The study of supraorbital notches and foramina in adult skulls

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Abstract:

Introduction: The knowledge of anatomy of forehead and localization of supraorbital notch is essential for performing various operations like eyebrow lift surgery. This study was aimed to study occurrence of supraorbital notches and foramina in adult skull.

Materials & Methods: This study was conducted in Government medical college Nanded in Department of Anatomy. The material for present study was collection of dried skulls from dissection hall of Government Medical college Nanded.

Results: In 96 skulls 57 were male and 39 were female. In 52% male skulls supraorbital notches were present on both side. In 30.8% female skulls supraorbital nothches were present on both side. In 10.05% male skulls supraorbital foramina present on both sides. In 30.8% female skulls supraorbital foramina present on both sides. In 36.9% male skulls & 38.5% female skulls notch was present on one side and foramina on other side. In 15.7% male skulls accessory foramina were on both side. There was no female skull having accessory foramina on both sides. In 31.5% male skulls and 7.7% female skulls had accessory foramina on one side.

Conclusion: Our simple study work confirmes the presence of supraorbitaal notches more common than foramina as studied by various workers.

Key words: supraorbital foramina, supraorbital notches, Adult skulls

Introduction:

Supraorbital notch lies on supraorbital margin of orbit at the junction of medial one third with its lateral two third. In superior rim of the orbit at the junction of its medial third with lateral two third one can palpate supraorbital notch. Occasionally the ligament that bridges across the notch become ossified converting the easily palpabal supraorbital notch into less easily palpabal supraorbital foramina (1). Duke elder called this ligament as supraorbital ligament (2) Schaffer Claimed for frequent conversion of notch into foramen (3) Supraorbital notch/foramen transmits supraorbital nerves and blood vessels. supraorbital nerve is a branch of frontal nerve (Branch of ophthalmic nerve) after passing through supraorbital foramina terminates by giving branches to upper eyelid and conjunctiva (4) Additionally it supplies the frontal sinus and the skin from the forehead. Supraorbital artery supplies the levator palpebrae superioris, the diploë of the frontal bone, the frontal sinus, the upper eyelid, and the skin of the forehead and the scalp. Authors of various textbooks have mentioned the presence of supraorbital foramina instead of supraorbital notch. Webster et al (5) mentioned that 25% individual notches are converted into foramina by ossification of ligaments crossing it. He has also mentioned about the occurrence of multiple foramina or notches.
occasionally. Various workers like Berry (6) (1975), Kimmura (7) (1977), Gumusburun et al (8) (2002) studied the anatomical variations of supraorbital foramena and notches in their region. But there is no similar work carried in this region of Marathwada of Maharashtra. The perfect knowledge of Anatomy of supraorbital notch & foramena is helpful to reduce the injuries of supraorbital neurovascular bundle and their complications during surgery on forehead region and eyelids.

**Material and methods:**
The material for present study was collection of 96 adult dried skulls from dissection hall of Anatomy Department of Government medical college Nanded. All the skulls were between age group 30 to 50 as confirmed from sutures. These skulls were separated as of male and female by seeing the superciliary arches. All the skulls showing supraorbital notches or foramina without doubt were chosen for the study. All the skulls were examined for the presence of supraorbital notch, foramina and supernumerary supraorbital foramena and their variations on both sides. The statistical formula was applied to the values calculated & found to be significant (p < 0.00001)

**Observations:** Table showing various findings of supraorbital notches and foramina

<table>
<thead>
<tr>
<th></th>
<th>Male (57)</th>
<th>Female (39)</th>
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</thead>
<tbody>
<tr>
<td>Bilateral supraorbital notches</td>
<td>52%</td>
<td>30.8%</td>
</tr>
<tr>
<td>Bilateral supraorbital foramina</td>
<td>10.5%</td>
<td>30.8%</td>
</tr>
<tr>
<td>Unilateral notch &amp; foramina</td>
<td>36.9%</td>
<td>38.5%</td>
</tr>
<tr>
<td>Bilateral accessory foramina</td>
<td>15.7%</td>
<td>0%</td>
</tr>
<tr>
<td>Unilateral accessory foramina</td>
<td>31.5%</td>
<td>7.7%</td>
</tr>
</tbody>
</table>

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Results:
Total 96 skulls were considered for study. Out of 96 skulls 57(59.37%) were male and 39(40.62%) were female. In 57 skulls of male 30 (52.63%) had notches on both sides while in 21(36.9%) skulls notch on one side & foramina on other side. In 39 female skulls 12(30.8%) had notches on both sides while in 15(38.5%) skulls notch on one side & foramina on other side. In 21(36.9%) male skulls 18(31.6%) skulls were having notch on right side &3(5.3%) having foramina on right side while 3(18.3%) skulls notch on left side &18(85.6%) foramina on leftside. In 15(38.5%) female skulls 3(7.7%) were notch on right side & 12(30.8%) having foramina on left side.

Accessory foramina were present in 27(47.4%) male skulls. In 6(10.5%) male skulls accessory foramina was present on right side whereas in 12(21%) skulls it was on left side. In 9 (15.7%) male skulls accessory foramina present on both side . Accessory foramina were present only in 3(7.7%) female skulls. In all the female skulls accessory foramina were on left side. There was no accessory foramina on right side in male skull.

Discussion:
Various workers quoted the variations of supraorbital notch & foramina but available literature is limited. The knowledge of Anatomy of forehead is not correctly understood for the surgical procedure in this region. Forehead & eyebrow lifting procedure in recent years have gained importance in the management of aging phase. Frontal nerve in the orbit gives the supraorbital nerve, which pierces orbital septum to supply sensation to the medical aspect of upper eyelid & skin of forehead & anterior scalp. Supraorbital artery supplying arterial blood to the part of forehead is branch of ophthalmic artery. To preserve the neurovascular bundle coming out from supraorbital foramina need to know how frequently foramina occur.

Improper knowledge of supraorbital notches may lead to injuries of supraorbital neurovascular bundle during subglial dissection in supraorbital rim. In our study we found that there was equal distribution of notches and foramina in female. Accessory foramina were more common in male than female. The incidence of unilateral supraorbital foramina and notches were more in female. The incidence of accessory supraorbital foramina was more in male and we could not found the presence of bilateral accessory foramina in female .In present study there were 43.75%(male & female) bilateral supraorbital notches,18.75% (male &female) had bilateral foramina and in 37.5% notch on one side &foramina on other side while R. C. Webster et al (6) got 59.07% bilateral supraorbital notches,25.93% had bilateral supraorbital foramina & 25% had notch on one side & foramina on other side . In the study of Gumusburun et al9 there were 54.7% skulls having notches on either side, 8.9% had one foramina on one side & notch on other side, 5.3% had one foramin on either side & 24.4% had other combination. In the study of Trivedi D. G. et al(9) outof 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. The incidence of supra orbital foramina as reported by Duke Elder and Hollinshed W.Henry was 25% of total adult skulls [2,10], while Rao etal reported 6.5% in south indian studies [11]. Arunkumar S. Bilodi, San ikop MB had shown incidence of supraorbital foramina of 39% on right side and 43.3% on left side [12], while study by Sinha DN had shown the
incidence to be 34.25% on right side and 28.5% on left side (13). Berry had found equal incidences of supra orbital notches and foramina in Mexican crania [14]. In the study of Lonhe S.R.et al there were 28.7% skulls having bilateral notches and 15.8% having bilateral foramina and 10% having notch on one side & foramen on other side (15).

According to textbook of Gray’s anatomy supraorbital notch and foramen occurs equally in same population. (3) This difference of incidence of notches and foramina by different authors may be due to study of skulls from different region. Workers like Berry², Kimurra³ in their study confirmed variations of supraorbital notch & foramina in their region.

There is no similar work carried out in region of Marathwada in Maharashtra state, so in present work we determined the proportions of variations of supraorbital notches & foramina. In India, an application of technology in medical education particularly in Anatomy is on the way to rise. (16) The changing ways of teaching – learning like EBM also has impact on understanding the basic anatomy. (17) It is essential that knowledge of Anatomy of Forehead include study of supraorbital notch & structures coming out through it(Richard C. Webster MD et al 1986). Supraorbital notch similar to supraorbital foramina shows variation in its form & needs the similar study with the present work.

**Conclusion:**

The knowledge of Anatomy of forehead, eyelid is required during the various surgical procedures in this region. Knowledge of supraorbital notches helps to prevent injuries of supraorbital neurovascular bundle however as mentioned in various textbooks in anatomy. These notches show variation in the form of foramina. Our study confirms the presence of supraorbital notches more common than foramina as studied by various workers.

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Authors published these results due to their sole importance in clinical scenario.

**References**


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