

## A Study Of Supraorbital Notches And Foramina In Gujarati Human Skulls.

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**Abstract :** The anatomy of the supraorbital notches and foramina has been studied in 249 human skulls. Of 233 skulls, 35.62% had bilateral supraorbital notches, 21.45% had bilateral supraorbital foramina and 16.73% had a notch on one side and a foramen on other side. In present study, total 13 types of combinations were found. The average distance from the nasion to the supraorbital notch/ foramen was 24.30 mm ( 16.74-31.86) on right side and 23.73 mm (15.78-31.86) on left side. The exit point can be significantly cephalad to the orbital rim. Knowledge of the anatomy of the region is important for those doing forehead and brow lift surgeries in order to avoid injuring the neuro-vascular bundle passing through these notches/foramina.

**Key words :** Supraorbital notch , Supraorbital foramen , Supraorbital nerve, Supraorbital vessels

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**INTRODUCTION:** Until now, it was believed that the point of emergence of supraorbital nerve is by way of a notch or a foramen slightly medial to the junction of outer 2/3<sup>rd</sup> and inner 1/3<sup>rd</sup> of supraorbital rim. Subsequently, it was noticed by surgeons that the exit point was repeatedly not at the site where anticipated, when implanting lid springs for facial palsy.

Knowledge of exact location of supraorbital notch/foramen is important when supraorbital block is given. This block is carried out in treatment of migraine and chronic paroxysmal hemicrania<sup>1</sup>.

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<sup>2</sup>. In forehead, coronal and

brow lifting procedures deep division of supraorbital nerve is done. Only thorough knowledge of exact localization of supraorbital nerve emergence point avoids transaction of this nerve<sup>3</sup>.

However, available literatures on the subject of supraorbital notch/foramen lack details of its incidence, shape and combination of notch and foramen.

**MATERIAL AND METHOD:** 249 skulls of unknown age and sex were examined from the collection of Anatomy departments of various Medical Colleges of Gujarat. 16 skulls showing any breakage near supraorbital rim were not included in the study. In the remaining 233 skulls, supraorbital notches or foramina were differentiated and recorded. Observations taken in the study were distances from the midline to the supraorbital notch/foramen, dimensions of the foramen (transverse and

vertical) and measurement of horizontal length of the notch.

The midline of the forehead was established by dropping a silk suture from the vertex of the skull through the nasion to the anterior nasal spine and inter-maxillary suture line. The measurements were done with vernier calipers and measuring tape. Observations thus made were compiled; tabulated and statistical data were calculated.

**OBSERVATIONS:** Table-I shows thirteen types of combinations amongst notch, foramen & incomplete foramen including absence of all the features at the supraorbital margin of the skull with their incidences.

Table-II shows the distance in mm. of supraorbital notch/foramen from the midline. Mean distance from midline to supraorbital notch/foramen was 24.30 mm on right side and 23.73 mm on left side.

Table-III shows measurement of horizontal length of supraorbital notches and horizontal and vertical length of supraorbital foramina. The mean distance of horizontal length of supraorbital notch was 4.59 mm on right side and 4.67 mm on left side. The mean horizontal diameter of supraorbital foramen was 3.67 mm on right side and 3.54 mm on left side. The mean vertical diameter of supraorbital foramen was 2.49 mm on right side and 2.45 mm on left side.

TABLE-I

VARIETIES OF FEATURES AT SUPRAORBITAL MARGIN

Sr. No.	Types of combinations in same skulls		Skull (Nos)	% (Percentage)
	Right	Left		
1	N	N	83	35.62
2	N	F	18	7.72
3	N	IF	08	3.43
4	N	X	02	0.85
5	F	N	21	9.01
6	F	F	50	21.45
7	F	IF	12	5.15
8	F	X	02	0.85
9	IF	N	12	5.15
10	IF	F	08	3.43
11	IF	IF	15	6.43
12	X	F	01	0.42
13	X	X	01	0.42

(N= Notch, F= Foramen, IF= Incomplete foramen, X= Absence of all features)

Figure 1: Measurement of Supraorbital Notches and Foramina



**Measurement of distance of supraorbital foramen from midline**

**Measurement of vertical diameter of supraorbital foramen**



**Measurement of horizontal diameter of supraorbital foramen**

**Supraorbital foramen on right side and notch on left side**



**Bilateral supraorbital notches**

**Bilateral supraorbital foramina**

TABLE-II

DISTANCES (mm) OF SUPRAORBITAL NOTCHES AND FORAMINA FROM THE MIDLINE

Sr. No.	Value	Supraorbital notch / foramen	
		Right	Left
1	No. of observations	233	233
2	Mean distance (mm)	24.30	23.73
3	Range (mm)	16.74 - 31.86	15.78 – 31.68

TABLE-III

MEASUREMENT OF HORIZONTAL LENGTH OF SUPRAORBITAL NOTCHES AND DIMENSIONS OF SUPRAORBITAL FORAMINA

Sr. No	Value	Horizontal length of supraorbital notch		Horizontal diameter of supraorbital foramen		Vertical diameter of supraorbital foramen	
		Right	Left	Right	Left	Right	Left
1	No. of observations	146	153	86	76	86	76
2	Mean distance(mm)	4.59	4.67	3.67	3.54	2.49	2.45
3	Range(mm)	0.36-8.82	0.42-8.92	1.48-5.86	1.13-5.95	1.12-3.86	0.95-3.95

**DISCUSSION:** Previously, it was believed that the point of emergence of supraorbital nerve is constant. However, it was noticed by various studies that the exit point was repeatedly not at the site where expected i.e. at the junction

of outer 2/3<sup>rd</sup> and inner 1/3<sup>rd</sup> of the supraorbital rim.

Among the risks of forehead surgeries, are injuries to the supraorbital and supratrochlear

neurovascular bundles. Problems resulting from such injuries include:-

1. Haematoma formation in subgaleal plane.
2. Anaesthesia or hypoaesthesia of the forehead.
3. Ischemia or necrosis in portions of the forehead flap.
4. Hair loss.

In the present study, it has been found that notches varied from broad, flat designs to narrow keyholes or bi-lobed forms, whereas the foramina were more uniform and did not differ much in the diameter. Foramina were ovoid in shape, with the longer axis lying in the horizontal plane.

Webster<sup>4</sup> observed that out of 108 skulls studied, 49.07% demonstrated bilateral supraorbital notching, 25.93% demonstrated bilateral supraorbital foramina, 25% demonstrated a notch on one side and a contralateral foramen. Sinha D. N.<sup>5</sup> observed that out of 400 skulls studied, 44.25% demonstrated bilateral supraorbital notches, 18.25% demonstrated bilateral supraorbital foramina, 12.55% demonstrated a notch on one side and contralateral foramen. Chung M.S.<sup>6</sup> found supraorbital notches (69.9%) were more frequent than supraorbital foramina (28.9%). Present study of 233 skulls showed, bilateral notches in 35.62% of skulls and bilateral foramina in 21.45 % of skulls and 16.73 % of skulls demonstrated a notch on one side and a contra lateral foramen.

Hollinshead<sup>7</sup> had described a total incidence of supraorbital foramina as 25% but has not given the side difference. Warwick and Williams<sup>8</sup> did not mention the absence of all the three (notch, foramen and incomplete foramen) features at supraorbital margin of human skull. The present study revealed absence of all the three features in 0.42% on the right side and 1.71% on the left side which was also seen in combination with notch, foramen and incomplete foramen in the same skulls. Gertude M. Beer<sup>3</sup> observed average distance of supraorbital notch/foramen to nasion was 31 mm. Chung M.S.<sup>6</sup> observed average distance from nasion to the centre of supraorbital notch/foramen was 22.7 mm. Ebraheim N.A. et al.<sup>9</sup> found the mean distance between the midline and lateral branches of supraorbital nerve was  $39 \pm 4$  mm on the left side and  $39 \pm 5$  mm on the right side. Present study showed average distance from nasion to supraorbital notch/foramen was 23.73 mm on the left side and 24.30 mm on the right side.

**CONCLUSION:** Of the 233 skulls studied following conclusions can be drawn:-

The exit points of the supraorbital nerve are not at all constant. It can be either a notch or a foramen. It may be an incomplete foramen. Complete absence of notch or foramen may deprive the supraorbital nerves and vessels, the protection given by these and make them more vulnerable to injuries at the sharp supraorbital margin. Because of the numerous variations of the exit points on the supraorbital rim, all surgical approaches to the supraorbital nerve on the supraorbital rim, especially the

endoscopic ones, always have to be done under vision and with the necessary care of the nerves. The knowledge provided by various measurements recorded in the present study regarding the location of supraorbital notch/foramen will help the surgeons to avoid injuries to the neurovascular bundles passing through the same.

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