

Cementoenamel junction-alveolar bone crest distance in interproximal areas of intact primary molars in healthy 7-9 year old girls in Hamadan

Shariatmadar Ahmadi, R. * Torkzaban, P. ** Gholami, L. ***

* Assistant Professor, Department of Periodontics, Faculty of Dentistry, Azad University of Medical Sciences.

** Assistant Professor, Department of Periodontics, Faculty of Dentistry, Hamadan University of Medical Sciences.

*** Post-graduate student of Periodontics, Faculty of Dentistry, Hamadan University of Medical Sciences.

ABSTRACT

Statement of the problem: Early detection of periodontal disease and destruction is important for prevention of further destruction of the tissues. We carried out this study to determine the normal cement enamel junction (CEJ) to alveolar bone crest (ABC) distance in the interproximal area of primary molars on bitewing (B. W) radiographs in healthy 7-9 year old girls living in Hamadan, Iran.

Materials and Methods: Four hundred healthy 7-9 year old junior school girls with no clinical evidence of dental caries, diastema and fillings in intermolar areas (D, E) were selected by cluster method and 800 bitewing radiographs were taken and examined.

Results: From 3200 measurements, only 2582 sites were included in the study. The mean cementoemal junction- alveolar bone crest distance of all primary teeth was 1.1 mm. 7.7% of the total examined surfaces showed distances of greater than 2mm indicating the prevalence of alveolar bone loss. The mean distances measured in the maxilla were greater than the mandible which was statistically significant ($P<0.05$).

Conclusion: This study provides useful base line data on alveolar bone height in assessment by radiographical examination. It is important to establish proper diagnostic measurements to identify patients at risk and further studies are recommended.

Keywords: Periodontitis, Cementoemal junction, Alveolar bone crest, Primary molars

INTRODUCTION

Destruction of bone still remains as the most important criterion for assessing the severity of periodontitis and identifying individuals susceptible to periodontal tissue breakdown. ⁽¹⁾ Recent studies have

indicated that juvenile periodontitis in the permanent dentition of adolescents can often rapidly destroy the periodontium. ⁽²⁻⁴⁾

This indicates the importance of early recognition and treatment of these patients to prevent the transition of the Early Onset Periodontitis (EOP) is now considered as aggressive periodontitis, from the primary dentition to the permanent dentition. Children and adolescents susceptible to periodontal disease should be identified as

Corresponding Author: P. Torkzaban Address: Member of Dental Research Center and Assistant Professor, Dept. of Periodontology of Faculty of Dentistry of Hamadan University of Medical Sciences, Fahmideh Blv, Hamadan, Iran. Tel: +98 8118354018 Email: Torkzaban@umsah.ac.ir

early as possible in order to prevent the advance of a possibly destructive disease. Several authors have introduced bitewing radiographs as useful diagnostic methods of early detection of bone loss in the primary and permanent dentitions. ⁽⁵⁻⁷⁾ Sometimes, it can be difficult to diagnose alveolar bone loss in the primary dentition due to increased distance between cementoenamel junction (CEJ) and the level of alveolar bone crest (ABC). However, in clinical practice, general practitioners and periodontists rely on both radiographic and clinical measurements of bone loss as diagnostic tools. ^(5, 8) The radiographic signs as evidence of initial periodontal breakdown are 1- widening of the periodontal ligament space, 2- diffuseness or absence of the crest cortical plate, 3- thinning or absence of the trabeculae of the crestal alveolar, and 4- quantitative changes in the distance from the cementoenamel junction (CEJ) to the alveolar bone crest (ABC).⁽⁹⁾ For diagnosis of alveolar bone loss, the distance from CEJ to the ABC should be greater than 2mm. ^(6, 10-13) Periodontal diseases in children may indicate the presence of predisposing factors that can facilitate the establishment of disease in subsequent ages, which in some cases are associated with systemic diseases.^(5, 14) Prevalence of periodontitis in children and adolescents ranges from 0% to 51.5%. The wide range might be due to differences in the patients regarding ethnic

backgrounds, sex, age, stage of dentition, oral hygiene and values of the alveolar bone height in primary molars using direct measurements in standardized bitewing (B. W) radiographs in healthy 7-9 year old girls living in Iran, Hamadan, (west of Iran). In addition, this study evaluated whether alveolar bone height varied due to function and dental arch position.

MATERIALS & METHODS

In this study, 400 healthy 7-9 year old junior school girls with no clinical evidence of dental caries, diastema and fillings in the intermolar areas (D, E) were selected. Then, bitewing radiographs were taken and examined. The selected B.W. radiographs had the following criteria: minimal evidence of distortion, minimal overlapping, and clear image of CEJ and ABC in primary molars. Teeth restored with S.S.C (stainless steel crown) but with visible CEJ were also included. Eight dental surfaces were studied for each one. The radiographs were analyzed and the distance between the CEJ and the alveolar crest on the mesial of E and the distal of D were measured using a digital caliper (Mituyoto, with 0.01 mm accuracy) and a lens on a negatoscope. Measurements were only preformed on fully erupted teeth which were in function. All measurements were done by one periodontist. The student's ages were recorded. Data were analyzed by SPSS version 10. ANOVA test was used to compare the variables.

RESULTS

From 800 bitewing radiographs of 400 girls, totally, 3200 surfaces were measured but, only 2582 surfaces were included in this study. Table 1 shows the mean distances and distribution of CEJ -ABC in interproximal areas of primary molars according to age (Table 1). The mean CEJ-ABC distance for all primary teeth was 1.1 ± 0.5 mm. In 201 surfaces (7.7%) of the total examined surfaces the distances were greater than 2mm which indicates the prevalence of alveolar bone loss. This value was 8.7% in 7-year-old girls, 6.4% in 8-year-girls and 8.3% in 9-year-old girls which showed no statistically significant differences. In 33% of girls, the CEJ -ABC distance was more than 2mm in at least one

site or even more, which shows higher risk for early onset of periodontitis in them. Based on the mean alveolar crest level of 8 examined sites in primary molars the maximum prevalence of bone loss was found in URE (Upper right D) (18.4%). The Minimum prevalence of bone loss was 1% in LLD (left right D). (Table1)

The mean distance of CEJ-ABC for the maxillary primary molars was greater than that of the mandibular primary molars but the difference was statistically significant ($P < 0.0001$) (Table2). The mean bone levels in the right side of maxilla were more than that in the left side ($P < 0.0001$) (Table3).

There was no statistically significant difference in CEJ to alveolar crest distance in different age groups. ($P > 0.05$) (Table 4)

Table 4: The mean distance of CEJ- ABC and distribution in the interproximal surfaces of molars by age in girls.

Study groups	Bone Level \leq 2mm		Bone Level $>$ 2mm		No	Bone Level (mean \pm SD)	*P.value
	percentage	No.	percentage	No.			
7years	91.2	1091	8.7	105	1196	1.09 \pm 0.573	
8years	93.1	573	6.4	44	797	1.06 \pm 0.437	
9years	92.6	537	8.3	52	589	1.15 \pm 0.49	P=0.542
Total	92.3	2381	7.7	201	2582	1.1 \pm 0.494	

*ANOVA. One TEST

Table 2: The comparisons of mean bone level of the jaws.

Region of jaw	No.	Bone Level (mean ± SD)	*P.value
Maxilla	173	1.18±0.616	
Mandible	173	1.02±0.307	P=0.00

*Independent two samples t.test

Table 3: The comparison of mean bone level in maxillary and mandibular quadrants.

Region of jaw	Bone Level (mean ± SD)	No.	*P.value
Left Maxilla	1.06±0.759	272	
Right Maxilla	1.38±0.644	272	0.000
Left mandible	0.293±0.98	250	
Right mandible	0.03±0.472	250	0.132

*Independent two samples T.test

Table 1: Bone loss prevalence in different tooth areas.

$Mm2 \geq$ Bone Level		$Mm2 \leq$ Bone Level		Region
percentage	Number	percentage	Number	
(18.4)	61	(81.6)	271	URD
(15.9)	52	(84.1)	276	URE
(9.6)	31	(90.4)	293	ULE
(8.7)	28	(91.3)	294	ULD
(2.8)	9	(97.2)	315	URD
(2.7)	9	(97.3)	320	URE
(2.5)	8	(97.5)	318	LLE
(1)	3	(99)	294	LLD
(7.7)	201	(92.3)	2381	Total

DISCUSSION

Previous studies have described that juvenile periodontitis or early onset periodontitis can be diagnosed in primary dentition when distances between CEJ-ABC are more than 2 mm (according to B. W. radiographs).⁽⁵⁻⁸⁾ Therefore, successful treatment might be achieved before permanent teeth are getting involved. In all populations, practitioners should routinely measure the distance between ABC and CEJ, using BW radiographs to detect early signs of periodontal diseases and also to recognize high-risk patients.^(5,6,8) In the present study, the mean CEJ -ABC distance was 1.1 mm located in the range as found by Needleman et al. in the USA(0.58-1.39 mm), Sjodin & Matsson in Sweden (1mm) and Bimstein et al. in the USA.(0.97 mm).⁽¹⁵⁻¹⁷⁾ In the current study, the prevalence of bone loss in total examined surfaces is 7.7%. Compared with previous studies this prevalence is located in the range of Asian epidemiological reports.^(12, 13) Some other studies have reported the prevalence of bone loss ranges from 0% to 51.5%⁽¹⁵⁾. In this report, 33% of girls had one or more sites with an ABC-CEJ distance more than 2mm, which are suspected to have periodontal diseases which is a little more than the amounts found in other similar studies .Mattson & Sjodin reported a prevalence of marginal bone loss range of 0.2-4.5% in young school children in Sweden.⁽¹⁰⁾ In addition,

Bimstein et al. reported the prevalence of periodontitis in deciduous teeth in 2.1-8.5% in New Zealand.⁽¹⁷⁾ In another study, Sjodin et al. found a prevalence of 0.9-4.5%.⁽¹²⁾ In the present study, the mean ABC-CEJ distance for the maxillary primary molars was more than that of mandibular primary molars. This difference was statistically significant. In previous studies, Needleman et al. Shapira et al. Dummer et al. and Bishop et al. have reported more bone loss in maxilla than mandible.^(15, 18-20) One possible explanation is that plaque and calculus accumulation is more common in maxilla than mandible (due to location of parotid gland duct orifice near the first upper molar). Another possible reason could be that the cortical bone in maxilla is thinner, less dense and more rigid than that in mandible; therefore, the maxillary alveolar bone undergoes resorption more readily than that of the mandible. Contrarily, some studies showed no significant difference in this issue.⁽²¹⁾ In this study, there was a significant difference between right and left sides of the mandible as all the distances of the right side were greater than those of the left side. McDonald suggested that the contralateral side of a jaw (left side for the Right Handed person) is brushed more than the epilateral side and children spend more brushing time for the mandible than maxilla.⁽²²⁾ But Needleman and Bimstein et al. found no significant differences between the

corresponding teeth on the right and left sides of the mouth.^(15, 17) There was no significant association between age and marginal bone level in this study; however, gradual increase in CEJ-ABC distance along with the increase of the age has been reported. Needleman et al. Bimstein & Soskolon, Bimstein & Garcia-Godoy had detected this relationship in their studies.^{(14,}

^{15, 23)} This finding may reflect the influence of eruption and exfoliation in the older age

CONCLUSION

Accurate measurements presented in this study may indicate the early stage of a periodontal disease in primary dentition and/or predisposing the development of periodontal diseases in young girls. Therefore, patients at risk should be identified and cured carefully. The most important step is to establish proper diagnostic measurements to prevent the chronicity and continuous progress of periodontal disease. As there are few epidemiological studies on periodontitis in the primary dentition and also because of the high prevalence of bone loss in prepubertal years, further longitudinal studies are suggested.

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groups of children. It is also possible that within a short time interval (7-9 years) an increase in the CEJ-ABC distance can not be detected with the applied methods. It is worthy to note that our results are correct for normal CEJ-ABC distance in girls aged 7 - 9. However, this study does not evaluate the progression rate of periodontitis in young individuals. But clinicians must be aware that children may develop periodontal disease affecting the alveolar bone.

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