JECA

J. Expt. & Clin. Anat. 7 (1) 37-40(2008)

Incidence Of Metopism In Adult Malawian Population

E.I. ODOKUMA, *P.S. IGBIGBI
Department of Anatomy College of Health Sciences Delta State University, Abraka, Nigeria.
*Author for correspondence

ABSTRACT

Metopic suture runs ftom the bregma to the nasion in a definite characteristic that varies between population, gender and lifestyles. It is influenced by genetic factors hence the population variations in its incidence.The incidence of metopism in adult Malawian subjects was determined using eight hundred and thirty nine (839) anteroposterior skull X-rays of adult Malawian subjects. Complete metopism was found in 0.12% of the population with no incidence of incomplete metopism. The only male subject with complete metopism had no ftontal sinuses on the skull X-ray. Furthermore, medical records did not reveal any other associated diseases or abnormalities. Our study has shown regional variability in metopism as well as thedocumented population and gender differences. Despite the lowest incidence recorded probably for the first time in an Afiican sample, in X -ray diagnosis of ftactures of the ftontal bone, metopic suture should be considered as a possible differential.

Key words: Metopic suture, ftacture, ftontal bone.

Metopic (Frontal) suture runs from the bregma (where the sagittal and coronal sutures unite) to the nasion (the central point of the Frontonasal suture aperture),.!t may be continuous with the sagittal suture in most cases and is present at birth (Hamilton 1976).The suture normally disappears by the age of 6-8 yrs (Hamilton 1976, Torgersen 1950,A jmani et al 1983, Baaten 2003). The suture is a normal developmental stage in children and unites the left and right frontal bones and its persistence either completely or incompletely in some adults is known as metopism (Bolk 1917, Marciniak and Nizankows Ki 1959). In complete metopism the whole suture (from the bregma to the nasion) is persistent while in the incomplete type, the persistence is limited only to either the upper, middle or lower part of the frontal bone (Ajmani et al 1983, Agarwal et al 1979).

Metopism is a congenital defect due to developmental delay of the precursors of the frontal bone in the blastemal stage of fusion. It may occur alone or as part of a polytrophic syndrome of other defects. It is a discrete trait, which seems to be under simple genetic control (Rigersen 1972). It may be accompanied by mild facial asymmetry and is associated with increased frontal curvature (Targersen 1950, Hess 1945). More recently, cases of complete metopism were reported as associated with theabsence of frontal sinuses (Baaten et al 2003).

The incidence of metopism has been shown to vary between population, gender and lifestyles such as rural/urban lives (Baaten et al 2003, Keith 1948, Jit and Banga 1988). It is said to occur sporadically and intrequently in North Americans, Indians, Eskimos, Africans and Australians. Metopism is most common in the European samples, especially those from the UK, distinguishing the samples in this area from those of many other populations (Hanihara and Ishida, 2001). The incidence is 7-10% in European, 4-5% in Asian, 1% in African, Australians and 1.75% in Lebanese (Lit and Banga 1988a) In Lebanese it is 1.84% in males and 1.62% in females (Baaten et al 2003). Cranial sutures are considered in age estimation because of their age-related progression of closure (Ajmani et al 1983). The knowledge of the differing onset and progression of obliteration of the sutures of the cranial vault is of particular interest for both pale demography and forensic medicine (Hanser et al 1991). Metopism is also of interest in studies of genetics, growth and development. Its variations in relation to population groups, gender and shape of the skull have excited anatomists for a long period of time.

Clinically, it is sometimes associated with brachycephaly or dolichocephyaly (Lit and Banja 1988). Occasionally metopic suture is confused with a ftacture (Keats 1996) or even with the sagittal suture (Ajmani et al 1983, Keats 1996). Despite the clinical and anthropological importance of metopism, only few reports have been documented in Afiicans in general, and none

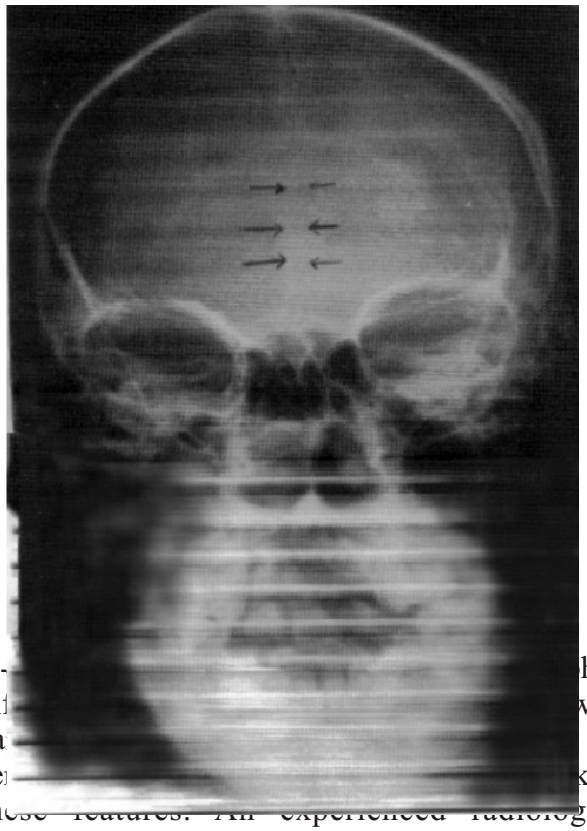
Table 1:
Incidence of Complete Metopism in Different Population Groups as Reported by Other Authors*

Name of Author	Race	Incidence (%)
Jit and Shah (1948)	Indian (Punjab)	5.00
Keith (1948)	Different races	3.00-8.00
Woo (1949)	Mongoloid	10.00
Breathnach (1958)	Asian	4.00-5.00
Romanes (1972)	European	up to 8.00
Das et al. (1973)	Indian	3.31
Berry (1975)	Various racial groups	0-7.40
Agarwal et al. (1979)	Indian	2.66
Ajmani et al. (1983)	Nigerian	3.40
Baaten et al (2003) Lebanese	0.82	
*Above adopted from Baaten et la. 2003		
Hanihara and Ishida (2001)	East Asians	2.5-9
Present study	Malawian	0.12

in Malawians. The present study therefore, deals with the incidence of metopism in adult Malawian population. The data obtained may be of importance to radiologists and clinicians since metopic suture may be confused with ftactures or even with the sagittal suture in an adult.

MATERIALS AND METHODS

The materials for this study consisted of skull X-rays of 839 adult Malawians (523 males;316 females) aged 21-65. They were randomly collected ffom Queen Elisabeth Central Hospital, Lilongwe Central Hospital and Malamulo Seventh Day Adventist Hospital in Blantyre. The first two are referral hospitals. The protocol for this research project was approved by the College of Medicine Research and Ethics Committee (COMREC) . Anteroposterior radiographs of the skull were examined using an



Plain radiograph of the skull in an Ap projection showing a metopic suture with accessory bones and absent frontal sinuses

X- hic
di was
ca by
se ked
these features. An experienced radiologist confirmed our findings. Furthermore, other parameters like accessory bones, ages (gender) and the presence or absence of frontal sinuses were noted. The radiograph with metopism was

correlated with the medicalrecords for diseases or abnormalities. Skulls of infants and children were excluded from the study.

RESULTS

Only one case of metopism was found in all the skulls examined. . This gave an incidence of 0.12%. The subject was male. It was a case of complete metopism associated with the absence of ITontal sinuses bilaterally. The coronal suture was well developed and there were no associated abnormalities (fig 1). Table 1 showed the incidence of complete metopism in different population samples as reported by other authors.

DISCUSSION

In this study complete metopism was detected in just one case giving an incidence of 0.12% (1/839;0.12%), which is lower than the incidence in most population groups and nations (Baten et al 2003) . This incidence is much lower than the incidence of 1% reported for Ariicans and Australians; (Agarwal et al 1979; Williams et al 1995) and is very close to the reported world minimal values (Ajmani et al 1983). There was no case of incomplete metopism in our study with the only case being complete and occurring in a male subject. This is a pointer to a greater male predisposition as indeed other studies have shown (Baaten et al 2003, Keith 1945, Lit and Banja 1988. This may be in favour of genetic predisposition or environmental factors (Torgersen 1950, Berry 1975).

The low incidence recorded in this study could be partly due to the use of X-rays rather than cadaveric skulls. In a similar study on Nigerians, using cadaveric skulls an incidence of 3.40% was recorded by Ajmani et al (1983) However, some investigators who used X rays also reported high incidences (Torgersen 1950, Marciniak and Nizankowsk, 1959) yet, a recent report on Lebanese using X-rays gave an incidence of 0.82% for complete metopism. Romanes (1981) showed that with cadaveric skulls one could detect more metopism especially incomplete metopism particularly, when it is rudimentary and near the nasion. In support of Romanes (1981) Torgersen (1950) stated that on Xray, the metopic suture could not be clearly identified if the internal table is closed or if there is no sclerosis along the suture. Marciniak and Nizankowski (1959) however, were of the opinion that there was no difference in the incidence observed on X-ray and that detected by anatomists on cadaveric skulls. Furthermore, they showed that metopism is not associated with underdevelopment or absence of the frontal sinuses.

The only case of complete metopism we found had no frontal sinuses as was indeed shown by Baaten et al (2003) in Lebanese subjects. Hodgson (1957) among others, indicated that the presence of metopic suture is mostly associated with the congenital absence or underdevelopment of the frontal sinuses. We have also shown regional variations in the incidence of complete metopism between Nigerians, (3.40%), Ajmani et al. (1983) on one hand and Malawians (0.12%) on the other, the two different methods not withstanding.

CONCLUSION

The lowest incidence of complete metopism in an Allican population has been demonstrated. Population, regional and gender variations in the incidence of complete metopism has also been documented. Variations in the incidence of metopism in different population groups could also be attributed to differences in the methods and their precision, as well as to the varying interpretation of what constitutes metopism. However, despite this low incidence in our studied population, the possibility of complete or incomplete metopism needs to be considered in X-ray diagnosis of midline vertical fractures of the frontal bone.

ACKNOWLEDGMENT

We acknowledge the technical assistance of Dr. Sam Kampondeni, a Specialist Radiologist.

REFERENCES

Agarwal S K, Malhotra VK, Tewari S P (1979). Incidence of the metopic suture in adult Indian crania. Acta Anat **105**:469-474.

Ajmani M L, Mittal RK, Jain SP (1983). Incidence of the metopic suture in adult Nigerian skulls. J. Anat **137**: 177-183

Baten PJ et al (2003) Incidence of metopism in the Lebanese population. J. Coo Ana; **16**:148-151.

Berry AC (1975) Factors affecting the incidence of non-metrical skeletal variants J. Anat **120**:519-535.

Bolk L (1917) On metopism. Am J. Anat **22**:27-47.

Bryce TH (1915) Quain's elements of anatomy 11th ed. Longmans and Green London:. P 188.

Hamilton W1 (1976) Textbook of Human Anatomy. 2nd ed Macmillan & Co London. Pp. 150-158.

Hanihara T, Ishida H (2001) Frequency variation of discrete cranial traits in major human populations. J. Anat 198: 707-725.

Hauser G, Vienna A, De Stefano GF (1991) Size and shape of human cranial sutures-a new scoring method. Am 1 Anat **190:** 231-244.

. Hess L (1945) The metopic suture and the metopic syndrome. Hum BioI **17**:107.

. Hodgson G (1957) A textbook of X-Ray diagnosis 3rd 00. H.KLewis.London Vol. 1,. P 152.

. Jit I, Banga N (1988a) Metopism in Northwest population India. J. Anat Soc India **37**: 45-60.

. Jit I, Banga N (1988b) Incidence of metopism in Macaca. 1. Anat Soc India **37**:61-66.

Keats TE (1996) Atlas of normal Roentgen variants that may simulate disease. 6th ed. St Louis: Mosby Pp31, 63.

Keith A (1948) Human embryology and morphology. 6th ed. Edward Arnold & Co.; London: pp.I64-166.

Marciniak R, Nizankowski C (1959) Metopism and its correlation with the development of the Frontai sinuses. Acta Radiol **51:** 343-352.

Rightmire GP (1972) Cranial Measurements and Discrete Traits Compared In Distance Studies of Ailican Negro skulls. Hum BioI **44:** 263-276.

Romanes GI (1981) In Cunningham's textbook of anatomy 12th ed. Oxford, Oxford University Press. P 133.

Torgersen JA (1950) Roentgenlogical study of the metopic suture. Acta Radiol **33**:1-11.

Williams PL et aI (1995) Gray's anatomy 38th ed: Churchill Livingstone New York. Pp 595.