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METOPIC SUTURE: COMPREHENSIVE STUDY IN ADULT SKULLS OF JHARKHAND POPULATION

Anatomy

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ABSTRACT

The metopic suture is formed at the meeting of the two halves of the frontal bone, in the midline. The suture usually disappears during infancy or in early childhood. The time of the closure of metopic suture varies from one to eight years and it can persist until adult age. In some cases it persists as a complete suture extending from the nasion to the anterior angle of the bregma and this condition is called metopism. This study was carried out on 105 adult Indian skulls from the bone collection of the Department of Anatomy of Rajendra Institute of Medical Sciences, Ranchi, Jharkhand. Metopism was found in 2.8% of the studied skulls. The incomplete metopic suture was found in 11.4% of skulls. Morphology of sutures varied from linear type (58.33%), side to side excursion type (25%) 'Y' shaped (8.3%) and 'V' shaped (8.3%). Out of which linear type was found to be the most common. 90 skulls (85.7%) were found to have no metopic suture.

KEYWORDS

metopic suture, metopism,

INTRODUCTION:

The metopic suture is a suture seen between the two halves of the frontal bone. It ossifies in membrane from two primary centres, which appears by the end of the second month of fetal life and fuses first at the inner surface of the skull. The suture between the two halves of frontal bone will generally disappear in childhood. Metopic suture results when the suture between the two halves of the frontal bone fails to fuse. The metopic suture shows various morphological patterns. When the metopic suture extends from bregma to nasion it is called complete metopic suture and if not so then it is called incomplete metopic suture. Presence of complete metopic suture extending from nasion to bregma is known as Metopism. The incomplete type of metopic sutures are further described under various morphological types according to their shape ; "V" shaped , "U" shaped, "H" shaped and "linear" variety.

The persistence of the metopic suture has been reported in frequency ranging from 1% to 12% of skulls.

It is also important for palaeo-demography and forensic medicine.

AIM OF THE STUDY:

This study is an attempt to identify the incidence of metopic suture and its variation in shape and size in the skulls of adult population of Jharkhand.

NUMBER OF CASES:

The present study was carried out on 105 dry skulls from adult individuals at Rajendra Institute of Medical Sciences, Ranchi, Jharkhand. Out of 105 skulls, 61 being male and 44 being female according to the criteria of sexual dimorphism and the age ranged from 25 to 80 years.

PLACE OF WORK:

This study was carried out in the Department of F.M.T and the Department of Anatomy, R.I.M.S, Ranchi and P.M.C Palamu.

INCLUSION CRITERIA:

Only those cases with age more than 25 years were considered because the age related changes are prominent after puberty.

EXCLUSION CRITERIA:

Deformed, diseased and fractured skulls were not included in the study.

MATERIALS:

The materials for the present study consists of - Skulls obtained from the cadavers and water bath for washing and cleaning the obtained skulls.

METHOD:

The skulls so obtained were cleaned with a wet cloth and were then dried. Then the skulls were analysed and described for the metopic suture by gross observation of the skulls.

The skulls were also photographed with help of a digital camera.

The skulls were divided into three initial groups: those having a complete metopic suture; those with an incomplete suture and those without apparent signs of the metopic suture.

The metopic sutures were considered complete when they extended from the nasion to the bregma uninterruptedly and this condition of complete persistence of metopic suture is known as metopism.

The metopic sutures were considered incomplete when they extended from the nasion to varied points of the frontal bone anterior to the bregma. The incomplete metopic sutures showed various morphological patterns. These patterns of incomplete metopic sutures were observed carefully. Moreover the lengths of the complete and incomplete metopic sutures were measured with help of a measuring tape. The data thus obtained was tabulated and analysed.

OBSERVATION:

Overall 105 skulls were studied for incidence of metopic suture. Out of which 15 crania (14.28%) showed presence of metopic suture either complete or incomplete. Three skulls (2.85%) showed presence of complete metopic suture (metopism) while 12 skulls (11.42%) showed presence of incomplete metopic suture. Ninety skulls (85.71%) showed complete absence of metopic suture.

Table 1: Incidence of metopic suture

Extent of the metopic suture	Number of skulls	Percentage
Complete	03	2.85%
Incomplete	12	11.42%
Absent	90	85.71%
Total	105	

Table 2: Length of complete metopic suture

Serial no	Length in cm
1.	12.5 cm
2.	12 cm
3.	11.9 cm

Mean length of the complete metopic suture is 12.13 cm.

Out of the twelve skulls showing incomplete metopic sutures, linear pattern was observed in seven skulls (58.33%) while side to side excursion pattern was observed in three skulls (25%) and in one skull (8.33%) V shaped suture was observed whereas in one skull (8.33%) Y shaped suture was found to be present.

Table 3: Incidence of various morphological patterns of the incomplete metopic suture

Pattern	Number	Percentage
Linear	7	58.33
Side to side excursion	3	25
V shaped	1	8.33
Y shaped	1	8.33
U shaped	0	0
H shaped	0	0
Inverted U	0	0
Double linear	0	0

DISCUSSION:

The highest incidence of metopism has been reported in Alpine skulls i.e. 63.2% by Comas et al while the least incidence has been reported in Australian and Scottish skulls i.e. 1% by Bryce et al.

Bryce in his work on Negro skulls observed that the incidence of metopism was 1.20%.

Bryce in his work on Australian skulls concluded that the incidence of metopism was only 1%.

Bryce in his work on European skulls found that the incidence of metopism was 8.7%.

Bryce in his work on Mongolian skulls reported that the incidence of metopism was 5.10%.

In contrast, Del Sol et al reported that incomplete metopic suture existed in 28.75% skulls of Brazilian subjects.

Rau in 1934 in his study over Dravidian skulls found that the incidence of metopism was 4%.

Inderjit Shah in 1948 conducted a study over Punjabi skulls and concluded that the incidence of metopism was 5%.In their study they also reported presence of incomplete metopic suture in 32.5% of skulls.

Woo in 1949 observed that the incidence of metopism in Mongoloid skulls was 10%.

Breathnach (1958) reported that the incidence of metopism was 7-10% in Europeans skulls while only 1% in African skulls.

Fakhruddin and Bhalerao (1967) reported an incidence of metopism to be 2% in the Indian skulls.

Dixit and Shukla in 1968 conducted a study on the skulls obtained from Uttar Pradesh and concluded that the incidence of metopism to be 2.53%.

Linc and Fleischman (1969) reported the incidence of metopism as high as 11% in Czech skulls.

Das et al (1973) observed that the incidence of metopism in the Indian skulls was 3.31%. They also reported presence of incomplete metopic suture in 24.67% of skulls.

In 1979 Agarawal et al reported an incidence of 38.17% of metopic suture in Indian skulls but the incidence of metopism reported by them was very low i.e. only 2.66%.

In their study Ajmani et al (1983) also observed that the the incidence of metopism was only 3.40% while they found incomplete metopic suture in 34.97% of the skulls.

Bilondi in 2004 studied skulls obtained from Nepal and concluded that the incidence of metopism to be 3.92% while he reported presence of incomplete metopic suture in 11.46% skulls.

Anju et al 2007 in their study on Indian skulls concluded that the incidence of metopism was 3.5% they found presence of incomplete metopic suture in 18.04% skulls.

In a study conducted by Shanta Chandrashekharan the incidence of metopism was found to be only 5%.

CONCLUSION:

Out of 105 skulls 15 crania (14.28%) showed presence of either complete or incomplete type of metopic suture. 3 skulls (2.85%) showed the presence of complete metopic suture (metopism) while 12 skulls (11.42%) showed the presence of incomplete metopic suture. 90 skulls (85.71%) showed complete absence of the metopic suture. The morphological knowledge of the metopic suture is important for the radiologists and neurosurgeons in day to day practice. Vertical frontal bone fractures may be easily misdiagnosed with persistent metopic sutures. Hence the doctors should be aware of this anatomical condition while treating the traumatized patient and during surgical intervention including frontal craniotomy.

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