International Journal of Innovative Research and Advanced Studies (IJIRAS)
Volume 5 Issue 4, April 2018

ISSN: 2394-4404

Influence Of The Vertical And Horizontal Dimension Of Interdental Space On Papillary Gingival Health

Dr. Sneha Puri

Lecturer, Dept. of Periodontics, Swargiya Dadasaheb Kalmegh Smruti, Dental College and Hospital Wanadongri Road, Nagpur

Dr. Priyanka G. Jaiswal

Associate Professor, Dept. Of Periodontics, Sharad Pawar Dental College, Sawangi (M), Wardha

Abstract:

Background: During the course of progressive periodontitis and following periodontal treatment, it is not uncommon to have partial loss of interdental papilla. The partial or complete loss of interdental papilla may affect esthetic appearance. The aim of this study was to relate the interdental papillary health with distance from contact point to alveolar crest as well as interproximal distance between roots.

Method: A total of 450 interdental embrasure/papillae in 150 patients between maxillary incisors were examined. For each patient, a digital photograph and RVG between maxillary incisors were taken by using gutta percha fixed to centre as a reference marker. Clinical and radiographic data were obtained for the distance from proximal contact point to alveolar crest and for horizontal measurement between the interdental septum. For measurement, classification with regards to peri implant soft tissue based on esthetic assessment was used.

Result: The height of papillae that filled the interproximal space decreased with increasing distance from contact point to alveolar crest [4mm (P=3), 5-8mm (P=2), 9-11mm (P=1)]. In addition, number of papillae that filled interproximal space decreased with increasing interproximal distance between roots and became more prominently decreasing with increasing distance from contact point to alveolar crest.

Conclusion: The result suggest that the interproximal distance between roots and distance between the contact point and alveolar crest have an independent and combined effect on existence of interdental papillae.

Keywords: Interdental papilla, RVG, black triangle

I. INTRODUCTION

The presence of a normal and harmonically shaped papilla is crucial to avoid the unpleasant presence of the "black triangle" that is of major concern to periodontists, restorative dentists, and patients. Loss of interdental papillary height is often the sequel of periodontal pathology as well as the response to periodontal therapy. The papillary loss in maxillary anterior region often creates a cosmetic concern in afflicted patient. Therefore there is more emphasis on the existence of papillae that can affect diagnosis and treatment plan in dentistry.

The form of interdental space is divided into a vertical dimension between the contact point and the alveolar crest and a horizontal dimension between the mesial and the distal surfaces of the adjacent teeth. Regarding the vertical dimension of the interdental tissue, Tarnow et al (1992) reported a study that interdental papillae are always present when the distance from the contact point to alveolar crest is ≤ 5mm and when the distance was ≥7mm, the papilla usually was missing. Grunder (2000) showed that the existence of interdental papillae depends not on the alveolar crest adjacent to implant but on the height of the alveolar crest adjacent to the teeth. In relation to the horizontal dimension of interdental tissue Tal (1984) reported that the number of infrabony pocket increased with the increasing interproximal distance. Although there have been many studies on the existence of interdental papillae as a function of the distance from the contact point to

alveolar crest, there are few reports on the relation between the interproximal root distance and the existence of interdental papillae.

The aim of the study was to investigate the influence of vertical and horizontal dimension of interdental space on papillary health with following objectives:

- ✓ To evaluate the relation of interdental papilla with various distances from contact point to alveolar crest.
- ✓ To evaluate the relation of interdental papilla with various interproximal distance of roots.

II. MATERIAL AND METHOD

A total of 450 interdental embrasure/papillae in 150 patients with mean age of 26.5 years were selected randomly for examination from the outpatient Department of Periodontics, Sharad Pawar dental College Sawangi (Meghe) Wardha. The patients with presence of closed contact point among 4 maxillary anterior teeth, periodontal pockets ≤3mm associated with loss of attachment ≤ 3mm around maxillary incisors, localized plaque score (LPS) and a Localized bleeding score (LBS) lesser than 20% were enrolled in the study. The patients with history of periodontal surgery in selected area, teeth with interdental spacing /proclinated teeth/rotated teeth in selected quadrant, area with exposed roots that was rotated or has concavities interproximally, orthodontically treated area

Prior to initiating of this study, the purpose and diagnostic procedure of this clinical trial was explained to the patients and provided verbal informed consent to participate in the study. The study protocol was first approved by the research and ethical committee of Datta Meghe Institute Of medical Sciences, Sawangi (Meghe), Wardha.

Information concerning dietary status, mouth cleaning habits, systemic background, gingival and periodontal status along with other routine clinical details was recorded in a specially designed chart. Patients were examined under good illumination with the help of mouth mirror and William's graduated periodontal probe.

Patient's oral hygiene was evaluated by using Plaque Index as an expression of the level of localized mouth supragingival plaque accumulation. Gingival inflammation were assessed by papillary bleeding index.

Determination of existence of interdental papillae:

Digital photograph and modified periapical radiograph of interdental embrasure for each patient were taken. The esthetic aspect of papilla was assessed from clinical observation and photograph by means of the index described by Jemt (1997) for interproximal papillae between teeth number 11and12, 11and21, 21and22. The assessment was related to the space between reference lines to the highest gingival curvature of crown tooth margin and contact point.

Distance from the crest of bone to proximal contact point:

The distance from the crest of bone to proximal contact point was measured by using RVG with long cone paralleling technique with the help of plastic film holder with metallic arms. The contact point was indicated on the RVG (Screen) by using gutta percha placed within the interdental embrasure at the most apical part of contact area. The distance from the contact point to crest of bone was measured with the help of Grid scale line printed vertically in built RVG system.

Interproximal distance between the roots:

After measuring the vertical dimension the Interproximal distance between the roots at the highest alveolar crest level as measured with the help of RVG (Screen) by using Grid scale line printed horizontally in built RVG system between the interdental septum.

III. RESULTS

The height of papillae that filled the interproximal space decreased with increasing distance from contact point to alveolar crest [4mm (P=3), 5-8mm (P=2), 9-11mm (P=1)]. In addition, number of papillae that filled interproximal space decreased with increasing interproximal distance between roots and became more prominently decreasing with increasing distance from contact point to alveolar crest.

IV. DISCUSSION

The teeth and gingiva can be esthetically harmonized only when the mesial and distal surfaces of the adjacent teeth adequately surround the interdental papillae and when the interdental papillae completely fill the interproximal space without any unfavorable gingival hyperplasia. The top of the interdental papillae is the elevated facial and lingual peaks, and these facial and lingual papilla margins are connected by col. Col is histologically non-keratinized and can be a starting point for inflammation and caries formation upon food retention. The papillae are maintained in various forms and are affected by many factors such as alignment of the each tooth, the shape of the adjacent tooth crown, and the interradicular alveolar bone. These fibers maintain the shape of dental arch against the mechanical masticatory force, and both support and protect the alveolar bone below by attaching the gingiva to the teeth and the alveolar bone.

In addition, there are other factors that can affect the shape and health of interdental soft tissue. These include: 1) inflammation in the periodontal tissue; 2) the probing depth of the adjacent teeth; 3) Fibrotic or edematous condition of the interdental soft tissue; 4) The volume of the interdental space;5) a history of surgical or nonsurgical periodontal treatments. Based on the literature, the presence of the interdental papillae is affected by the level of the alveolar crest below in the interdental space and the relationship between the vertical dimension of the interdental space and the presence of papillae.

However, there are very few reports on the intimate relationship between the horizontal dimension and the presence of interdental papillae. The relationship between the interdental space and papillae presentation need to be clarified using the multiple and detailed approach. Therefore, in the present study, interproximal distance of roots, as a horizontal factor and vertical distance between contact points to alveolar crest were studied in relation with papillary height. In this study, the most common distance between two roots was 2mm. When the distance between two roots was 2 mm, the

average distance between a contact point and the alveolar crest was 7.2 mm.

When the interdental space had undergone previous periodontal surgery, Tal (1984) reported that a scar can be formed in the interdental soft tissue, the col can be removed below the interdental contacts, and the fiber groups can be removed below the interdental contacts, and the fiber groups can be rearranged or severed. Takei (1980) reported that the contact points in the areas with transpositioned or tilted teeth can be difficult to measure, and the denaturation of papillae was expected from frequent inflammation of food impaction. Therefore in this study, the previous periodontal surgery area and the exposed root that was rotated or had concavities interproximally were excluded because they can cause measurement errors. Orthodontic ally treated areas were also excluded because orthodontic treatment can artificially suppress the interdental soft tissue, deform interdental papillae, and reshape the interdental contact area.

From an anatomic point and histologic point of view, the anterior papillae are quite different from the posterior interproximal papilla. In addition, contact points are different in anterior region. Therefore, in the present study only anterior esthetic areas represented by the four maxillary incisors were included to have a homogenous sample.

To identify the presence or absence of interdental papilla in a more addition appropriate and complete way we used Jemt (1997) classification system that takes a first look esthetics aspect of the entire smile unit.

In the presence study, it was found that when the distance from the contact point to alveolar crest was 4mm, the presence of papilla was 100% and when the distance from thee contact point to alveolar crest was in the range of 5-8mm, there was partial presence of papilla. However, there was complete absence of papilla, when the vertical distance between the contact point and alveolar crest was 9mm or more. When the horizontal distance between the roots was 1mm, only 25% of site showed complete presence of papilla. When the distance between roots was in the range of 1.5-2.5mm, there was partial presence of papillae in 66.6% to 82.5% of sites. However, there was complete absence of papilla when horizontal distance between roots was 3mm or more.

In the present study, according to the increase in the distance from the contact point to alveolar crest, the number of papillae that filled the interproximal space decreased with the increasing interproximal distance between roots. The interproximal distance between the roots and the distance from the alveolar crest to contact point, which can represent the vertical and horizontal dimension, can affect existence of papilla. Therefore, a thorough understanding of anatomic form of interdental space will be very useful in esthetic dental treatment like papilla reconstruction procedure and for predicting the treatment outcome.

Score	4(43)	5(61)	6(59)	7(52)	8(57)	9(38)	10(32)	11(36)
Score1.				(15/378) 3.9%	(15/378) 3.9%	(38/378) 10%	32/378 8.4%	(36/378) 9.5%
Score2.	(23/378) 6.08%	(50/378) 13.2%	(45/378) 11.9%	(37/378) 9.7%	(42/378) 11.1%			
Score3	(20/378) 5.2%	(11/378) 2.9%	(14/378) 3.7%					
Score4								

Table 1: Existence of interdental papillae according to various distances from the contact point to the alveolar crest

Score	1(55)	1.5(72)	2(98)	2.5(47)	3(58)	3.5(26)	4(22)
Score1.	(22/378) 5.8%	(32/378) 8.4%	(36/378) 9.5%	(22/378) 5.8%	(58/378) 15.3%	(26/378) 6.8%	(22/378) 5.8%
Score2.	(25/378) 6.6%	(35/378) 9.25%	(56/378) 14.8%	(25/378) 6.6%			
Score3	(8/378) 2.11%	(5/378) 1.3%	(6/378) 1.5%				
Score4							

Table 2: Existence of interdental papillae according to various interproximal distances of root

IDR (mm)	4(43)	5(61)	6(59)	7(52)	8(57)	9(38)	10(32)	11(36)
1.0	(12/378) 3.17%	(31/378) 8.2%	(21/378) 5.55%	(17/378) 4.49%	(21/378) 5.55%			(8/378) 2.1%
1.5	(16/378) 4.23%	(27/378) 7.14%	(24/378) 6.34%	(7/378) 1.85%	(12/378) 3.17%	(14/378) 3.70%		(9/378) 2.3%
2.0	(15/378) 3.96%	(2/378) 0.52%	(14/378) 3.70%	(22/378) 5.82%	(19/378) 5.02%	(12/378) 3.17%	(13/378) 3.4%	(7/378) 1.85%
2.5		(1/378) 0.26%		(4/378) 1.05%	(12/378) 3.17%	(5/378) 1.32%	(11/378) 2.9%	(8/378) 2.1%
3.0				(2/378) 0.52%	(4/378) 1.05%	(7/378) 1.85%	(8/378) 2.1%	(9/378) 2.3%
3.5								(9/378) 2.3%
4								(7/378) 1.85%

Table 3: The percentage (%) of papillae according to the interproximal distance from the contact point to alveolar crest

IDR (mm)	N Sites	Mean ± SD (mm)
1.0	55	5.44 ± 1.35
1.5	72	6 ± 1.5
2.0	98	7.2 ± 1.34
2.5	47	8.4 ± 1.6
3.0	58	9.08 ± 1.2
3.5	26	11
4.0	22	11

Table 4: Interrelation between the interproximal distance between roots (idr) and the distance from the contact point to the alveolar crest

V. CONCLUSION

From the analysis of the result, and within the limitation of the present study, following conclusions were drawn:

- ✓ With the distance from the contact point to alveolar crest 4mm, the presence of papillae was 100% and with the distance in the range of 5 to 8 mm there was partial presence of papilla. However, there is complete absence of papilla when the distance was 9mm or more.
- ✓ With the horizontal distance between the roots 1mm only 20% of sites show complete presence of papilla and with the distance in the range of 1.5-2.5 mm there was partial presence of papilla.
- ✓ The interradicular distance and the distance between the contact point and the alveolar crest appear to have independent effects on the presence or absence of the interdental papilla.
- ✓ A thorough understanding of anatomic form of interdental space will be very useful in esthetic dental treatment like papilla reconstruction procedure and for predicting the treatment outcome.

REFERENCES

[1] Salama H, Salama MA, Garber D, Adar P. The interproximal height of bone: A guidepost to predictable

ISSN: 2394-4404

aesthetic strategies and soft tissue contours in anterior tooth replacement. Pract periodontics Aesthst Dent 1998;10:1131-1141.
[2] Tarnow DP, Magner AW, Fletcher P. The effect of distance from the contact point to crest of bone on the presence or absence of interproximal dental papilla. J Periodontol 1992;63:995-996.
[3] Grunder U. Stability of mucosal topography around single tooth implants and adjacent teeth:one year results. Int J periodontics Restorative Dent 2000;20:11-17.
[4] Tal H. Relationship between the interproximal distance of roots and the prevalence of infrabony pocket.J Periodontol 1984 Oct;55(10):604-7
[5] Turesky S, Gilmore, Glickman. Reduced plaque formation by the chloromethyl analogue of vitamin C. J Periodontal 1970;41-49
[6] Muhlemann H.R. Psychological and chemical mediators of gingival health. J Prev Dent 1977;4:6
[7] Jemt, T. (1997) Regeneration of the gingival papillae after single-implant treatment. Int J Periodontics Restorative Dent. 17, 326–333.\
[8] Hassell TM. Tissues and cells of the periodontium. Periodontol 2000. 1993;3:9-38.
[9] Takei HH. The interdental space. Dent Clin North Am 1980;24:169-176.