

STUDY OF METOPIC SUTURE IN THE ADULT HUMAN SKULLS OF NORTH INDIA

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ABSTRACT

The Metopic or Frontal Suture is formed at the meeting of the two halves of Frontal bone, in the midline. Normally it starts to close in the second year of life and within a short duration, gets completely obliterated. At times, there may be a partial or complete failure of this obliteration- so when a complete metopic suture is present from Nasion to Bregma, it is known as Metopism.

The present study was undertaken to observe the incidence of Metopic suture and Metopism in the adult human skulls of North India. For this purpose, 1020 skulls were observed, belonging to the Anthropology Museum of Department of Anatomy, GSVM Medical College Kanpur. Metopic suture was found to be present in the midline, in altogether 184 skulls (18.04%), out of which complete persistent Metopic suture (or Metopism) was reported in 36 skulls (3.5%) and partially obliterated suture in 148 skulls (14.6%)- it was present in the lower part of Frontal bone in 142 skulls (14%), in the upper part in 4 skulls (0.38%) and in the middle part in 2 skulls (0.19%). The upper end of Metopic suture was observed to meet the median sagittal suture, end-to-end, at Bregma in 6 skulls (15%) while in the rest of 34 skulls (85%), the upper end of Metopic suture failed to meet the anterior end of median sagittal suture and the deflection ranged between 12 mm to 2 mm. Mean suture length was computed to be 128 mm.

KEY WORDS: skull, metopic suture, metopism

INTRODUCTION

The Metopic or Frontal Suture is formed at the meeting of the two halves of Frontal bone, in the midline. Normally it starts to close in the second year of life and within a short duration, gets completely obliterated. At times, there may be a partial or complete failure of this obliteration- so when a complete metopic suture is present from Nasion to Bregma, it is known as Metopism.

When this Metopic suture is persistent, it presents as a typical dentate suture and about 2 cms anterior to the Coronal suture, it becomes more simple and direct, termed as pars bregmatica. Usually the posterior end of Metopic suture does not meet the Sagittal suture and may miss it by an interval as great as 15 mm. Similarly, the anterior end of Metopic suture fails to meet the internasal suture (Jones, 1946)¹.

Rau (1934)² reported the incidence of Metopism to be 4% in Dravidians of Madras, Inderjit & Shah (1948)³ 5% in Punjabi skulls, Woo (1949)⁴ as high as 10% in Mongoloids, Breathnach (1958)⁵ observed 7-

10% in Europeans and only 1% in Africans.

Romanes (1964)⁶ observed that the obliteration of Metopic suture usually begins at the level of the frontal eminence and extends upwards and downwards and therefore traces may be left either at the Bregma or Nasion, if the fusion is not complete.

Fakhruddin and Bhalerao (1967)⁷ observed incidence of Metopism to be about 2% in Indian skulls, Dixit & Shukla (1968)⁸ 2.53% in skulls from UP, Linc & Fleischman (1969)⁹ 11% in Czech skulls.

Das et al (1973)¹⁰ reported the incidence of Metopic suture as 24.67% and Metopism as 3.31% in Indian skulls. They have also reported several variations in Metopic suture as - a single linear midline suture, U-shaped, V-shaped and Y-shaped.

Agarwal et al (1979)¹¹ observed Metopism in 2.66% and Metopic suture in 38.17% of Indian skulls and variations in suture as inverted Y-shaped and a radiating type, too.

Ajmani et al (1983)¹² reported Metopism in 3.4% and Metopic suture in 34.97% of Nigerian skulls while Bilodi et al (2004)¹³ observed Metopic suture in 11.46% skulls. Skrzat et al (2004)¹⁴ studied varied morphological patterns in Metopic suture and computed the mean suture length to be 123.1 mm.

MATERIAL AND METHOD

For the present study, 1020 skulls were observed,

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randomly selected from the stock of about 1300 skulls, belonging to the Anthropology Museum of Department of Anatomy, GSVM Medical College Kanpur.

The age and sex of the macerated skulls were not taken into consideration.

The skulls were washed and their superior surface properly cleaned with the help of soap, water and soft brush and wiped with a clean dry cloth. Thereafter, they were observed for the presence of metopic suture or its remnants. Its length was measured with the help of thread spread straight from nasion to bregma.

OBSERVATIONS

Metopic or Frontal suture was found to be present in the midline, in altogether 184 skulls (18.04%), out of which complete persistent Metopic suture (or Metopism) was reported in 36 skulls (3.5%)

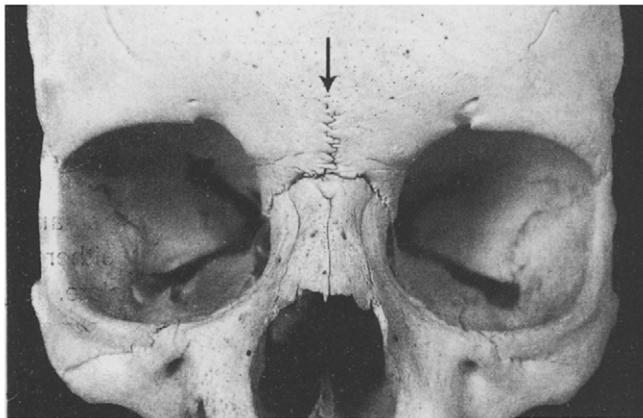


Fig. 1: Partial Metopic suture (arrow) in the lower part of Frontal bone (just above Nasion)

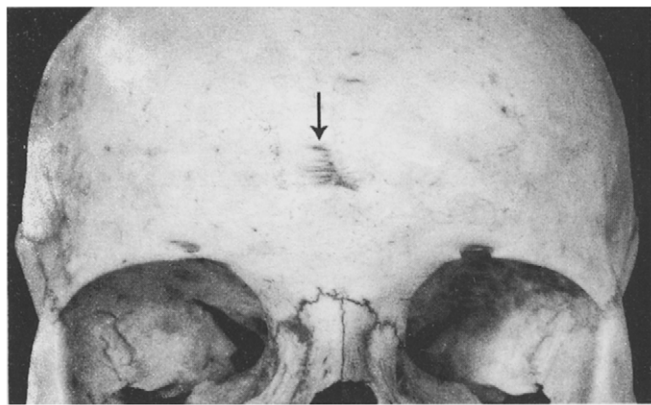


Fig. 2: Remnant of Metopic suture (arrow) in the middle part of Frontal bone.

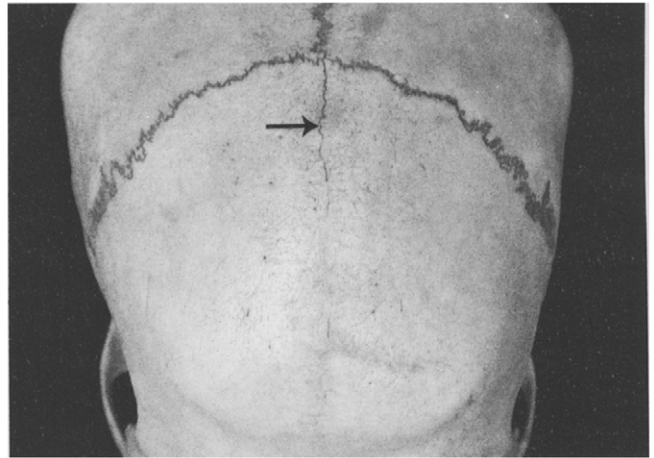


Fig. 3: Remnant of Metopic suture (arrow) in the upper part of Frontal bone.

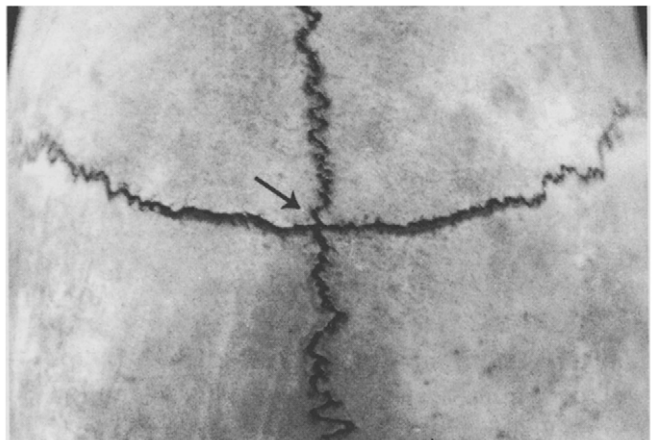


Fig. 4: Metopic suture meeting, end-to-end, with the median Sagittal suture at Bregma (arrow).

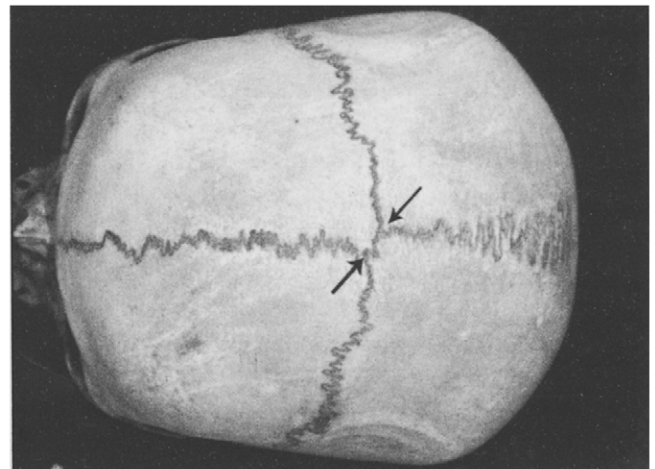


Fig. 5: Metopic suture, not meeting end-to-end with the median Sagittal suture, at Bregma (arrows).

TOTAL SKULLS OBSERVED	1020	
1. Metopic suture present in	184	18.04 %
2. Complete suture (metopism)	36	3.5 %
3. Partially obliterated suture	148	14.6 %
-in lower part of frontal bone	142	14.02 %
-in upper part	04	0.39 %
-in middle part	02	0.19 %

Table I: Incidence of Metopic Suture in The Present Study

1.	<i>Rau</i>	1934	<i>Dravidians of Madras</i>	-	4
2.	<i>Inderjit & Shah</i>	1948	<i>Punjabi skulls</i>	32.5	5
3.	<i>Woo</i>	1949	<i>Mongoloids</i>	-	10
4.	<i>Breathnach</i>	1958	<i>Europeans Africans</i>	-	7-10 1
5.	<i>Fakhruddin & Bhalerao</i>	1967	<i>Indian skulls</i>	-	2
6.	<i>Dixit & Shukla</i>	1968	<i>UP skulls</i>	-	2.53
7.	<i>Linc & Fleischman</i>	1969	<i>Czech</i>	-	11
8.	<i>Das et al</i>	1973	<i>Indian</i>	24.67	3.31
9.	<i>Agarwal et al</i>	1979	<i>Indian</i>	38.17	2.66
10.	<i>Ajmani et al</i>	1983	<i>Nigerian</i>	34.97	3.4
11.	<i>Bilodi et al</i>	2004	-	11.46	3.92
12.	<i>Present Study</i>	2007	<i>Indian skulls</i>	18.04	3.5

Table II: Incidence Of Metopism As Reported By Different Research Workers

and partially obliterated suture in 148 skulls (14.6%)- it was observed as a linear midline suture remnant, present in the lower part of Frontal bone (as in Fig.1) in 142 skulls (14%), in the upper part (as in Fig.3) in 4 skulls (0.38%) and in the middle part (as in Fig.2) in 2 skulls (0.19%). The upper end of Metopic suture was observed to meet the median Sagittal suture, end-to-end, at Bregma (as in Fig.4) in 6 skulls (15%) while in the rest of 34 skulls (85%), the upper end of Metopic suture failed to meet the anterior end of median Sagittal suture, at Bregma (as in Fig. 5) and the deflection ranged between 12 mm to 2 mm. Mean suture length was computed to be 128 mm.

DISCUSSION

In the present study, Metopic suture was observed in the midline in altogether 184 skulls (18.04%), in which complete persistent Metopic suture (or Metopism) was observed in 36 skulls (3.5%) and partially obliterated suture in 148 skulls (14.6%). Incidence of Metopic suture and Metopism, as reported by different research workers, has been summarized in Table II.

Maximum incidence of Metopic suture was reported by Agarwal et al (1979)¹¹, as 38.17% in Indian skulls, but incidence of Metopism observed by him was quite low, i.e. 2.66%. Linc & Fleischman (1969)⁹ reported the incidence of Metopism as high as 11% in Czech skulls, Woo (1949)⁴ observed Metopism to be 10% in Mongoloids while Breathnach (1958)⁵ reported the incidence of Metopism to be 7-10% in Europeans. It appears as if the incidence of Metopism is higher in the skulls from Temperate regions.

While incidence of Metopism in Indian skulls, was reported as 2% by Fakhruddin & Bhalerao (1967)⁷, as 3.31% by Das et al (1973)¹⁰ and 2.66% by Agarwal et al (1979)¹¹; 2.53% in U.P. skulls by Dixit & Shukla (1968)⁸, 4% in Dravidians of Madras by Rau (1934)² and 5% in Punjabi skulls by Inderjit & Shah (1948)³ suggesting an over-all low incidence in the Tropical regions. In the present study also, incidence of Metopism was observed as 3.5% in Indian skulls, which is quite in sync with the earlier studies, and strengthens this hypothesis. It seems that Regional or Climatic bearings are more significant than the racial ones, in the incidence of Metopism.

In the present study, partially obliterated Metopic suture was observed in the lower part of Frontal bone in 142 skulls (14.02%), in the upper part in 4 skulls (0.39%) and in the middle part in 2 skulls (0.19%). While Das et al (1973)¹⁰ found Metopic suture in

lower part in 20.96% cases, in the upper part in 0.28% cases and none in the central part. Agarwal et al (1979)¹¹ also reported the presence of Metopic suture in lower part in 35.27% skulls, while in the upper, upper middle and lower middle parts in 0.8% of cases, each.

Inderjit and Shah (1948)³ described variations in lower part of Frontal bone as V-shaped (in 11.25% cases), Y-shaped (in 1.25% cases) and H-shaped (in 1.25% cases) while Das et al (1973)¹⁰ described the variations as a single linear midline suture (in 17.57% skulls), U-shaped (in 1.01%), V-shaped (in 1.93% skulls) and Y-shaped (in 0.28% skulls). Agarwal et al (1979)¹¹ also reported variations in Metopic suture as inverted Y-shaped (in 0.63% skulls) and radiating type (in 0.31% skulls). But in the present study, no such variations, like V-shaped or Y-shaped were observed and the Metopic suture remnants were single linear midline.

Jones (1946)¹ commented that the posterior end of the Metopic suture does not meet the Sagittal suture end-to-end and may miss it by an interval as great as 15 mm. In the present study, the upper end of the Metopic suture was observed to meet the median Sagittal suture, end to end, at Bregma, in 6 skulls (15%) while in the rest of the 34 skulls (85%), the upper end of Metopic suture failed to meet the anterior end of median Sagittal suture and the deflection ranged between 12 mm to 2 mm.

Mean suture length was computed to be 128 mm in the present study while Das et al (1973)¹⁰ reported it to be 121.4 mm and Skrzat et al (2004)¹⁴ to be 123.1 mm.

CONCLUSION

Incidence of Metopic suture in North Indian skulls was found to be 18.04% and Metopism to be 3.5% in the present study.

On correlating with the data available of earlier research workers, the incidence of Metopism seems to be higher in the skulls from temperate regions while a low incidence of Metopism has been recorded in skulls from tropical regions. Therefore, it seems that regional or climatic bearings are more significant than the racial ones.

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