



Determination of Age from Epiphyseal Union of Bones at Shoulder Joint in Boys in Bikaner Region

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Abstract

Background: The study of epiphyseal union of bones is considered a reasonably accurate and accepted method for age determination. There is a variation in the timing of appearance and fusion of the epiphyses of the bones. So, the present work is to investigate the ages of epiphyseal union around shoulder joint radiologically in boys Bikaner region.

Material & Methods: The present study has been conducted on 107 boys falling in the age group of 14-25 years, which are selected randomly from various local educational institutions, neighbourhood of various faculty members and staff as well as cases attending the OPD of the Forensic Medicine Department of PBM Hospital, Bikaner.

Results: In our study shows the complete fusion seen in 16-17 years of age group of the coracoids process, 19-20 years of age group of acromian process and 18-19 years of age group of the head of humerus in boys.

Conclusion: In concluded that determine whether an individual has already reached the criminal responsibility age (18 years) or not; evaluation of epiphysis of shoulder joint closure is important after closure of hand and wrist bone epiphyses just before evaluation of iliac crest and ischial tuberosity fusion.

Keywords: Epiphysis, Coracoids process, acromian process, head of Humerus.

Introduction

Determination of age of an individual whether living, dead or from human remains is a vexing problem for medical jurist in both civil and criminal matters. Age estimation cases are often referred to forensic experts as it is a very important issue to the court of law and to common man¹.

In law the crime and punishment is entirely based on criminal responsibility and this in turn depend on the age of a person. Age is helpful in identification of an individual which in turn is helpful in both civil and criminal cases. The study of epiphyseal union of bones is considered a reasonably accurate and accepted method for age determination. Despite the fact that there are a

number of laws requiring registration of births (e.g. Registration of births and deaths Act 1969) most births are not properly recorded. There is a variation in the timing of appearance and fusion of the epiphyses of the bones¹.

Reddy KSN (2009) stated that the bones of human skeleton develop from a number of ossification centers.²

The complexity of overall ossification problem may be gleaned by the estimation that at the 11th prenatal week in humans there are some 806 centers of bone growth, at birth about 450, while the adult skeleton has only 206 bones³.

It is an established fact that the sequence and ultimate ossification of epiphysis varies in both sexes in different part of the world to the extent that there are wide variation even in the population of the different states of a country⁴. Jit and Kulkarni revealed that Precocity of epiphyseal union has been attributed to racial and climatic factors.⁵ So, the present work is to investigate the ages of epiphyseal union around shoulder joint radiologically in boys Bikaner region.

Material & Methods

The present study has been conducted on 107 boys, which are selected randomly from various local educational institutions, neighbourhood of various faculty members and staff as well as cases attending the OPD of the Forensic Medicine Department of PBM Hospital, Bikaner, falling in the age group of 14-25 years, in order to understand the pattern of appearance of ossification centre and fusion of diaphysis epiphyseal union in coracoids, acromian process, head of humerus in shoulder joint by radiological examination.

In school going subjects, date of birth was confirmed from the verbal statement, record of school, secondary school certificate etc. All the subjects were bona fide resident of Rajasthan and are residing in Bikaner region for more than 5 years and were free from physical and mental illness, disability, and long lasting disease. Informed expressed verbal consent of each subject

was taken before his/her physical and radiological examination. Exclusion criteria: 1. The subjects should not have any nutritional deficiency, endocrinal disorders, history of chronic drug intake (e.g.) anti-epileptic drugs, steroids, bony deformity or pathology, congenital malformation, and chronic illness thus affecting the skeletal growth and development of the individual. 2. Those who have no valid Date of Birth certificates.

For analysis of observation and discussion the whole process of epiphyseal union divided into three stages:

1. Centre of Ossification not appeared.
2. Centre of Ossification appeared but union is not.
3. Complete union with or without scar line.

Results

The observation shows the partial fusion seen in 30.00% cases in 14-15 years of age group & 85.71% cases in 15-16 years of age group. Complete fusion seen in 100% cases from 16-17 years to 24-25 years of age group of the coracoids process in boys (table 1).

The observation shows the appearance in 100% case from 15-16 years to 24-25 years of age group. Partial fusion seen in 85.14% cases in 16-17 years of age group, 80.00% cases in 17-18 years of age group & 75.00% cases in 18-19 years of age group. complete fusion seen in 100% cases from 19-20 years to 24-25 years of age group. No fusion seen in 14-15 years & 15-16 years of age group of acromian process in boys (table 2).

The observation shows the partial fusion seen in 40.00% cases in 14-15 years of age group, 14.28% cases in 15-16 years, 100% cases in 16-17 years of age group & 70.00% cases in 17-18 years of age group. Complete fusion seen in 30.00% cases in 17-18 years & 100% cases from 18-19 years to 24-25 years of age group of the head of humerus in boys.

Table no. 1: Appearance and Fusion Coracoid Process in Males

S. No.	Age (yrs)	No. of Cases	Appearance		Partial Fusion		Fusion	
			No.	%	No.	%	No.	%
1	14-15	10	10	100%	3	30%	-	-
2	15-16	7	7	100%	6	85.71%	-	-
3	16-17	7	7	100%	-	-	7	100%
4	17-18	10	10	100%	-	-	10	100%
5	18-19	16	16	100%	-	-	16	100%
6	19-20	8	8	100%	-	-	8	100%
7	20-21	15	15	100%	-	-	15	100%
8	21-22	14	14	100%	-	-	14	100%
9	22-23	8	8	100%	-	-	8	100%
10	23-24	7	7	100%	-	-	7	100%
11	24-25	5	5	100%	-	-	5	100%

Table no. 2: Appearance and Fusion of Acromian Process in boys

S. No.	Age (yrs)	No. of Cases	Appearance		Partial Fusion		Fusion	
			No.	%	No.	%	No.	%
1	14-15	10	6	60%	-	-	-	-
2	15-16	7	7	100%	-	-	-	-
3	16-17	7	7	100%	6	85.14%	-	-
4	17-18	10	10	100%	8	80%	2	20%
5	18-19	16	16	100%	12	75%	4	25%
6	19-20	8	8	100%	-	-	8	100%
7	20-21	15	15	100%	-	-	15	100%
8	21-22	14	14	100%	-	-	14	100%
9	22-23	8	8	100%	-	-	8	100%
10	23-24	7	7	100%	-	-	7	100%
11	24-25	5	5	100%	-	-	5	100%

Table no. 3: Appearance and Fusion of the centre of Head of Humerus in boys

S. No.	Age (yrs)	No. of Cases	Appearance		Partial Fusion		Fusion	
			No.	%	No.	%	No.	%
1	14-15	10	10	100%	4	40%	-	-
2	15-16	7	7	100%	1	14.28%	-	-
3	16-17	7	7	100%	7	100%	-	-
4	17-18	10	10	100%	7	70%	3	30%
5	18-19	16	16	100%	-	-	16	100%
6	19-20	8	8	100%	-	-	8	100%
7	20-21	15	15	100%	-	-	15	100%
8	21-22	14	14	100%	-	-	14	100%
9	22-23	8	8	100%	-	-	8	100%
10	23-24	7	7	100%	-	-	7	100%
11	24-25	5	5	100%	-	-	5	100%

Discussion

The present study has been conducted on 107 boys, which are selected randomly in school going subjects, date of birth was confirmed from the verbal statement, record of school, secondary school certificate etc.

In this study shows the partial fusion seen in 30.00% cases in 14-15 years of age group & 85.71% cases in 15-16 years of age group. Complete fusion seen in 100% cases from 16-17 years to 24-25 years of age group of the coracoids process in boys. This study consistent with

Galastaun⁶, Chaurassia B.D.⁷, T.A. Gonzales⁸, Peter L. Williams⁹ and SC Shanks¹⁰ and in consistent with L.A. Waddae¹¹, C.K. Parikh, K.S¹². Narayan Reddy², F.E. Camps¹³, J.V. Basmajian¹⁴ and Krogman¹⁵.

The present study shows the appearance in 100% case from 15-16 years to 24-25 years of age group. Partial fusion seen in 85.14% cases in 16-17 years of age group, 80.00% cases in 17-18 years of age group & 75.00% cases in 18-19 years of age group. complete fusion seen in 100% cases from 19-20 years to 24-25 years of age group. No fusion seen in 14-15 years & 15-16 years of age group of acromian process in boys. In case of boys findings of present study for Acromian Process corresponds with Pillai¹⁶, Galastaun⁶, KS Narayan Reddy², JV. Basmajian¹⁴, Flecker¹⁷, Bernard Knight¹⁸ and Krogman¹⁵ and not in accordance with C.K. parikh¹², Chaurassia B.D.⁷, T.A. Gonzales⁸, F.E. Camps¹³, Peter L. Williams⁹, S.C. Shanks¹⁰.

The present study observed that the partial fusion seen in 40.00% cases in 14-15 years of age group, 14.28% cases in 15-16 years, 100% cases in 16-17 years of age group & 70.00% cases in 17-18 years of age group. Complete fusion seen in 30.00% cases in 17-18 years & 100% cases from 18-19 years to 24-25 years of age group of the head of humerus in boys. In Case of boys findings of Head of humerus in present study are in accordance with the L.A. Waddell¹¹, Galastaun⁶, T.A. Gonzales⁸, J.V. Basmajian¹⁴ and not in accordance with Lall and Nat¹⁹, Pillai¹⁶, S.N. Sahana²⁰, K.S. Narayan Reddy², Chaurassia B.D.⁷, F.E. Camps¹³, Peter L. Williams⁹, S. Cochrane Shanks¹⁰, Flecker¹⁷, Davies and Parson²¹, Bernard Knight¹⁸ and Kragman¹⁵.

Conclusion

In concluded that determine whether an individual has already reached the criminal responsibility age (18 years) or not; evaluation of epiphysis of shoulder joint closure is important after closure of hand and wrist bone epiphyses just before evaluation of iliac crest and ischial tuberosity fusion.

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