

SHORT COMMUNICATION

Study of Supra Orbital Notch and Foramen in Adult and Foetal Human Skulls

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Abstract: *Background:* We aimed to correlate anatomic variation of supra orbital notch, foramen, and incomplete foramen in adult and foetal human skulls for age related difference. *Observation:* The present study was done on 101 human adult skulls and 59 foetal skulls, to observe the various combinations of supra orbital notch, foramen, incomplete foramen and absence of these features. *Result:* 9 types of combinations were observed in adult skulls & 8 types of combinations were observed in foetal skulls amongst notch, foramen, incomplete foramen & absence of these features. The difference between incidence of foramen was significant in adult skulls ($p < 0.05$). Percentage of notch was higher in adult 29% as well as foetal skulls 30% than other features. Absence of all the features (notch, foramen and incomplete foramen) were not seen in adult skull but were observed in 6.77% of foetal skulls. *Conclusion:* All features that is notch, foramen and incomplete foramen was present since 4th lunar month of foetal age in foetal skulls so there was no correlation found in adult and foetal skulls features.

Key words: Supra orbital foramen, notch Incomplete foramen, Absence of features, Adults & foetal skulls.

Introduction

Supraorbital margin formed by the frontal bone is interrupted at the junction of its sharp lateral two third and rounded Medial third by the supra orbital notch which transmits the supra orbital vessels and nerves. In case of absence of supra orbital foramina or notches, supra orbital vessels and nerves are more prone for injury due to sharp supra orbital Supra orbital margin formed by the frontal bone, is interrupted at the junction of its sharp lateral two- third and rounded margin of orbital rim [1]. In 25% individuals, the notch is converted into foramen by ossification of the periosteal ligament crossing it [2]. Duke Elder has named this ligament as supra orbital ligament [3]. Schaffer Claimed for frequent conversion of notch into foramen [4]. D.N.Sinha studied four hundred adult skulls of unknown sex and noted that the difference between incidence of notch and foramen was significant ($p < 0.05$) [5]. Arunkumar S. Bilodi, Sanicop MB observed the various combinations of supra orbital foramina and recorded their percentages on right and left sides of 300 adult human skulls [6]. Hollinshed, Berry, Rao et al have also studied supra orbital foramina [2, 7-8]. Available literature on this subject lacks details of its incidence, shape, and combinations of notches and foramen in same skull and also separately for left and right side of skull. With the available literature no study was observed to be conducted in foetal skulls. The present study includes adult and foetal skulls and their comparison for different combinations and incidences.

Material and Method

101 adult skulls of unknown sex were examined from department of anatomy, Dr. V. M. Medical College, Solapur. (Maharashtra). Skulls were observed for notches, foramen, incomplete foramen and absence of these features, in both right and left side of individual skulls. Various combinations like notch with notch, notch with foramen, and all other combinations stated in (table no. 1 & 3 & photograph 1) were recorded and sorted out individually in each skull. Difference in incidence of these features and combinations were found out. 59 aborted fetuses of varying C-R length were collected from Department of Obstetrics and Gynaecology, Survopachar Rugnalaya, Solapur. To obtain skull bones the foetuses were macerated. Two frontal bones of right and left side were collected from each specimen of a foetus, which were observed for the supra orbital notch, foramen, incomplete foramen and none of above features as observed in foetal skulls. Crown, Rump length i.e. (C R length) of each foetus was recorded, to judge the age of foetus, CR length of foetuses was correlated with the age and age of each foetus was found out in lunar month as by [9]. Collected foetal skulls were studied as CR length in mm, Age in lunar months, Number of skulls and combinations of foetuses as shown in table-3 & photograph-2.

Result

Nine types of combinations of various features were noticed in 101 adult skulls as shown in table no.1 and photographs no.1. In the present study absence of all these features was not found in any of the adult skull.

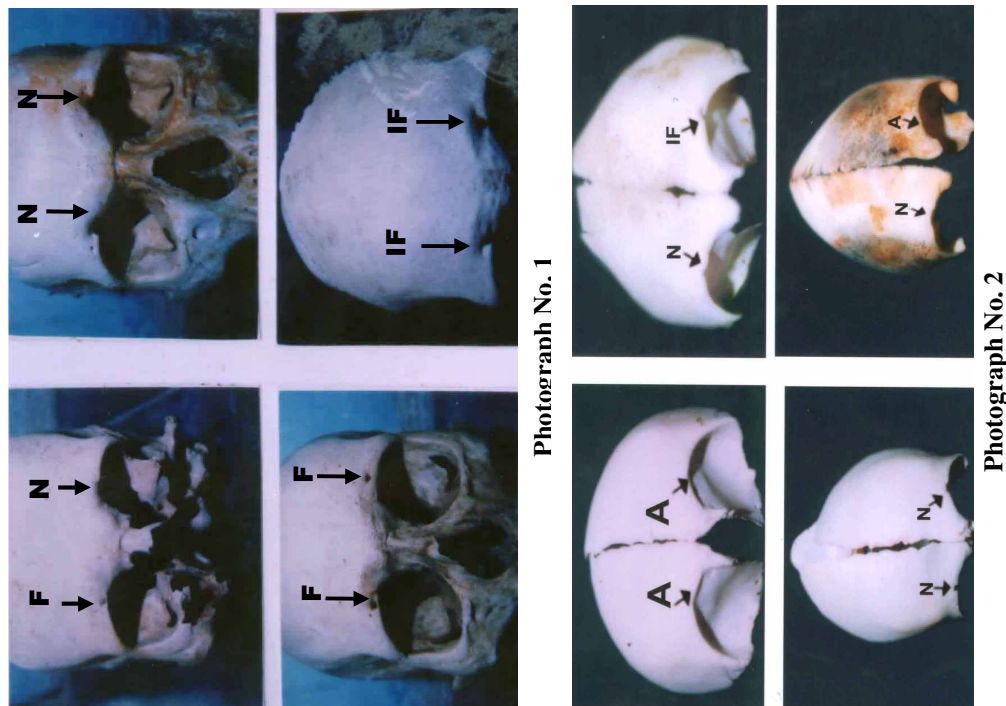
The most common combinations were notch with notch in 29 and incomplete foramen with incomplete foramen in 17 adult skulls as shown in photograph 1. In the study of individual feature on right and left side of skull. The difference between incidence of foramen was significant ($P < 0.05$) in adult skull as shown in table-2.

Sr. No.	Type of Skulls	Type of Combinations		No. of skulls	Percentage
		Lt.	Rt.		
Adult Skulls					
1		N	N	29	28.71
2		N	IF	8	7.92
3		N	F	3	2.97
4		F	N	8	7.92
5		F	F	14	13.86
6		F	IF	9	8.9
7		IF	N	11	10.89
8		IF	F	2	1.98
9		IF	IF	17	16.83
Foetal Skulls					
1		N	N	30	50.84
2		N	IF	7	11.86
3		N	A	5	8.47
4		IF	N	7	11.86
5		IF	IF	2	3.38
6		IF	A	2	3.38
7		A	N	2	3.38
8		A	A	4	6.77

N : Notch; IF : Incomplete Foramen; F : Foramen; A : Absent

Eight types of combinations of various features were observed in 59 foetal skulls as in table-1 and photograph-2.

Table-2: Showing Percentages of Combinations on Right and Left Side in Adult and Foetal Skulls						
Total no. of Adult skulls examined	Right			Left		
	IF	F	N	N	F	IF
101	30	31	40	48	19	34
Percentage	29.7	30.7	39.6	47.52	18.81	33.66
Total no. of Foetal skulls examined	Right			Left		
	IF	A	N	N	IF	A
59 Percent	11	6	42	39	9	11
Percentage	18.64	10.16	71.18	66.10	15.25	18.64
In Adult Skulls : $p < 0.05$ foramen; In Foetal Skulls : $p > 0.05$ is not significant						



The most common combination was notch with notch observed in 30 foetal skulls. Incidence of difference in all features of foetal skull was not significant) ($p > 0.05$). Complete foramen were notably absent in foetal skulls. Incidence of incomplete foramen was found in the 4th lunar month of foetal age and onwards as in table no 3. Bilateral absence of notch or foramen was seen in 4 foetal skulls. So no correlation was found between the foetal age and all features.

Table-3: Showing the incidence of different types of combination amongst notch, foramen, incomplete foramen & absence of all of the above features at the supra orbital margin of foetal skulls.						
Sr. No.	CR length in mm	Age in lunar months	Number of skulls	Combinations		Number of same combinations found
				Right	Left	
1	120	3 rd	1	N	N	1
2	150-190	4 th	3	N	N	1
				N	IF	1
				IF	A	1
3	200-214	5 th	11	N	IF	1
				IF	N	3
				N	A	1
				A	N	1
				IF	IF	2
4	220-255	6 th	13	N	N	3
				A	A	1
				N	N	4
				A	N	1
				IF	N	2
5	260-274	7 th	9	N	IF	4
				N	A	1
				IF	A	1
				A	A	2
				N	N	3
				N	A	1
6	290	8 th	7	N	N	6
				IF	N	1
7	343-378	10 th	15	A	A	1
				IF	N	1
				N	N	12
				N	A	1

Discussion

Supra orbital notch or foramen is situated at the junction of lateral 2/3 and medial 1/3 of the supra orbital margin. The formation of foramen results because of ossification of the periosteal ligament which closes it below [2], Partial ossification of this ligament causes a slight gap at the lower margin resulting into an incomplete foramen [10].

The incidence of supra orbital foramina as reported by Duke Elder and Hollinshed W. Henry was 25% of total adult skulls [2-3], while Rao et al reported 6.5% in south Indian studies [8]. Arunkumar S. Bilodi, San ikop MB had shown incidence of supra orbital foramina of 39% on right side and 43.3% on left side [6], while study by Sinha DN had shown the incidence to be 34.25% on right side and 28.5% on left side [5]. Berry had found equal incidences of supra orbital notches and foramina in Mexican crania [7]. In the present study, percentage of foramen on right & left side in adult skulls, were 30.7% and 18.81 % respectively (table 2). Complete supra orbital foramina were not seen in any of the foetal skulls.

Sinha DN. observed incidence of supra orbital notch in 44.25% of skulls. It was 14.25% on right side and 25.5% on left side [5]. Rao et al showed the presence of supra orbital notch in 38.5% adult skulls [8], while incidence of notch by Arunkumar S. Bilodi, Sanikop MB was 47.38% on right side and 36.6% on left side [6]. In the present study the percentage of notch was higher as compared to any other feature in both adult and foetal skulls. In adult the incidence was 39.6% on right side and 47.52% on left side, while in the foetal skulls the incidence was 71.18% on right side and 66.10% on left side (table 2). In the present study the incidence of incomplete foramen was 29.7% on right side and 33.66% on left side in adult skulls and 18.64% on right side and 15.25% on left side in foetal skulls. Complete absence of all these features was not seen in adult skulls while the incidence was 10.16% on right side and 18.64% on left side in foetal skulls. Arunkumar S. Bilodi, Sankop MB concluded that in the absence of supra orbital foramina and notches, supra orbital vessels and nerves are more prone for injury due to sharp supraorbital margin at orbital rim [6].

References

1. Susan, standing. In: Gray's Anatomy 40th edition. *Churchill Livingstone*, 2008; 554.
2. Henry Hollinshed W. in: *Anatomy for Surgeons Vol- IP III New York & London*, Hoeber Harper 1966; 111.
3. Duke Elder SS. In: *System of Ophthalmology 1st edition*. Henry Kimpton Volume II London, 1961; 401
4. Schaeffer JP. in: *Morrison's Human Anatomy 11th Ed*. New York Toronto & London; McGraw Hill Book company INC 1953; 119 & 147
5. Sinha DN. Study of supra orbital notch and foramen in North Indian Human Skulls, *J Anat Soc India* 1978; 27: 124-126
6. Bilodi Arun Kumar S. & Sanikop MB. Some observations on supra orbital foramina in Human skulls in Karnataka. *Anatomica Karnataka* 2002; 1(3): 17-23.
7. Berry AC. Factors affecting the incidence of non-musculo-skeletal variant. *J Anat* 1975; 120:519-535
8. Rao et al. Study of supra orbital Notch and Foramen in 200 Human skulls in south India. *Anatomical Adjuncts* 1997; 3(2): 15-22.
9. Hill AH. Foetal age Assessment of centres of Ossification. *Am J Phys Anthropol* 1939; 23(3): 251-272
10. Last RJ. in: *Eugene Wolff's Anatomy of the Eye & Orbit 6th Ed*. London: *H.K. Lewis & Co. Ltd*, 1968; 23

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