



Original Research Article

Third molars: A peek-a-boo of orthodontics?

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Abstract

Introduction: There is considerable variation between populations with regard to stage of formation of the third molars among which the radiographic diagnosis of its presence and degree of formation forms a crucial part of treatment planning.

Objective: The purpose of this study was to define an age above which the chances of formation of third molars will be less or negligible to guide in the treatment planning of patients undergoing orthodontic treatment with an extraction treatment plan or planning for distalization.

Materials and Methods: Pre-treatment and Post treatment orthopantomogram (OPG) of 200 orthodontic patients with known gender and chronological age were obtained. The OPG's which showed the absence of any of the 3rd molars on pretreatment X rays were evaluated again on the post treatment x-rays to see any signs of radiographic appearance of third molar at the end of the treatment.

Results: The appearance of presence of molar crypts was earlier in females than males and third molars can form in an age gap of eight to fourteen years in both males and females. However, the male patients showed that appearance of maxillary molars may occur even after age of 14 years.

Conclusion: Third molars may present a peek-a-boo appearance as they might be missing on a pretreatment OPG and can appear on post treatment OPG. Therefore, special consideration should be given to third molars while formulating a treatment plan as they can mitigate the results of patients in whom treatment is completed at or before the age of fourteen years.

Keywords: Third molars, Orthopantomogram, Treatment planning, Orthodontic treatment

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1. Introduction

The presence of population differences in tooth formation has long been speculated upon in different ethnic groups across worldwide.¹ There is considerable variation between and within populations with regard to tooth size, age of eruption, stage of formation and crown morphology of the third molars among which the radiographic diagnosis of its presence, position and degree of formation is a crucial part of treatment planning.²

Mineralization of third molars is a population specific process and does not occur in every ethnic group at the same age.³ Therefore, it is necessary to use population specific reference data in forensic age estimation of people and to

identify a difference in the timing of initial mineralization between groups, the entire developmental sequence of a tooth must be documented. The third molar is usually the only tooth visible from crypt appearance to apex completion on radiographs of children and young adults. It is an unusual tooth characterized by large variability in formation time, hence, precise and reliable determination of age using third molar mineralization is critically important because^{4,5} of its use in determining the age of unidentified cadavers, human remains, and of living persons for purposes of differentiation between juvenile and adult status in criminal law cases.

In orthodontics, the earliest age for third molar genesis could be of an academic interest to an orthodontist but the

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upper age limit for the start of its formation is of extreme importance. The usual age of seeking orthodontic treatment by young adolescents is 12-13 years for most of the malocclusions and it is important to know if third molars are developing or not at that stage before formulating a treatment plan.¹⁰

Therefore, the aim of this study was to see any signs of third molar development in patients undergoing orthodontic treatment from the start of the treatment until completion or during the treatment to guide in the treatment planning of patients with an extraction treatment plan specially in patients in whom distalization has to be done so as to define an age after which the chances of third molar formation are less.

2. Materials and Methods

In this retrospective study, Pre-treatment and Post treatment orthopantomogram of 200 orthodontic patients (129 females, 71 males) with known gender and chronological age were obtained from Department of Orthodontics and Dentofacial Orthopedics at Dr. Harvansh Singh Judge Institute of Dental Sciences and Hospital, Chandigarh. The inclusion criteria were: age 8 years and above, no prior orthodontic treatment, absence of craniofacial anomalies, the availability in their clinical records of a panoramic radiograph of adequate quality, no history of medical or surgical disease that could affect the presence and development of third molars. Exclusion criteria included: image deformity affecting mandibular permanent tooth visualization, hypodontia, or gross pathology. OPG radiographs meeting these selection and inclusion criteria were evaluated using the formation stages described by Demirjian et al. (from Stages 'A' to 'H' (Figure 2). The exact age of each patient was calculated from the date of X-ray minus the date of birth. The OPG's which showed the absence of any of the 3rd molars on pretreatment X rays were evaluated again on the post treatment x-rays to see any signs of radiographic appearance of third molar during or at the end of the treatment.(Figure 1)

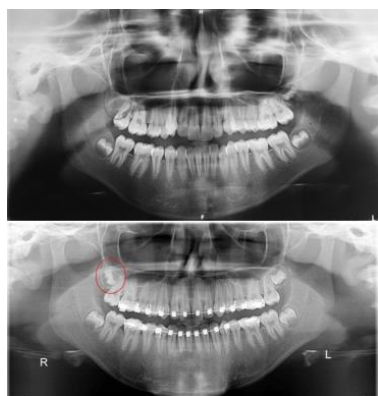


Figure 1: Pre and post treatment OPG's of a patient from the study sample showing appearance of third molar (18) in pre debonding OPG

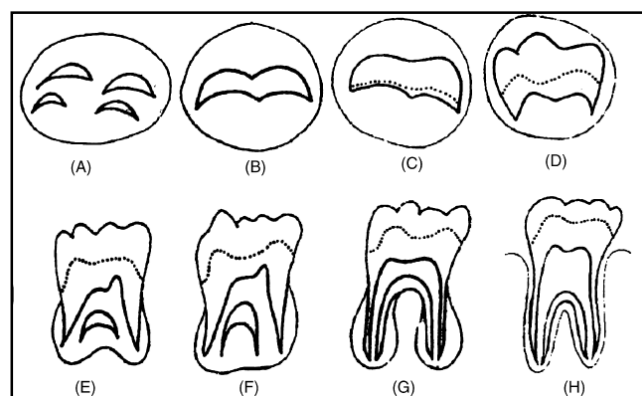


Figure 2: 3rd molar formation stages as described by Demirjian et al

The developmental stages of the third molars from stage 'A' to 'H' (6)

Stage A: Cusp tips mineralized but not yet coalesced.

Stage B: United mineralized cusps and well-defined mature coronal morphology.

Stage C: Crown about half formed, evident pulp chamber, and visible dentinal deposition.

Stage D: Crown formation completed to the cemento-enamel junction and pulp chamber with a trapezoidal form.

Stage E: Commencement of formation of the inter-radicular bifurcation and root length less than the crown length.

Stage F: Root length at least as great as the crown length and roots with funnel-shaped endings.

Stage G: Root walls parallel, with apices remaining open.

Stage H: Apical ends of the roots completely closed and uniform width of the periodontal membrane around the root.

3. Results

A detailed excel sheet was prepared for all the variables including the presence or absence of third molars for all quadrants. The statistical analysis was performed with the SPSS 10.0 for Windows software package.

Out of 200 patients, 129 were females comprising 64.5% of the study population and 71 were males comprising 35.5% of the study population.(Table 1)

Pre-treatment and post treatment OPG's also showed a strong correlation in the appearance of 18, 28 in similar stages and 38, 48 likewise. Appearance of presence of molar crypts is earlier in females than in males. Third molars can form in an age gap of eight to fourteen years in both males and females but in males appearance of maxillary molars can occur even after the age of 14 years.(Table 2)

Table 1: Gender and age wise distribution of patients

Gender and age group Cross tabulation					
			Age group		Total
			Age less than 14	age 14 or above	
Gender	F	Count	50	79	129
		% of Total	25.0%	39.5%	64.5%
	M	Count	24	47	71
		% of Total	12.0%	23.5%	35.5%
Total		Count	74	126	200
		% of Total	37.0%	63.0%	100.0%

Table 2: Wilcoxon signed ranks test showed significant results in males and females of age below 14 years and for males of age above 14 for tooth 18 and 28 only.

Wilcoxon Signed Ranks Test						
Gender	Age group1		Tooth18post - Tooth18pre	Tooth28Post - Tooth28pre	Tooth38post - Tooth38pre	Tooth48post - Tooth48pre
F	Age less than 14	Z	-2.236 ^b	-2.000 ^b	-2.449 ^b	-2.236 ^b
		Asymp. Sig. (p value)	.025	.046	.014	.025
	age 14 or above	Z	.000 ^c	-1.414 ^b	-1.000 ^b	-1.000 ^b
		Asymp. Sig. (p value)	1.000	.157	.317	.317
M	Age less than 14	Z	-1.000 ^b	-1.414 ^b	-1.000 ^b	.000 ^c
		Asymp. Sig. (p value)	.017	.057	.017	.020
	Age 14 or above	Z	-1.000 ^b	-2.000 ^b	-1.000 ^b	.000 ^c
		Asymp. Sig. (p value)	.017	.046	.317	1.000

4. Discussion

The third molars are unusual teeth characterized by variability in its timing of formation, variation in crown root morphology (not infrequently by agenesis) and majority of the studies have been concerned about its presence and absence only.⁷ Formation of tooth is superior to emergence of tooth for assessing dental maturation, because majority of the teeth can be studied at each examination, whereas emergence is only a specific phase of short duration in the continuous process of eruption.⁸

Demirjian’s method is one of the simplest, most practical, and widely employed methods to predict age and maturation, as it is comprised of clearly defined changes in shape that do not require speculative estimation. Various investigators have applied and modified this method to their own populations.⁹ The investigations using Demirjian’s method on several ethnic and geographical groups showed some changes in dental formation. For that reason, the aim of this study was to appraise the suitability of Demirjian’s method for assessing dental maturation in northern Indian children.

Salzmann JA¹¹ stated that it is reasonable to expect that an intimate relationship exists in the physical maturation of various tissue systems, although the correlation between dental development and growth of the body as a whole is claimed to be low. Bishara SE¹² in his review on Third molars: A dilemma! Or is it? concluded that the clinician has to consider the impact of the extraction decision of third

molars on any future treatment plan from an orthodontic, surgical, periodontic, or prosthodontic aspect as well as extraction of third molars should be done in young adulthood rather than at an older age if indicated, and the clinician has to have a justifiable reason to recommend the extraction of any tooth.

Present study showed that the age for appearance of third molar can range from eight to fourteen years for both males and females in concordance with study of Liversidge HM,¹ which reported the Comparison of mandibular third molar crypt formation from various studies and showed the mean age of third molar crypt formation starts as early as as eight or nine with a wide range from about six (this is often the minimum age) up to fourteen years. Rozkovcová E et al¹³ in their study of 1700 individuals of Czech population found that the first formation starts at the age of 6 years although the most frequent age of tooth formation was 10 years. Bolaños MV et al² in 2003 reported in their study that third molars appear at some time between the ages 5 years 10 months and 14 years 8 months; also a higher proportion of unformed molars was found in the maxillary third molars compared to mandible as the initial developmental stages of maxillary teeth may not be visible. Acc. to Richardson M,¹⁰ when third molar genesis is delayed beyond the age of years, the probability of four third molars developing is reduced by approximately 50% and the third molars formation may occur upto the age of sixteen years, although the possibility of their appearance is reduced after twelve years of age. Similar to our study, Sarnat H¹⁴ et al concluded in their study of 693

Israeli children that agenesis of third molars can be determined conclusively if no radiolucent bud is present beyond age 14 and the first appearance of a radiolucent bud was at seen at the age of 8 years whereas contradictory with the present study Meinal A et al¹⁵ in 2007 found in their study that males reach the developmental stages earlier than females which is probably because of the different inclusion criteria and age groups.

5. Conclusion

The third molars can appear in the wide age range of 8 to 14 years of age in both males and females but the maxillary molars may appear after 14 years of age in males. Hence, any signs of third molar development in patients undergoing orthodontic treatment from the start to mid stage until completion should be checked on an OPG to guide in the treatment planning of patients with an extraction treatment plan specially in patients in whom distalization has to be done as precise timing of the third molar development can bring more reliability into the planning of orthodontical treatment.

In a true sense, third molars present a peek-a-boo appearance as they might be absent on a pretreatment OPG and can appear on post treatment. So, special consideration should be given to third molars as they can mitigate the results of patients in whom treatment is completed at or before the age of fourteen years, also it may help to estimate the age of young individuals, if there is no other biological method on disposal.

6. Conflict of Interest

None.

7. Source of Funding

None.

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