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## Original Article

### To Estimation Of Age From Fusion Of Coronal, Sagittal & Lambdoid Suture– A Postmortem Study

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#### ABSTRACT

**Background:** Cranial sutures generally fuse with increasing age, although there is considerable variability in closure rates and patterns. The aim of this study to determined the chronology and closure pattern of Sagittal, coronal & lambdoid sutures of the skull. **Material & methods:** The study were conducted on 100 cases coming for medico-legal post-mortem examination to the Department of Forensic Medicine Department, RNT Medical College & Associated group of Hospital, Udaipur, Rajasthan, during the one year period. Sagittal, coronal and lambdoid sutures of 100 decedents aged between twenty years to sixty years were studied according to Acsadi and Nemeskeri scoring method. **Results:** Sagittal suture starts fusing in between 25-30 yrs and almost Complete fusion at the age of 61 to 65 yrs. Coronal suture starts fusing in between 25-30 yrs and almost Complete fused at the age of 56 to 60 yrs. Lambdoid suture starts fusing in between 25-30 yrs and almost Complete closure at the age of 66 to 70 yrs. **Conclusion:** We concluded that suture obliteration occurs earlier in endocranial surface of skull. Sagittal suture was first to close followed by Coronal suture, lambdoid suture sequentially, So if done on large sample more correct conclusions can be given.

**Keywords:** Cranial Sutures, Lambdoid Suture, Sagittal Suture, Coronal Suture

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## INTRODUCTION

Estimation of age can be done in multiple ways by eruption & development of teeth, epiphyseal fusion of long bones, degeneration of pelvic articular surfaces, ends of sternal rib, and fusion of cranial sutures, as well as microscopic examination of histology of bone.<sup>1</sup> The methods to age estimation at death of human skeletal remain unsatisfactory. Age of persons below 25 years can be estimated with relative accuracy, based on the epiphysis -diaphysis fusion of the long bones; eruption of teeth from infancy to about 17 to 25 years; the fusion of sphenoccipital suture is before 20, and the fusion of epiphysis of the medial clavicular between 25 and 28 years. Old ages especially above 30 years pose a problem for estimation of age<sup>2</sup>. The one of commonest method to determining the age of individual by fusion of skull vault, because the cranium is mostly the best preserved part of the archaeologically recovered skeleton.<sup>3</sup> Cranial sutures are classified as fibrous joints. The functions of sutures are (1) to prevent separation of the bones when external forces are applied (e.g., muscle function or trauma), and (2) to allow some movement to occur between bones during rapid growth of the cephalic viscera<sup>4</sup>. The idea that cranial bones closure progressively with age has been in existence since at least the 16th century<sup>5</sup>. The sutures

are distinguish easily in the young adults but in old persons the sutures are more or less obliterated. Vault is arched roof of skull and has three main sutures i.e sagittal, coronal and lambdoid<sup>6</sup>. Growth of the skull and obliteration of skull vault suture depends upon development of brain. Any visible closure of suture will at least indicate that the skull is of mature individual and it is unlikely below the age of 20 year<sup>7</sup>. The changing pattern of cranial suture with time may be due to under influence of genetic factors and environmental factors. The aim of this study to determined the chronology and closure pattern of Sagittal, coronal & lambdoid sutures of the skull.

## MATERIAL & METHODS

The study were conducted on 100 cases coming for medico-legal post-mortem examination to the Department of Forensic Medicine Department, RNT Medical College & Associated group of Hospital, Udaipur, Rajasthan, during the one year period.

#### Inclusion criteria

1. The cases of known age coming for medicolegal postmortem examination. Age will be confirmed by

documentary evidences like birth certificate, identification cards, ration card etc.

**Exclusion criteria**

1. Unknown, unclaimed bodies where exact age cannot be confirmed.
2. Cases showing deformed or diseased or fractured skull, which may hamper the study of suture closure.

The calvaria were removed by craniotome taking care to include complete Sagittal, coronal & lambdoid sutures. Coronal and sagittal sutures of 100 decedents aged between twenty years to sixty years were studied according to Acsadi and Nemeskeri scoring method for both endo and ectocranial sutures.<sup>8</sup> Photographs were taken in all cases.

Acsadi and Nemeskeri scoring method which is as follows ;

- 0 = open. There is still little space left between edges of adjoining bones.
- 1 = incipient closure. Clearly visible as a continuous often zig zagging line.
- 2 = closure in process. Line thinner, less zigzags, interrupted by complete closure
- 3 = advanced closure. Only pits indicate where the suture is located
- 4 = closed. Even location cannot be recognized

**RESULTS**

In our study showed that the sagittal suture starts fusing in between 25-30 yrs and almost Complete fusion at the age of 61 to 65 yrs. Coronal suture starts fusing in between 25-30 yrs and almost complete fused at the age of 56 to 60 yrs. Lambdoid suture starts fusing in between 25-30 yrs and almost Complete closure at the age of 66 to 70 yrs.

**Table 1: Fusion of cranial suture according to Acsadi and Nemeskeri scoring method**

| Cranial suture         | 0         | 1         | 2         | 3         | 4         |
|------------------------|-----------|-----------|-----------|-----------|-----------|
| <b>Sagittal suture</b> | 20-25 yrs | 26-30 yrs | 41-15 yrs | 61-65 yrs | 66-70 yrs |
| <b>Coronal suture</b>  | 20-25 yrs | 26-35 yrs | 36-40 yrs | 56-60 yrs | 66-70 yrs |
| <b>Lambdoid suture</b> | 20-25 yrs | 20-25 yrs | 41-45 yrs | 61-65 yrs | 66-70 yrs |

**DISCUSSION**

Age estimation is an fundamental part of the biological profile employed by forensic anthropologists in order to serve to achieving an recognition of an unknown deceased person. The estimation of age is more importance and essential to special attention in cases where found decomposed bodies, mutilated state or only fragmentary remains are discovered.

In our study range has been given in range of 5yrs. According to J.B.Mukherjee estimation of age from suture closure of skull can be given in a range of 5-10 yrs in age of 30-60 yrs.<sup>1</sup> Also according to Reddy estimation of age from suture closure of skull can be given only in a range of decades.<sup>9</sup> The worker like Krogman(1978)<sup>10</sup>, Rentoul & Smith (1973)<sup>11</sup>, T L Patil (1981)<sup>12</sup> & Robert Shapiro (1960)<sup>13</sup> concluded that the study of ectocranial fusion is less significant than endocranial fusion because suture along the outer table are more or less serrated while at inner table they are comparatively straight, whereas the process is speedy and more uniform and complete in the endocranial surface. In our study showed that the sagittal suture starts fusing in between 25-30 yrs and almost Complete fusion at the age of 61 to 65 yrs. This observation conforms with Todd & Lyon (1924)<sup>14</sup> and Ulhas shetty (2006)<sup>2</sup> who reported that sagittal suture closure at the age of 60-69 years. In our present study we found that Coronal suture starts fusing in between 25-30 yrs and almost complete fused at the age of 56 to 60 yrs. As per Modi J reported complete closure occurs in between 40-60 yrs while as per krishan vij lower half closes first in between 40-50 yrs followed by upper half which closes in between 50-60yrs.<sup>15,16</sup> In our present Study Lambdoid suture starts fusing in between 25-30 yrs and almost Complete closure at the age of 66 to 70 yrs., which shows that it is a year earlier than that reported by Todd and Lyon (1924)<sup>14</sup>. Another study done by Modi & parikh according to whom complete closure occurs in between 50-70 yrs.<sup>15,17</sup>. According to J.B.Mukherjee lambdoid suture closes at the age group of 45-55yrs.<sup>1</sup>

**CONCLUSION**

We concluded that suture obliteration occurs earlier in endocranial surface of skull. Sagittal suture was first to close followed by Coronal suture, lambdoid suture sequentially, So if done on large sample more correct conclusions can be given.

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