Research Paper

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Metopic Suture: an Osteological Study on Incidence and Morphology in Adult Human Skulls in Bihar

Medical Science

KEYWORDS : Frontal bone, Metopic suture, Nasion, Bregma, Bihar

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ABSTRACT

Abstract – Aim – The aim of the present study is to observe the incidence and morphology of metopic suture. Methodology – The present study was carried out on 120 adult dry human skulls obtained from three medical colleges in Bihar to observe the presence of metopic suture. Result – Metopic sutures were observed in 3 skulls (2.5%) out of 120. Conclusion – Knowledge of morphology of metopic suturesmust be kept in mind during both elective and emergency surgical interventions involving the frontal bone.

Introduction – Metopism is a congenital disfigurement of the forehead in which the frontal suture which normally undergoes closure during childhood, persists. Each half of the frontal bone ossifies in membrane from one primary centre, which appears near the frontal tuber in the eighth week of intra-uterine life. At birth, the two halves of the frontal bone remain separate as metopic suture, which is replaced by bone at about two years. Remnants of the metopic suture may remain may persist in some skulls at the glabella. This suture usually extends from the nasion to the bregma. Metopic suture may present as complete or incomplete. The metopic suture also known as the median frontal suture is a dentate type of calvarial suture. It is often associated with frontal sinus agenesis or hypoplasia [1]. This suture runs through the midline across the frontal bone from the nasion to the bregma and it may often be incomplete. It usually fuses by around 9 months of age [2-4]. A premature fusion of the suture is termed metopic synostosis, which can then result in trigonocephaly [5]. The metopic suture is usually obliterated by 7 years of age, but in rare cases, it can persist as an anatomic variant of little clinical significance and may be mistaken for vertical fractures of frontal bone [6]. Radiologically, metopic sutures have a characteristic midline position and demonstrate sutural interdigitations [7]. Such sutures may be found associated with Wormian bones. In previous studies, authors have reported that incidence of metopic sutures is related to gender, race, population and geographic variations but there is no documented data on any such study in the state of Bihar. Our objective was to observe the incidence and morphology of metopic suture in adult human skulls in Bihar.

Material and Methods – 120 adult human skulls were obtained from the Department of Anatomy and Department of Forensic Medicine of Katihar Medical College, Katihar, MGM Medical College, Kishanganj and Patna Medical College, Patna. Sexes of the skulls were not considered in the study. Damages and malformed skulls were excluded from the study. The skulls were observed for presence of metopic sutures; complete and incomplete. The data obtained was compared with the results of previous research work performed by Indian authors on Indian skulls in other regions of India.

Results – Presence of metopism was observed in 3 out of 120 skulls (2.5%).

Discussion – Metopic suture is a dentate suture. Aetiology of persistent metopic suture remains a mystery. Genetic influence is the most commonly accepted factor in the scientific community [8]. During foetal life both frontal bones are separated by the presence of a sutural space, that contains fibrous tissue and mesenchymal cells. These cells may be responsible for the growth of frontal bones and the mesenchyme may differentiate into either bone or cartilage [9]. Chondroid tissue is responsible for normal closure of a suture. Metopic sutures although rare in adults are not pathological. Higher incidence of metopic suture is found in rural people than in their urban counterparts [10].

Table 1: Incidence of metopic suture in present study

Skulls Studied (n)	Metopic Suture (Absent)	Metopic Suture (Present)
120	117	3

Table 2: Incidence of metopism as reported by Indian authors in regions of India

Researcher	Year	Region	Percentage
Inderjit et al	1948	Punjab	5%
Dixit et al	1968	Uttar Pradesh	2.53%
Das et al	1973	Uttar Pradesh	3.31%
Agarwal et al	1979	Uttar Pradesh	2.66%
Herker et al	1981	Maharashtra	3%
Murlimanju et al	2010	Karnataka	1.2%
Hussain et al	2010	South India	3.2%
Mangalgiri et al	2010	Central India	3.95%
Chandrasekaran et al	2011	South India	5%
Gupta et al	2012	Uttar Pradesh	5%
Chakravarthi et al	2012	South India	6.25%
Masih et al	2013	Rajasthan	6.5%
Saikia et al	2014	Assam	3.17%
Pujari et al	2015	Karnataka	3%
Omar et al	2015	Bihar	2.5%

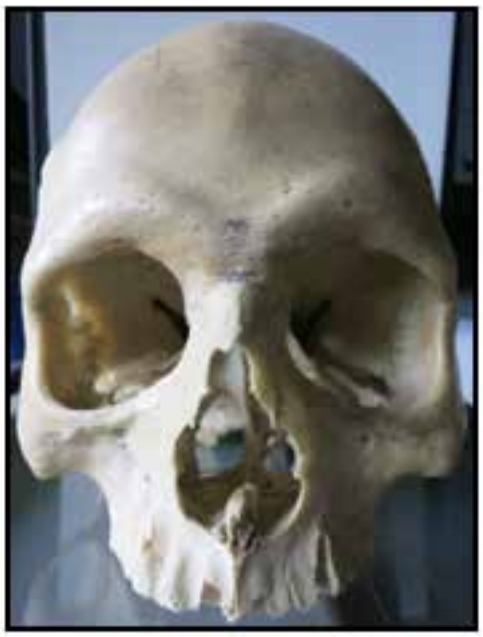

Fig 1: Norma frontalis view of a normal skull without Metopic suture

Fig 2: Norma frontalis view of skull with incomplete Metopic suture (Arrow)

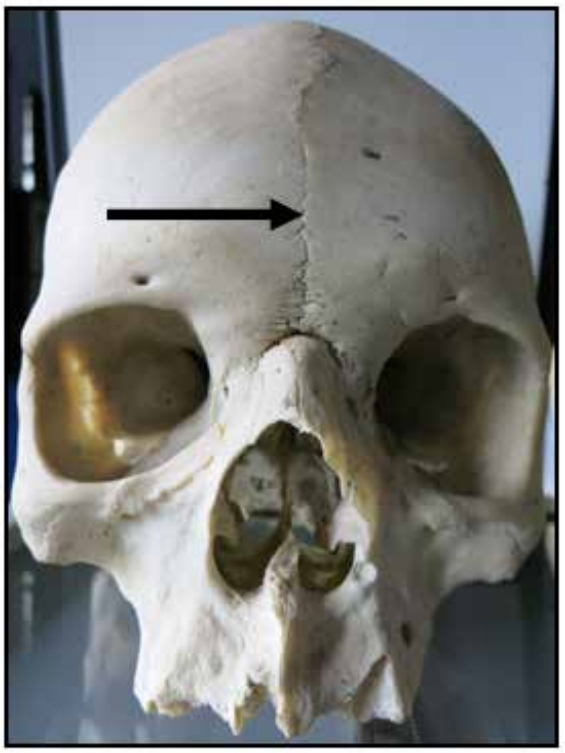

Fig 3: Norma frontalis view of skull with complete Metopic suture (Arrow)

Fig 4: Norma verticalis view of skull showing complete Metopic suture meeting with the Coronal suture

Conclusion – Knowledge of morphology of metopic sutures is important for anatomists, neurosurgeons, radiologists and medicolegal experts. Presence of a metopic suture between both frontal bones must be kept in mind during treatment of a traumatized patient with head injury and during surgical approach for frontal craniotomy.

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