.979 (left side)/ 26.198 ± 3.174 (right side)		29.775 ± 3.718 (left side) 30.273 ± 3.259 (right side)

The distance between nasion and SOF/SON is between 22.7 – 39.4mm and the distance in our study is 25.218± 2.979mm on right side and 26.198± 3.174mm on left side. The maximum distance is in Ebraheim N.A. *et al* study which is 39±4mm.

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The distance between frontozygomatic suture and SOF/SON is between 20.55- 29.34mm whereas in present study its 29.775 ± 3.718 mm on left side and 30.273 ± 3.259 mm on right side. The distance in our study is more in comparison to previous studies.

Though most of the previous studies have measured the SOF/SON from the nasal midline; it can be difficult to accurately locate on the skin during surgery. Hence, measuring the distance between the SOF/SON and the frontozygomatic suture is considered to be a more reliable parameter, which was used in the current study.



Picture Showing the Landmarks of the Study

Conclusion

The conclusion from this study is that the position of SOF/SON is not constant and varies in skulls of different races. Thus, doing surgeries where supraorbital nerves and vessels are required or SON/SOF is required need a very careful and expertise opinion before starting the procedure.

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Research Article

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