

Study of metopic suture in adult human skulls of Marathwada region

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Abstract

Background: Metopic sutures are vertical sutures between two halves of the frontal bone, it extends from anterior fontanelle (bregma) to the nasion. When the complete suture persists between bregma and nasion it is called as metopism whereas if only small part persists then called as incomplete metopic suture. **Materials and Methods:** The present study was carried out by using 116 adult dry human skulls. The samples were collected from the Department of Anatomy, Government Medical College Aurangabad. The skulls were carefully examined for the presence of metopic suture and its morphological variations. **Results:** In the present study 116 adult dry human skulls were studied out of which 27 (23.27%) skulls showed the persistent metopic suture. The complete metopic suture (metopism) was noted in 4 (3.44%) of cases. 24 (20.68%) of skulls revealed persistent incomplete metopic sutures. Among the morphological variations Linear type was observed in 9 (7.75%) of cases. 7 (6.03%) skulls showed the presence of U shaped variation. V shaped variation was seen in 4 (3.44%) skulls. The Y shaped 2 (1.72%) and Bilinear variant were also noted in 2 (1.72%) skull. The other variations like H shaped, inverted U shaped did not found in the present study. **Conclusion:** The persistent metopic sutures commonly misdiagnosed as fracture so that radiologists, forensic expert and neurosurgeon should have knowledge of metopic suture and its variations.

Key Words: metopic suture, metopism.

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INTRODUCTION

Metopic suture connects the two frontal bone in developmental stage. It is a kind of dentate suture and is seen in infants. It usually closes at an age of 6 years when the two frontal bones fuses together. Sometimes the metopic suture persists in adults even after fusion and it is called as persistent metopic suture. The persistent metopic suture may occur as two forms. The suture from bregma (anterior fontanelle) till the nasion called as complete metopic suture or metopism.

Incomplete (Partial) suture extending from nasion not till bregma or from bregma not till nasion. Metopic suture normally closes by fifth or sixth year¹. Hamilton² stated that the metopic suture disappears by seventh year of life. Fusion of this suture commences at the anterior fontanelle i.e., bregma and terminates at nasion. Williams³ claims that the frontal bones are separated by the metopic suture at birth; this is obliterated by 6-8 year. Keith⁴ stated that the metopic suture disappears at the end of the first year, or in the beginning of the second year of life. A.K. Dutta⁴ stated that at birth the 2 halves of the frontal bone are separate as the metopic suture, replaced by bone at the age of 2 years. Remnants of the metopic suture may persist in some skulls at glabella. So the upper limit for the persistence of metopic suture may extends upto 8 years. The metopic suture may be mistaken as fracture of skull at frontal bone by an inexperienced forensic expert. This anatomical variation should be known to neurosurgeon while performing frontal craniotomy. The present study is undertaken to find out the incidence of metopic suture among Marathwada region. The knowledge of metopic suture is important in order to not

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to mistaken it as fracture also neurosurgeons, radiologists should have knowledge about metopic suture and it's variations.

MATERIALS AND METHODS

The present study was carried out by using 116 adult dry human skulls. The samples were collected from the Department of Anatomy, Government medical college Aurangabad during the year 2019. The skulls were carefully observed for the presence of metopic suture by naked eyes. Complete and incomplete metopic sutures were recorded along with the morphological variation of their shapes. The length of the complete metopic suture were also recorded by using thread spread from bregma to nasion. The above obtained data was properly recorded and analysed. The findings if present study were compared with the previous studies held by various authors.

RESULT

In the present study in total 116 adult dry human skull were studied, out of which 23.27% of skulls shows the presence of metopic suture whereas the rest 85.34% of skull are of without metopic suture. Among total 23.27% of skulls with metopic suture 3.44% of skull shows

presence of complete metopic suture i.e metopism (Photo-1), while 20.68% of skulls shows presence of incomplete metopic suture. Five types of variation in the shape of metopic suture were noticed in the present study. The Linear incomplete metopic suture (Photo-2) were observed in 9 (7.75%) of skulls. The U shaped incomplete metopic suture (Photo-3) were noted in 7 (6.03%) of skulls. The V shaped suture (Photo-4) were found I 4 (3.44%) of skulls. The Y shaped suture (Photo-5) were noticed in 2 (1.72%) and Bilinear suture (Photo-6) in 2 (1.72%) of skulls.

TABLE 1: Metopic suture findings in present study

Sr.no.	Type of suture	No.of skull	No.of skull in %
1.	Without metopic suture	99	85.34%
2.	Total metopic suture	27	23.27%
3.	Complete metopic suture	4	3.44%
4.	Incomplete metopic suture	24	20.68%
5.	-Linear suture	9	7.75%
6.	-U shaped suture	7	6.03%
7.	-Vshaped suture	4	3.44%
8.	-Y shaped suture	2	1.72%
9.	-Bilinear suture	2	1.72%



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6

Photo 1: Complete Metopic suture (metopism); **Photo 2:** Linear variety of incomplete metopic suture; **Photo 3:** U shaped incomplete metopic suture; **Photo 4:** V shaped incomplete metopic suture; **Photo 5:** Y shaped incomplete metopic suture; **Photo 6:** Bilinear incomplete metopic suture.

DISCUSSION

The incidence of metopic suture compared with the findings of previous workers. (Table No.2) Overall incidence varies from 1 to 10%. The lowest incidence was reported by Breathnach⁶ which was 1% in Africans and also in Australian population (1%) studied by Bryce⁷. The highest incidence was observed by the Woo⁸ which was 10% among Mongolian population, also the European population studied by Breathnach⁶ and Scottish population studied by Bryce⁷ shows higher rates of metopism which was 7-10% and 9.5% respectively. In the present study incidence of metopism is 3.44% among the Marathwada region in Maharashtra state. The findings of present study resembles with the Das *et al*⁹ which was 3.31% and also with the Ajmani *et al*¹⁰ which was 3.4%. This study describes the incidence incomplete metopic suture of about 20.68%. The Das *et al*⁹ reported the incidence of incomplete metopic suture of about 17.57%, by Agrawal *et al*¹¹ was 35.5%, by Ajmani *et al*¹⁰ was 31.57% and by Shanta Chandrasekaran¹² was found to be 40%. Thus the findings of present study in relation to the incidence of incomplete metopic suture correlates with

the findings of Das *et al*⁹ The linear incomplete metopic suture were noted in 7.75% of cases in present study whereas Agrawal *et al*¹¹ reported it in 23.12% of skulls, 17% by Shanta Chandrasekaran¹². In this study the incidence of U shaped suture is 6.03% whereas Shanta Chandrasekaran¹² observed it to be 15%. The incidence of V shaped suture is 3.44% in this study. The Das *et al*⁹ observed V shaped suture in 1.01%, Agarwal *et al*¹¹ in about 3.25%, Ajmani *et al*¹⁰ in 0.49% and S.chandrasekaran¹² by 7.5%. The incidence of V shaped suture of present study (3.44%) resembles with the findings of Agarwal *et al*¹¹ (3.25%). The incidence of Y shaped suture is 1.72% in our study which is similar to the findings of Inderjit and shah¹³ and Agarwal *et al*¹¹ which was 1.25% and 1.96% respectively. The incidence of Bilinear suture in the present study is 1.72%. The other variations like H shaped, inverted U shaped did not noticed in the present study. The mean suture length of complete metopic suture was reported to be 121.4mm and 123.1mm by the skrzat *et al* whereas it is 120.75mm in the present study.

TABLE 2: Incidence of metopism by various authors

Sr.No.	Authors	Year of study	Percentage of metopism	Population studied
1	Bryce	1915	9.5%	Scottish
			1%	Australian
			5%	Mongolian
			8.7%	European
			1.2%	Negros
2	Inderjit and shan	1948	5%	Indian Punjabi
3	Woo	1948	2	Negroid
4	Breathnach	1958	10	Mongolian
			1%	Africans
			4-5%	Yellow race
5	Das	1973	7-10%	European
			3.31%	Indian U.P.
6	Agrawal	1979	2.66%	Indian Kanpur
7	Ajmani	1963	3.4%	Nigerian
8	Shanta Chandrasekaran	2011	5%	South Indian
9	Prasent study	2019	3.44%	Indian Maharashtra

CONCLUSION

The present study was conducted for the incidence of metopic suture in 116 adult dry human skulls. The suture (metopism) was detected in 3.44% of skulls and incomplete metopic suture was present in 20.68% of skulls. This anatomical knowledge and morphological variation of metopic suture is usefull for the surgeons, forensic experts and radiologists as it can be commonly mistaken as fracture of frontal bone. The neurosurgeons should also aware of these persistent suture while performing frontal craniotomy.

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