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Analysis Of Metopic Suture In Adult Human Skulls Of Vidarbha Region: A Cross Sectional Study

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Abstract:
Background: Vertical sutures between two halves of the frontal bone that stretch from the anterior fontanelle (bregma) to the nasion are metopic sutures. It is called metopism when the full suture persists between bregma and nasion, while if only a small part persists, it is called incomplete metopic suture.
Aims & Objectives: The present study is aimed at the presence of recurrent metopic sutures in different types in Central Indian adult skulls.
Materials and Methods: The current research was carried out using 100 dry human skulls from the Department of Anatomy & Forensic Medicine obtained from adults. The skulls and their morphological differences were closely investigated for the presence of metopic suture.
Results: 100 adult dry human skulls were analysed in the current study, of which 27 (27 percent) of the skulls displayed recurrent metopic sutures. In 6 (6 percent) of cases, full metopic suture (metopism) was observed. Persistent incomplete metopic sutures were revealed in 17 (17 per cent) of skulls. In 6 (6 percent) of cases, the linear form was observed among the morphological variations. The occurrence of U shaped variation & V shaped variation was shown by 3 skulls each.
Conclusion: Continuous metopic sutures are often misdiagnosed as fractures, so radiologists, forensic specialists, and neurosurgeons must have knowledge of metopic suture and its variations.

Key Words: metopic suture, Vidarbha region, human skull.

INTRODUCTION

The two frontal bones in the developmental process are connected by metopic suture. It is a kind of dentate suture seen in infants. It normally closes as the two frontal bones fuse together at the age of 6 years. Sometimes, even after fusion, the metopic suture persists in adults and it is considered a chronic metopic suture[1]. There may be two types of permanent metopic sutures. As

a full metopic suture or metopism, the suture from bregma (anterior fontanelle) before nasion is named. Incomplete (Partial) suture extends not till bregma from nasion or not till nasion from bregma. Usually, metopic sutures close by the fifth or sixth year. Hamilton[2] notes that by the seventh year of life, the metopic suture disappears. At the anterior fontanelle, i.e. bregma, fusion of this suture begins and terminates at nasion[3]. Williams states that at birth the metopic suture divides the frontal bones which is obliterated by 6-8 years.Keith[4] claimed that at the end of the first year, or at the beginning of the second year of life, the metopic suture would disappear. Dutta[5] suggested that the 2 halves of the frontal bone are distinct at birth as the metopic suture, replaced at the age of 2 years by the bone. Remnants of the metopic suture in glabella can remain in some skulls. So the upper limit of metopic suture persistence may be extended for up to 8 years. An inexperienced forensic expert may misinterpret the metopic suture as a fracture of the skull at the frontal bone. Neurosurgeons should be mindful of this anatomical difference when performing a frontal craniotomy. The current study is being carried out to determine the incidence of metopic suture among the population of this area. The understanding of metopic suture and its variation is extremely important as neurosurgeons, radiologists etc can mistake it for fracture.

Aims & Objectives:

The present study is aimed at the presence of recurrent metopic sutures in different types in Central Indian adult skulls.

Material and Methods

The present research was performed using 100 dry human adult skulls. The samples were obtained from Jawaharlal Nehru Medical College, Sawangi&DattaMeghe Medical College, Nagpur Department of Anatomy & Department of Forensic Medicine. The skulls were closely monitored by naked eyes for the presence of metopic sutures. Along with the morphological variation of their shapes, complete and incomplete metopic sutures were reported. Using thread spread from bregma to nasion, the length of the complete metopic suture was also recorded. The data obtained above was documented and analysed properly. The results of the present research have been compared with previous studies conducted by different scholars.

Result

A total of 100 adult dry human skulls were analysed in the current study, out of which 23 percent of skulls show the presence of metopic suture, while the remaining 77 percent of skulls do not have metopic suture. Of the total of 23% of skulls with metopic suture, 6% of skulls have absolute metopic suture, i.e. metopism, while 17% of skulls have incomplete metopic suture. In the present analysis, six forms of variation in the shape of the metopic suture were noted. In 6 per cent of skulls, the linear incomplete metopic suture was observed. In 3 percent of skulls each, the U shaped & V shaped incomplete metopic sutures were noted. The U-shaped inverted & H shaped sutures were located in 2 skulls each. In 1 skull, the Y shaped suture was noted.

TABLE 1: Findings of metopic sutures in the present study

Sr.no.	Type of metopic suture		No. of skulls	No. of skulls in %
1.	Absent metopic suture		77	77%
2.	Complete metopic suture		6	6%
3.	Incomplete metopic suture (17%)	Linear	6	6%
		H shaped	2	2%
		U shaped	3	3%
		Inverted U shaped	2	2%
		V shaped	3	3%
		Y shaped	1	1%
	Total		100	100%

Discussion

The occurrence of metopic suture is compared with previous workers' results. The average incidence ranges from 1% to 10%. In study conducted by Breathnach[6], which was 1 percent in Africans and also in Australian citizens (1 percent) studied by Bryce[7], recorded the lowest incidence. The Woo[8], which was 10 percent among the Mongolian population, was the highest occurrence, and the European population studied by Breathnach[6] and the Scottish population studied by Bryce[7] both reported higher metopism rates of 7-10 percent and 9.5 percent respectively. In the current report, the incidence of metopism in the Vidarbha area in Maharashtra state is 6 percent. Das et al[9] demonstrated metopism in 3.31% of the population in the Indian population, while it was 3.4% in the study conducted by Ajmani et al[10]. Our study explains about 17% of the incidence of incomplete metopic suture.Das et al[9] registered about 17.57 percent of incomplete metopic suture incidence, 35.5 percent by Agrawal et al, 31.57 percent by Ajmani et al[10], and 40 percent by ShantaChandrasekaran. The results of the present study in relation to the occurrence of incomplete metopic suture are also correlated with the results of Das et al. In 6 percent of cases in the present sample, linear incomplete metopic suture was observed, while Agrawal et al recorded it in 23.12 percent of skulls, 17 percent by ShantaChandrasekaran. The occurrence of U-shaped sutures in this study is 3 percent, while Shanta Chandrasekaran[12] found it to be 15 percent. In this research, the frequency of V-shaped sutures is 3 percent. Das et al observed 1.01 percent V-shaped suture, around 3.25 percent by Agarwal et al[11]& 0.49 percent byAjmani et al. The incidence of V-shaped sutures in the current study (3 percent) is close to the results of Agarwal et al (3.25 percent).In our sample, the incidence of Y-shaped suture is 1 percent, which is close to the results of Inderjit and Shah[13] and Agarwal et al[11], respectively 1.25 percent and 1.96 percent. In the current analysis, the occurrence of inverted U-shaped sutures is 2%. The mean suture length of the complete metopic suture was stated by Skrzat et al[14] to be 121.4 mm and 123.1 mm, whereas in the present study it is 120.75 mm[15,16].

CONCLUSION

The present research was carried out on the occurrence of metopic suture in 100 dry human skulls of adults. In 6% of skulls, suture (metopism) was found and incomplete metopic suture was present in 17% of skulls. For surgeons, forensic specialists and radiologists, this anatomical knowledge and morphological variation of metopic suture is beneficial as it can be generally mistaken as a frontal bone fracture. When performing a frontal craniotomy, neurosurgeons should also be conscious of these persistent sutures.

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