

Persistent Metopic Suture in Various Forms in South Indian Adult Skulls – A Study

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Abstract- Persistence of frontal suture separating the two frontal bones in the adults is called metopism and the suture is called metopic suture. The fusion of metopic suture starts at around 18 months after birth and is completed by 8-9 years of age. The present study aims at the presence of persistent metopic suture in the adult skulls in various forms between glabella and bregma which may be misinterpreted as radiological fracture. 180 adult skulls ranging from 30-60 years of age group from the department of Anatomy RIMS, Ongole were studied for the presence of metopic suture and their shapes and measurements were tabulated. 103 skulls were found to have no metopic suture, 9 skulls showed complete metopic suture extending from glabella up to bregma, 18 skulls revealed 'V' shaped, 14 skulls manifested to have 'H' shape, 16 skulls were discovered to have linear metopic suture in the midline, 7 'Y' shape, 11 had inverted 'U' shaped metopic suture, 2 skulls showed 'U' shaped metopic suture with extension on to the right. To conclude, 42.5 % of skulls revealed the presence of metopic suture in various forms and 57.2% showed no metopism.

Index Terms- Adult skulls, bregma, frontal bone, glabella, metopic suture

replaced by bone at about 2 years. Remnants of metopic suture may persist in some skulls at the glabella. According to Warwick & Williams metopic suture is obliterated by 8th year. G.J.Romanes⁵ declared that the metopic suture closes by 5th or 6th year leaving traces above or below. Henry Gray¹ postulated that the median suture usually disappears by about 8 years but may persist as metopic suture. Metopic suture varies in different races as concluded by Breathnach⁶, the incidence is 4-5% in yellow races, 7-10% in Europeans, & 1% in Africans. Bryce demonstrated 5.1% in Mongolians, 8.7% in Europeans, 9.5% in Scottish, 1.2% in Negroes, 1% in Australian skulls. Das et al studied on Indian skulls and depicted 27.98% whereas Agarwal et al showed 40.83% skulls with metopic suture. Many factors were attributed for the persistence of the metopic suture in the adults which include abnormal growth of skull bones, hormones, cranial malformations, hydrocephalus, atavism, genetic causes etc. Knowledge regarding the persistent metopic suture is essential in studying the radiographs to avoid misinterpretation as fractures and also it is useful in evaluating various medico legal cases. The present study aims at evaluating the persistent metopic suture in adult skulls and comparison of results with different authors.

I. INTRODUCTION

The skull is the bony skeleton of the head. It shields the brain, the organs of special sense and the cranial parts of respiratory and digestive systems and provides attachments for many of the muscles of the head and neck. The majority of skull bones are held together by fibrous joints termed sutures. The frontal bone is the unpaired bone of the skull forming the forehead or the 'frons' which is the common area for scalp and face. Glabella is the median elevation between the superciliary arches (more pronounced in males). Bregma is the meeting point of sagittal and coronal sutures which can be viewed from the superior aspect of the skull. According to Gray¹, the glabella may show remains of frontal suture (metopic suture), which is present in about 9% of adult skulls.

Focussing on the development, frontal bone being a skull bone ossifies in membrane. Manzanares et al² mentioned that the metopic suture ossifies in membrane from two primary centers which appear by the end of second month of foetal life and fuse first at the inner surface of the skull by chondroid tissue. As stated by Moore, Dalley, Agur⁴ frontal suture is obliterated by 8th year and in approximately 8% of the people, metopic suture persists. A.K.Datta³ reported that at birth the two halves of the frontal bone remain separate as the metopic suture, which is

II. MATERIALS AND METHODS

180 adult skulls from the department of Anatomy, RIMS, and Ongole form the material for the present study. The age of the skulls varied from 30-60 years. Malformed or fractured or pathologic skulls were discarded and the study was conducted on mere normal crania. Each skull was thoroughly inspected for the different forms of metopic suture. The measurements of the lengths of metopic suture were illustrated in tables and graphs. The same were compared with those of different authors.

III. RESULTS

Table 1: occurrence of metopic suture in 180 skulls and their percentage

S.No.	Shape of metopic suture	Number of skulls	%
1.	Absent metopic suture	103	57.2
2.	Complete suture	9	5
3.	'V' shaped	18	10
4.	'H' shaped	14	7.7
5.	Linear midline	16	8.8

6.	'Y' shaped	7	3.8
7.	Inverted 'U' shaped	11	6.1
8.	'U' shaped with extension on right side	2	1.1

Table 2: lengths of complete metopic suture extending from glabella to bregma

S.No.	Length in cms
1.	11.2
2.	12.1
3.	11.8
4.	11.7
5.	12.0
6.	12.4
7.	11.6
8.	12.3
9.	10.8

Average length of the complete metopic suture from table 2 is 11.76 cms

Table 3: lengths of 'V' shaped metopic suture

S.No.	Length in cms
1.	0.8
2.	0.7
3.	0.9
4.	1.1
5.	0.6
6.	1.0
7.	0.9
8.	0.8
9.	1.3
10.	0.9
11.	0.7
12.	1.0
13.	1.2
14.	0.9
15.	0.8
16.	1.2
17.	0.8
18.	0.7

Average length of the 'V' shaped metopic suture from table 3 is 0.90 cms

Table 4: lengths of 'H' shaped metopic suture

S.No.	Length in cms
1.	1.0
2.	0.5
3.	0.8
4.	1.1
5.	1.0
6.	0.6

7.	0.7
8.	1.0
9.	1.1
10.	1.2
11.	0.6
12.	0.5
13.	0.9
14.	1.1

Average length of 'H' shaped metopic suture from table 4 is 0.86 cms

Table 5: lengths of linear midline metopic suture

S.No.	Lengths in cms
1.	2.0
2.	2.1
3.	1.9
4.	1.8
5.	2.0
6.	2.1
7.	2.2
8.	1.8
9.	1.9
10.	2.0
11.	2.1
12.	1.7
13.	1.8
14.	1.9
15.	2.0
16.	2.0

Average length of linear midline metopic suture from Table 5 is 1.95 cms

Table 6: lengths of 'Y' shaped metopic suture

S.No.	Length in cms
1.	0.5
2.	0.6
3.	0.8
4.	0.5
5.	0.7
6.	1.0
7.	0.6

Average length of 'Y' shaped metopic suture from table 6 is 0.67 cms

Table 7: lengths of inverted 'U' shaped metopic suture

S.No.	Length in cms
1.	1.5
2.	1.3
3.	1.2
4.	1.5
5.	1.7

6.	1.8
7.	1.5
8.	1.2
9.	1.3
10.	1.1
11.	1.0

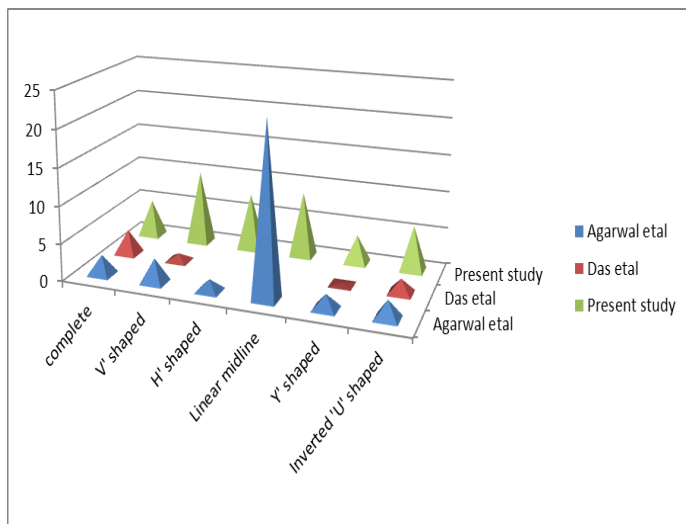
Average length of inverted ‘U’ shaped metopic suture from table 7 is 1.37 cms

Table 8: lengths of ‘U’ shaped metopic suture with extension on right side

S.No.	Length in cms
1.	0.8
2.	0.9

Average length of ‘U’ shaped metopic suture with extension on the right side from table 8 is 0.85 cms.

Graph 1: comparison of the present study with various authors



IV. DISCUSSION

The present study was conducted on 180 skulls for the occurrence of metopic suture in various forms. The % of complete metopic suture correlated with those of Agarwal and Das et al (graph 1). The different shapes of the metopic suture nearly correlated with the authors except the linear midline metopic suture value which showed a gross difference with those of Agarwal et al.

V. CONCLUSION

The persistence of metopic suture in adults which separates the frontal bones is of paramount importance in interpreting the radiological images and in evaluating medico legal cases. In the present study 42.5% skulls showed the presence of metopic suture which is more than the values from the previous authors. The metopic suture occurred in various forms like complete metopic suture extending from glabella to bregma (fig. 1), ‘V’ shape (fig. 2), ‘Y’ shape (fig. 3), inverted ‘U’ shape, linear midline position etc. A special form of the metopic suture has been observed in 2 skulls which showed ‘U’ shape with extension towards right side. 57.2% of the adult skulls showed no metopism (fig. 4)

ACKNOWLEDGEMENTS

I owe my sincere thanks to the in charge Professor and Head of the department of Anatomy, RIMS, and Ongole for providing the skulls for the study. I also thank the Director of the institution for giving me permission to conduct the study.

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FIGURES



Fig 1: complete metopic suture extending from glabella to bregma



Fig 2: 'V' shaped metopic suture



Fig 3: 'Y' shaped metopic suture



Fig 4 : Absent metopic suture