

Original Research Article

# To study the chronology and pattern of union of cranial sutures namely Basisphenoid-Basiocciput.

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## **Abstract:**

**Background & Method:** The aim of this study is to study the chronology and pattern of union of cranial sutures namely Basisphenoid-Basiocciput. Cases with complaints & diseases like headache, brain tumours, traumatic injuries, epilepsy, cerebrovascular accidents, various haemorrhages, encephalitis, meningitis etc. are referred to Department of Radio-diagnosis for investigation.

**Result:** In age group 15-20 years, total 15 cases were taken. Majority of female cases were in grade 3 (3 cases) followed by grade 4 (2 case). Among males in this age group, majority were in grade 2 (4 cases), followed by grade 4 (3 cases). Among 21-25 years age group, only 1 case was found in grade 3. Rest of all other age groups were showing complete closure (grade 4) of basi-sphenoid and basi-occiput suture.

**Conclusion:** There is a limited relationship between suture closures and age since above 40 years of age, it seems to be dependent on factors other than biological aging, and these factors can dictate fast closure or persisting non-closure. Basi-sphenoid and Basi-occiput sutures – in our study, out of total 150 subjects, 86 males and 64 females were taken, all males above 23 years of age showed complete fusion of basi-sphenoid and basi-occiput sutures i.e. Grade (complete closure of sutures without any suture line visibility) was present, while in the female, the complete closure i.e grade 4 was present in 20 years of age.

**Keywords:** chronology, cranial, sutures & Basisphenoid-Basiocciput.

**Study Designed:** A descriptive cross-sectional study.

## **1. INTRODUCTION**

Scientific estimation of age of an individual whether living, dead or human remains is a vexing problem for Medical Jurist in both civil and criminal matters. Cases for age estimation are being referred to Forensic expert for their opinion. Age estimation of living is most

important issue to the court and to common citizen as well. Community relies on Forensic expert for justice. Age estimation help in both civil and criminal cases such as consent, juvenile offenders, kidnapping, rape, marriage, attainment of majority, employment, impotence, sterility, competency as a witness, identification, senior citizen concession, retirement benefits, in old pension cases & in the question of fitness or unfitness. If proper age is not given, it is injustice to the patient and profession.

It may not be difficult to determine the age of the person, with good degree of accuracy from birth up to an age group of 25 years. The determination of age is needed for employment, marriage, majority, management of property, voting right, competency as witness and testamentary capacity. The significance of determination of the age is most important in the criminal cases, such as rape, infanticide, kidnapping, prostitution, juvenile delinquency and criminal responsibility.

Reasonably correct estimation of age in elderly people is essential in legal, medical, social and administrative matters, like fixing of age for regularization of employment, superannuation, pension settlements, senior citizen benefits, old age and good behaviour of the prisoner.

The scientific estimation of age is not an easy task especially in adult and elderly age groups. Usually the age estimation up to 25 years is done by physical examination, appearance of secondary sexual characters, data from dental eruption, maturity of bones, appearance and fusion of various ossification centres etc.

After 25 years of age, other scientific methods like tooth microscopy, Gustafson's method, study the union of sternbrae & manubrium, lipping of joints and closure of cranial sutures are considered for age estimation of the individual. Sutures are analogous to the epiphysio-diaphysis plane, in which both are loci of growth and have a sequence of time of closure.

Estimating age is not an easy task especially in adult and elderly age groups, because with advancing age, accurate age estimation is difficult by Forensic experts & age given usually has a wide range. So to decrease this wide age range, combined study closure of sutures of skull in CT scan is done in the present study. The sutures are easily seen in the young adults, but in the skull of older persons the sutures are more or less obliterated. Vault is an arched roof of skull and has three main sutures i.e sagittal, coronal and lambdoid.

## 2. MATERIAL & METHOD

This study is conducted on the cases referred for investigation in various pathological abnormalities from various departments in ..... SAMC & PG institute, Indore for CT scan. Cases with complaints & diseases like headache, brain tumours, traumatic injuries, epilepsy, cerebrovascular accidents, various haemorrhages, encephalitis, meningitis etc. are referred to Department of Radio-diagnosis for investigation.

### **Inclusion criteria:**

1. The cases of known age coming for CT scan examination. Age was confirmed by documentary evidences like birth certificate, identification cards, ration card, 10<sup>th</sup>, 12<sup>th</sup> marksheet, voter id .etc.
2. Subjects between 15-65 years of age were taken.

### **Exclusion criteria:**

1. Unknown age where exact age cannot be confirmed.

2. Individuals of unknown age or those who had suffered significant head trauma, which has potentially affected the area of interest, were excluded from the sample.
3. Individuals with endocrine diseases, metabolic, nutritional disorders, systemic chondro-osseous disease, or underlying bone pathology (such as punched-out lesion or internal frontal hyperostosis) were excluded from the sample.

### 3. RESULTS

**Table 1: Gender Wise Distribution of Cases**

Sex	Number Of Cases	Percentage
Males	86	57.3%
Females	64	42.7%
Total	150	100%

In our study, out of total 150 subjects, 86 males and 64 females were taken. The age of victims varied from 15 to 65 years. Age groups were classified in 5 year intervals. In each group, 15 cases were taken for the study. Number of males and females in each group were different.

Age group	% of Males		% of Females		Total
15-20	9	60%	6	40%	15
20-25	11	73.3%	4	27.7%	15
25-30	7	46.6%	8	54.4%	15
30-35	8	54.4%	7	46.6%	15
35-40	9	60%	6	40%	15
40-45	9	60%	6	40%	15
45-50	7	46.6%	8	54.4%	15
50-55	8	54.4%	7	46.6%	15
55-60	8	54.4%	7	46.6%	15
60-65	10	66.6%	5	33.3%	15

**Table 2: Age group with gender**

**TABLE- 3: BASI –SPHENOID AND BASI OCCIPUT SUTURE**

Age group	Males	Females	Total	Suture Grade-0		Suture Grade-1		Suture Grade-2		Suture Grade-3		Suture Grade-4	
				M	F	M	F	M	F	M	F	M	F
15-20	10	5	15	1	0	1	0	4	0	1	3	3	2

21-25	11	4	15	0	0	0	0	0	0	1	0	10	4
26-30	7	8	15	0	0	0	0	0	0	0	0	7	8
31-35	8	7	15	0	0	0	0	0	0	0	0	8	7
36-40	9	6	15	0	0	0	0	0	0	0	0	9	6
41-45	9	6	15	0	0	0	0	0	0	0	0	9	6
46-50	7	8	15	0	0	0	0	0	0	0	0	7	8
51-55	8	7	15	0	0	0	0	0	0	0	0	8	7
56-60	8	7	15	0	0	0	0	0	0	0	0	8	7
61-65	11	4	15	0	0	0	0	0	0	0	0	11	4
<b>Total</b>	<b>86</b>	<b>64</b>	<b>150</b>	1	0	1	0	4	0	2	4	79	59

In age group 15-20 years, total 15 cases were taken. Majority of female cases were in grade 3 (3 cases) followed by grade 4 (2 case). Among males in this age group, majority were in grade 2 (4 cases), followed by grade 4 (3 cases). Among 21-25 years age group, only 1 case was found in grade 3. Rest of all other age groups were showing complete closure (grade 4) of basi-sphenoid and basi-occiput suture.

#### 4. DISCUSSION

Many authors have pointed out discrepancies and some have consequently doubted the reliability of suture closure as an age indicator. However, none of these critics abandoned the starting point that if any correlation with age at death existed it had to be a positive one. This is even more noteworthy because in several publications the phenomenon of extremely old individuals with many open sutures is discussed. There are, for example, the crania of four Dutchmen, aged over hundred years, but with open sutures, described by J.B. Davis, and many others like Powers, Bolk. The above results suggest that these aged individuals with open sutures were not merely rare exceptions. There must be some underlying mechanism. The cranium may become thinner, but sutures once closed, do not open again. The question forces itself whether selection does occur. Do Individuals with open sutures have more chance to grow old? And if so, to what extent do similar selective mechanisms occur in relation to other age indicators?

C.T. Scan has advantages over X-rays that, Different sections such as axial or coronal etc. can be used to view closure of suture at different level on bone window.

Normally sutures are present in zig-zag fashion, when not closed but when closed present in straight line when viewed by naked eye, but on C.T. Scan only closure of suture is seen as closed or not closed.

Comparison of studies done by different authors in the past with present series i.e. CT scan for closure of suture of skull for Basisphenoid-Basiocciput, Saggital.

When basisphenoid and basiocciput suture is evaluated, it is found that the earliest closure is seen in males and females of 15 -20 yrs of age (3&2 cases respectively), but majority of closure were seen in age group 21-25 yrs and after 26 yrs of age, all sutures were completely closed.

The p value is calculated for gender difference and it is found to be 0.533, which is not significant.

Findings closely related with study mentioned in Vij<sup>62</sup>, Karmakar<sup>63</sup>, Vishwas<sup>64</sup>, Rao<sup>65</sup> and Bardale<sup>66</sup>.

Findings closely resembles with Yadav and Puri<sup>57</sup>.

## 5. CONCLUSION

There is a limited relationship between suture closures and age since above 40 years of age, it seems to be dependent on factors other than biological aging, and these factors can dictate fast closure or persisting non-closure. Basi-sphenoid and Basi-occiput sutures – in our study, out of total 150 subjects, 86 males and 64 females were taken, all males above 23 years of age showed complete fusion of basi-sphenoid and basi-occiput sutures i.e. Grade (complete closure of sutures without any suture line visibility) was present, while in the female, the complete closure i.e grade 4 was present in 20 years of age.

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