

Case Report**Dental Perspective in the Assessment of Grievousness of Dental Injury and Age Estimation in a Sexual Assault Victim: A Case Report**

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ABSTRACT :

Introduction: Forensic odontology is a branch which deals with proper handling and examination of dental evidence, and the proper evaluation and presentation of dental findings. It uses the skills of a dentist in personal identification during mass calamities, sexual assault and child abuse to name a few. The need to estimate the age of living individuals is becoming more frequent because of increasing number of crime rates by and against minors, increase in the number of immigrants without acceptable identification documents and the falsification of data to be prevented from being sentenced to a punishment. Teeth are bestowed with features of hardness and resilience against external factors such as chemicals, putrefaction and fire explosives making them a durable source of age determination. Dental age estimation has proven to be equivalent to the skeletal methods of age estimation. Further dentist's play a significant role in assessing the grievousness of the injuries sustained to the oral cavity. Hence it become a dentist's moral responsibility to act effectively in legal matters of such nature. Here we present a case suspected of sexual assault where age estimation and assessment of grievousness of injuries faced by the victim are evaluated.

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INTRODUCTION

Age estimation forms an integral part in human identification and plays a pivotal role in legal matters. The teeth are the most indestructible parts of the body and exhibit the least turnover of natural structure hence proving to be an asset in age estimation.^[1] The methods of age estimation are divided into three categories:

1. Morphological
2. Biochemical
3. Radiological^[2]

These methods have been enlisted in **Table 1**.

The methods used in this particular case include the Abridged version of Demirjian's method, The Schour and Massler method and the Harris and Nortje method. Each of these methods have proven under various studies to be as effective as skeletal methods of age estimation and providing results close to the chronological age of the patient.

Dental injuries are the most common type of orofacial injuries. However, cases of physical and sexual assault are also associated with injuries to the bony structures of the facial

skeleton, the temporomandibular joint and soft tissue injuries to the face.

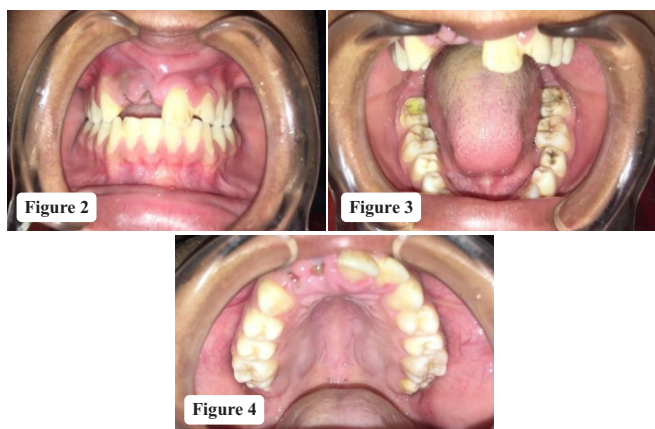
Moreover, the dentist's need to categorize oral injuries in court is not unusual. It is imperative for the dentist to be aware of such conditions and educate themselves about the laws pertaining to the same. Section 320 of the Indian Penal Code categorizes grievous hurt wherein the seventh point includes "fracture or dislocation of a bone or tooth. This has been enlisted in **Figure 1**.

CASE REPORT

A male patient claiming to be 16 years of age as per his Aadhar card visited the institute accompanied by a police investigator. The patient visited Mumbai with an acquaintance from his native place in search of labor. The patient gave history of sexual and physical assault by a known person which involved the patient's head being pushed onto the floor. Two days later, the patient reported the same to a shopkeeper, who helped him lodge a police complaint. The patient was asked to undergo medical and dental examination and was referred to Government Dental Hospital, Mumbai, for confirmation of

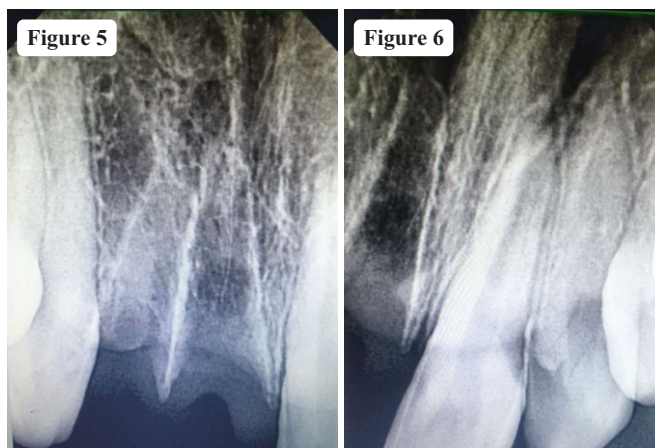
age and categorization of grievousness of dental injuries. The patient was conscious and well oriented. No significant past medical history. No significant family history.

Intraoral Examination: 11 and 12 missing, 21 was extruded slightly from its socket and was tender on percussion (**Figure 2 and Figure 3**). Tenderness was noted along the attached gingiva and alveolar mucosa with respect to 11, 12, 21. The marginal gingiva was inflamed and mildly erythematous in the same region. No signs of erythema, ulceration, or petechiae were noted on the palate or other regions of oral mucosa (**Figure 4**). Ellis class I fracture was seen in 22 on the mesioincisal aspect. No signs of periodontal disease.

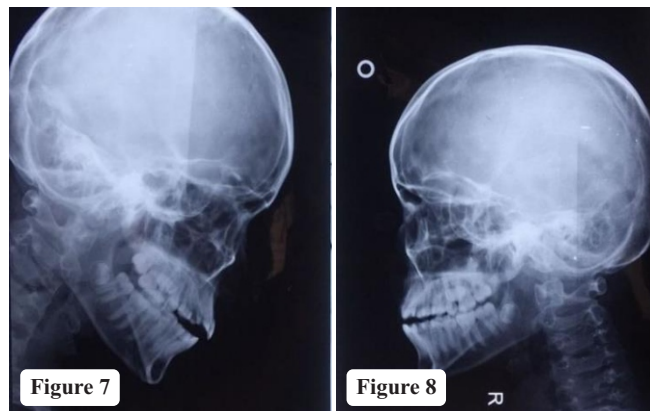


Dental Age Estimation Depending on Eruption Pattern of the Teeth: Complete eruption of the first and second bicuspsids of all the four quadrants. Complete eruption of first and second molars of all four quadrants. Angle's Class I molar relation noted. The dental age of the patient based on the clinical findings was estimated to be approximately 13-14 years.

Digital Intraoral Periapical Radiograph with respect to 11, 12, 21 region showed empty tooth socket in relation to 11, 12 with the lamina dura being intact. The periapical area and surrounding bone appear normal. Periodontal ligament widening noted with respect to 21 (**Figure 5 and Figure 6**).



Lateral Skull Radiograph showed completely erupted 46 with completely formed root apex, completely erupted 47 with the apex open and crown formation complete with respect to 48 with a well-defined follicular space around it (**Figure 7-8**).



According to IPC section 320 (7), "fracture or dislocation of a bone or tooth" is considered as grievous offence. Hence, we have classified the nature of injury as grievous.

According to the chronology of eruption of teeth we can determine the dental age of the patient to be approximately 13-16 years.

The confirmation of the dental age has been carried out with the following three methods of age estimation which has proven to be apt for the desired age group and are the most commonly used methods.

Demirjian's Method (Abridged form DAEC)

The original Demirjian's method utilizes three tables at a particular time while estimating the age of a person.

The abridged form of Demirjian's method depicted tooth

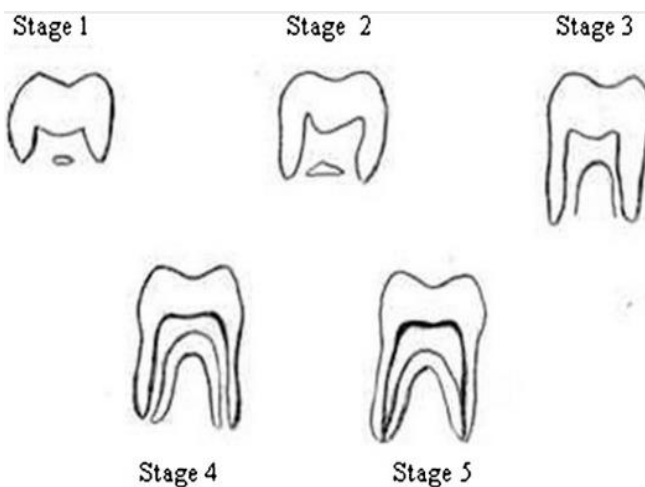
Patient ID: _____	OPD number: _____							
Gender: _____	Nationality: _____							
Date of data collection: _____	Place of origin: _____							
Dentition present: _____								
Determination of score based on developmental stages of the tooth								
Tooth number	Developmental stages of the tooth							
	A	B	C	D	E	F	G	H
31				0.0/0.0	1.9/2.4	4.1/5.1	8.2/9.3	11.8/12.9
CS: By/Gr								
32			0.0/0.0	3.2/3.2	5.2/5.6	7.8/8.0	11.7/12.2	13.7/14.2
CS: By/Gr								
33			0.0/0.0	3.5/3.8	7.9/7.3	10.0/10.3	11.0/11.6	11.9/12.4
CS: By/Gr								
34		0.0/0.0	3.4/3.7	7.0/7.5	11.0/11.8	12.3/13.1	12.7/13.4	13.5/14.1
35								
CS: By/Gr	1.7/1.8	3.1/3.4	5.4/6.5	9.7/10.6	12.0/12.7	12.8/13.5	13.2/13.8	14.4/14.6
								
36			0.0/0.0	8.0/4.5	9.6/6.2	12.3/9.0	17.0/14.0	19.3/16.2
CS: By/Gr								
37	2.1/2.7	3.5/3.9	5.9/6.9	10.1/11.1	12.5/13.5	13.2/14.2	13.6/14.5	15.4/15.6
CS: By/Gr								

Total score

*Adapted from the scoring and calcification tables given by Demirjian.²⁰ OPD: Outpatient department

Table 1: Conversion of Maturity Score to Dental Age (7 Teeth): For males³

Age	Score	Age	Score	Age	Score	Age	Score
3.0	12.4	7.0	46.7	11.0	92.0	15.0	97.6
3.1	12.9	7.1	48.3	11.1	92.2	15.1	97.7
3.2	13.5	7.2	50.0	11.2	92.5	15.2	97.8
3.3	14.0	7.3	52.0	11.3	92.7	15.3	97.8
3.4	14.5	7.4	54.3	11.4	92.9	15.4	97.9
3.5	15.0	7.5	56.8	11.5	93.1	15.5	98.0
3.6	15.6	7.6	59.6	11.6	93.3		
3.7	16.2	7.7	62.5	11.7	93.5	15.7	98.2
3.8	17.0	7.8	66.0	11.8	93.7		
3.9	17.6	7.9	69.0	11.9	93.9	15.9	98.3
4.0	18.2	8.0	71.6	12.0	94	16.0	98.4
4.1	18.9	8.1	73.5	12.1	94.2		
4.2	19.7	8.2	75.1	12.2	94.4		
4.3	20.4	8.3	76.4	12.3	94.5		
4.4	21.0	8.4	77.7	12.4	94.6		
4.5	21.7	8.5	79.0	12.5	94.8		
4.6	22.4	8.6	80.2	12.6	95.0		
4.7	23.1	8.7	81.2	12.7	95.1		
4.8	23.8	8.8	82.0	12.8	95.2		
4.9	24.6	8.9	82.8	12.9	95.4		
5.0	25.4	9.0	83.6	13.0	95.6		
5.1	26.2	9.1	84.3	13.1	95.7		
5.2	27.0	9.2	85.0	13.2	95.8		
5.3	27.8	9.3	85.6	13.3	95.9		
5.4	28.6	9.4	86.2	13.4	96.0		
5.5	29.5	9.5	86.7	13.5	96.1		
5.6	30.3	9.6	87.2	13.6	96.2		
5.7	31.1	9.7	87.7	13.7	96.3		
5.8	31.8	9.8	88.2	13.8	96.4		
5.9	32.6	9.9	88.6	13.9	96.5		
6.0	33.6	10.0	89.0	14.0	96.6		
6.1	34.7	10.1	89.3	14.1	96.7		
6.2	35.8	10.2	89.7	14.2	96.8		
6.3	36.9	10.3	90.0	14.3	96.9		
6.4	38.0	10.4	90.3	14.4	97.0		
6.5	39.2	10.5	90.6	14.5	97.1		
6.6	40.6	10.6	91.0	14.6	97.2		
6.7	42.0	10.7	91.3	14.7	97.3		
6.8	43.6	10.8	91.6	14.8	97.4		
6.9	45.1	10.9	91.8	14.9	97.5		



(Panchbhai AS. Dental radiographic indicators, a key to age estimation. Dento Maxillo Facial Radiology. 2011 May;40(4): 199-212. DOI: 10.1259/dmfr/19478385.)

which would give a final score at the end of the table.^[4]

$$11.8 + 13.7 + 11.9 + 13.5 + 14.4 + 19.3 + 13.6 = 98.2$$

TOTAL SCORE: 98.2

Estimated Dental Age of the patient = 15.7 years.

Schour and Massler's Method describes 20 chronological stages of tooth development. The chart is based on histological sections and permits direct comparison with the radiographs.^[5]

After the thorough analysis of the charts given by Schour and Massler, the estimated age of the patient according to this method would be 15 years +/- 6 months.

Harris and Nortje Method: The third molar corresponds to stage 1 of this method and the estimated dental age would be = 15.8 +/- 1.4 years. On thorough clinical and radiological examination of the patient:

1. According to IPC section 320 the patient suffered grievous injury.
2. The patient's estimated dental age was 15 +/- 1 year.

DISCUSSION

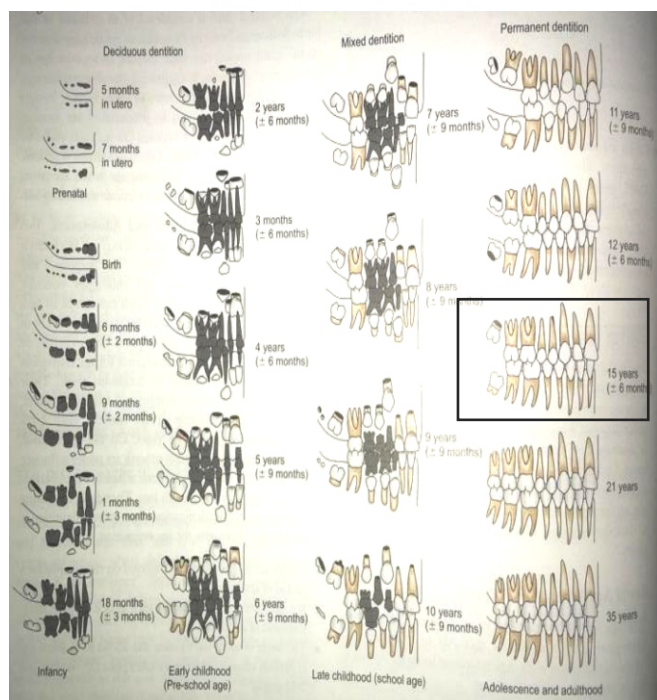
1. Age Estimation

Age assessment is required in circumstances such as, asylum seekers of unknown age, young people accused of criminal activities, and convicted criminals whose age is claimed to be <18 years before sentencing.^[6]

A number of age estimation methods exist as have been enumerated in **Table 1**.

Over the years, many methods have been developed in order to assess which one predicts more accurately the age. **Demirjian's** method is the most widely used estimation method for dental age evaluation.^[7]

The original Demirjian tables provide with a chart representing the calcification stages and separate scoring tables for boys and



number in FDI notation as well as all the eight developmental stages of each tooth, as given separately in the original tables. It included scanned copies of pictorial representation of developmental stages of all seven teeth under consideration. The scoring system of each developmental stage was also incorporated into DAECF for both boys and girls, the sum of

girls, assigning a particular score to each calcification stage, the sum of which is then compared with the tables provided for DAE, separately for boys and girls.^[8] however, this method proved to be time consuming.

The Abridged DAECC has been proven to be less time consuming and easy to interpret in the North Indian population.^[4] hence, this method has been used in this particular case.

According to a study by Vivek rai et al, the Schour and Massler technique was found to be comparable and equally reliable as the skeletal age estimation methods.^[9]

Further, the accuracy of the methods varies with the age group being considered. Hence, to reach a more accurate conclusion, keeping the sensitive nature of the case in mind, another method which involves the estimation of the dental age with the development of the third molar has been undertaken.

The dental age estimation by the Harris and Nortje method proved to be consistent with the other results.

The Cameriere's method is another widely used and accurate technique for age estimation. However, it involves the use of panoramic radiographs which were unavailable in this case and hence this method was not applied.

With the methods used, the dental age of the patient was estimated to be 15+/-1 year.

2. Assessment of Grievousness of Dental Injuries

Nationwide 81% of women and 43% of men reported some form of sexual harassment and/or assault in their lifetime.^[10] A number of cases go unreported due to lack of knowledge amongst the victims and their families. Most sexual abuse offenders are acquainted with the victim as is seen in this case. According to reports, 52.4% of the offenders are acquainted with the victims.^[10]

A large number of cases of physical or sexual assault report with injuries to the orofacial region, the most common being avulsion or fracture of the tooth as is seen in this case. Section 320 of the Indian Penal Code deals with the area of grievous hurt and has provided categories for the same.

CONCLUSION

Dental age estimation forms an integral part of forensic odontology. Numerous methods and studies have been put forward so far, but it is imperative to remember that each of these methods give an estimation of the age of the individual under consideration.

This case enlightens us about the prevalence of sexual assault on male victims and the seriousness of the crime.

The Parliament of India passed the 'Protection of Children Against Sexual Offences Bill (POCSO), 2011' regarding child sexual abuse on 22 May 2012, making it an Act.

Moreover, the prevalence of child labor due to poverty in India

is significant. The very reason the victim in this case was coerced into leaving home was with the opportunity of labor in another city.

An amalgamation of government policies, public awareness and education can help prevent such crimes.

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