



GINGIVAL SULCUS DEPTH IN VARIOUS TOOTH GROUPS DURING ERUPTION

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ABSTRACT

Introduction: Periodontal pathology in children and young adults has its own peculiarities based on the age-specific dynamic changes in the oral environment during the two dentitions.

Aim: Investigation of the depth of the gingival sulcus in various tooth groups during the period of tooth eruption in healthy children.

Tasks:

1. Determining the maximum depth of the gingival sulcus (GS) during probing according to tooth group and degree of tooth eruption;

2. Comparative analysis of gingival sulcus depth between the average ages for each tooth group according to the degree of the eruption.

Material and Methods: The object of the study were 30 children (15 girls and 15 boys) between 6 and 14 years old, without systemic disease and antibiotic treatment in the last 3 months, without gingivitis (up to 25% Papilla Bleeding index - Saxer & Mulheman) and good oral hygiene. The children were clinically tested - tooth status; stages of the permanent teeth eruption (up to 1/3 of the clinical crown, between 1/3 and 2/3, over 2/3, in occlusion contact); gingival sulcus depth. Data were processed statistically (SPSS 19).

Results: At the onset of the eruption the depth of GS is 2.34 mm to 2.86 mm in various tooth groups, and upon occlusal contact, the depth of GS is 2.03 to 2.35 mm. During the various stages of the eruption, in the group of molars and premolars, the depth of GS remains relatively stable. The changes of GS depth in incisors and canines are more dynamic.

Keywords: probing, gingival sulcus, eruption,

Periodontal pathology in children and young adults has its own peculiarities based on the age-specific dynamic changes in the oral environment and the processes of formation and stabilization of the periodontium during the two dentitions [1, 2].

Measuring the depth of the gingival sulcus, the loss of attachment and bleeding upon probing is the most often used method for the assessment of the periodontal sta-

tus, the severity of inflammation and the response to periodontal treatment. Various periodontal probes are used in the assessment of these parameters, with the most appropriate contemporary tool used for this purpose being the latest generation electronic probe [2, 3, 4]. According to Berendregt, the periodontal probe remains the most important diagnostic tool in assessing periodontal diseases [5].

In children, this type of assessment requires a specific approach. There are still no objective standards for comparison and assessment of the periodontal status between healthy individuals during tooth penetration and children suffering from periodontal diseases [2].

Unlike in adults, in children of various ages, as well as regarding different tooth groups, there still are no clinical indicators for a healthy periodontium, due to the various physiological processes such as the dynamic changes during puberty and tooth eruption.

Studying the gingival sulcus during the aforementioned conditions in children will provide an opportunity for creating criteria for a prophylactic approach towards periodontal health in children and young adults, which is a primary goal of pediatric dentistry in the country.

Aim:

The aim of this study is to conduct research on the depth of the gingival sulcus in various tooth groups during the period of tooth eruption in healthy children.

MATERIALS AND METHODS

Subjects of the study were 30 children between the ages of 6 and 14 (15 girls and 15 boys) undergoing the formation of permanent dentition and with no systemic diseases or antibiotic intake for three months up until that point. The subjects were not suffering from gingivitis (up to 25% Papilla Bleeding index (PBI) Saxer & Mulheman (spread)) and had good oral hygiene.

The following was performed for each subject:

- Registering the dental status;
- Registering the degree of tooth eruption by measuring the length of the clinical crown of each tooth with a graduated probe from the marginal gingiva to the incisal ridge along the axial axis of the clinical crown. Four distinct groups were established according to the degree of

penetration

- 1st degree – eruption up to 1/3 of the clinical crown;
- 2nd degree – eruption between 1/3 and 2/3 of the clinical crown;
- 3rd degree – eruption over 2/3 of the clinical crown;

- 4th degree – contacting the antagonist.

Measuring the depth of the gingival sulcus was performed through the use of a third generation electronic probe **Parometer (Orange)**. The depth of probing of the gingival sulcus of the permanent teeth during different degrees of the eruption was measured with the use of the electronic probe [6].

Fig.1 Third generation electronic probe Parometer (Orange)



Each of the permanent teeth tested had its depth of probing determined in six points – disto-vestibular (DV), vestibular (V), medio-vestibular (MV), medio-oral (MO), oral (O) and disto-oral (DO).

The deepest of the six points examined was determined as the maximum depth of probing for the corresponding tooth and was used as an indicator for analyzing the depth of the gingival sulcus in the respective degree of the eruption of the tooth group.

The data were statistically processed through SPSS 19, and an independent T- Fisher test was used with a 95% probability interval ($P < 0.05$).

RESULTS

1. Determining the maximum depth of the gingival sulcus (GS) during probing according to tooth group and degree of tooth eruption

Table 1. Maximum depth of probing according to the degree of eruption – molars and premolars.

Degree of eruption	Tooth group		molars mm.		premolars mm.		Ind T-test
	N	Mean ± SD	N	Mean ± SD	N	Mean ± SD	
up to 1/3 (1)	11	2.65 ± 0.33	22	2.34 ± 0.19			$t=3.516$ $p=0.001$
up to 2/3(2)	51	2.44 ± 0.65	45	2.40 ± 0.48			$t=0.483$ $p=0.630$
over 2/3 (3)	120	2.54 ± 0.77	247	2.28 ± 0.52			$t=3.759$ $p=0.000$
occ. cont.(4)	214	2.35 ± 0.53	20	2.07 ± 0.12			$t=6.954$ $p=0.000$
ANOVA	$t=2.918$ $p=0.034$		$t=16.362$ $p=0.000$				

The table shows that in molars GS values initially are 2.65 mm and through the course of the eruption, the depth of GS decreases and reaches 2.35 ± 0.53 mm, when the teeth reach occlusion. The values of these differences are supported by statistical plausibility ($\delta < 0.05$).

In premolars, analogically with molars, the depth of GS also decreases during the process of eruption – from 2.34mm in the initial stages of eruption to 2.07 mm upon reaching occlusal contact with the antagonist. The differences here are also supported by statistical plausibility

($p < 0.05$). It is noteworthy that initially, the depth of GS in this group is smaller than it is in molars and decreases with the same rates it does in molars until reaching 2.07 mm which is within normal parameters for adults.

Table 2. Maximum depth of probing according to degree of eruption – canines and incisors.

Degree of eruption \ Tooth group	canines mm.		incisors mm.		ANOVA
	N	Mean \pm SD	N	Mean \pm SD	
up to 1/3 (1)	19	2.77 \pm 0.30	11	2.86 \pm 0.81	t=-0.467 p=0.644
up to 2/3(2)	33	2.80 \pm 0.55	49	2.51 \pm 0.68	t=2.013 p=0.047
over 2/3 (3)	100	2.51 \pm 0.83	196	2.19 \pm 0.61	t=3.701 p=0.000
occ. cont.(4)	21	2.03 \pm 0.48	359	2.11 \pm 0.44	t=0.723 p=0.470
ANOVA	t=5.856 p=0.001		t=15.035 p=0.000		

Table two shows that, as in molars and premolars, in canines and incisors the depth of GS during the initial stages of eruption is larger and decreases as the degree of eruption advances. The differences are supported by statistical plausibility ($p < 0.5$).

Here the values are significantly higher at the onset of eruption – 2.77 mm for canines and 2.86 mm for incisors and decrease more drastically as eruption reaches more advanced stages. Upon the establishing of occlusal contact with the antagonist, the depth of GS reaches a maxi-

um of 2.03 mm for canines and 2.11 mm for incisors, showing similar average values to those of premolars, which are within normal parameters for adults.

2. Ratio between age and degree of tooth eruption

In order to determine the age range during which the periodontium is formed and stabilized we compared the average age for each tooth group according to the degree of eruption. The results are presented in the following table.

Table 3. Average age according to the degree of tooth eruption

	up to 1/3 (1)		up to 2/3(2)		over 2/3 (3)		occ. cont.(4)	
	N teeth	Mean \pm SD age	N teeth	Mean \pm SD age	N teeth	Mean \pm SD age	N teeth	Mean \pm SD age
6 th teeth (1)	9	6.56 \pm 0.72	25	6.96 \pm 1.14	93	7.47 \pm 0.52	216	10.94 \pm 2.03
1 st teeth (2)	4	6.50 \pm 0.21	22	7.00 \pm 0.512	83	7.05 \pm 0.58	222	11.13 \pm 1.97
2 nd teeth (3)	7	7.26 \pm 0.71	27	7.29 \pm 0.49	113	7.70 \pm 0.68	137	13.57 \pm 1.74
4 th teeth (4)	11	8.64 \pm 0.51	21	8.86 \pm 0.85	145	9.32 \pm 0.78	19	11.84 \pm 1.95
3 rd teeth (5)	19	9.58 \pm 0.61	33	11.76 \pm 0.97	100	11.93 \pm 1.02	21	13.57 \pm 1.12
5 th teeth (6)	11	11.17 \pm 0.76	24	11.82 \pm 0.27	102	11.96 \pm 1.32	1	14 \pm 0
7 th teeth (7)	2	11.48 \pm 0.51	26	12.38 \pm 1.20	27	13.0 \pm 2.34	2	14 \pm 0

From the ages of 6 to 11.5 there are permanent teeth in the initial stage of the eruption period, which develops differently for different tooth groups. We could divide the teeth into two groups. The first group includes the first molars, incisors and the first premolars, in which this period concludes towards the age of 12. The second group includes canines, second premolars and second molars, the period of eruption in this group concludes towards the age of 14.

DISCUSSION

The creation of clinical criteria for the identification of pathological periodontal changes, based on the physiological age-based peculiarities of the periodontium during the period of tooth eruption and stabilization of the periodontium, provides the possibility for early diagnosing and a prophylactic approach in the treatment of children and young adults. This is the primary goal of pediatric dentistry [2,6].

This study, researching the depth of the gingival sulcus during the period of permanent teeth eruption with the aim of determining the physiological parameters of change in GS during the course of tooth eruption, is the first of its kind in this country. For the purposes of the study, a third generation electronic probe – Parometer (Orange) was used.

This study shows that during the period of tooth eruption until occlusal contact, the gingival sulcus reaches a depth of 2.00 – 2.20 mm in all tooth groups with the exclusion of the molars in which GS is slightly deeper (2.36 – 2.34mm).

During the various stages of the eruption, in molars and premolars, the depth of GS remains relatively stable. In contrast, in canines and incisors, here is a variation in the gingival sulcus depth of more than 1.5 mm. By the end of the eruption, these groups reach a similar GS depth to other tooth groups.

The results of our study are at odds with those cited in some separate articles, according to which in mandibular incisors, all canines, first molars and second premolars at the age of 12, the stabilization of GS occurs and at the age of 16 in all other tooth groups concludes [6,7,8].

According to our results, the stabilization of the periodontium and its final formation for the first tooth

group (6, 1, 2, 4 teeth) concludes by the ages of 11 and 12 and for the second group (3, 5, 7 teeth) by the age of 14. Periodontal indices which use representative teeth – incisors and first molars can be appropriately used from the age of 11, and the inclusion of all teeth in the periodontal study would be optimally accurate precisely after the age of 14 [10, 11, 12].

CONCLUSIONS

1. At the onset of the eruption the depth of GS is 2.34 mm to 2.86 mm in various tooth groups, and upon occlusal contact, the depth of GS is 2.03 to 2.35 mm;

2. During the various stages of the eruption, in the group of molars and premolars, the depth of GS remains relatively stable. The changes of GS depth in incisors and canines are more dynamic;

3. The stabilization of the periodontium for the first molars, incisors and first premolars concludes by the ages of 11 and 12, and for canines and second premolars and molars by the age of 14.

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