

Analysis of the Factors Influencing the Interdental Papilla Integrity: Literature Review

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Received: 06/10/2015

Revised: 25/10/2015

Accepted: 04/11/2015

ABSTRACT

Introduction: The complete regeneration of the interdental papilla is the aim of every practitioner mainly in fixed prosthodontics and especially at the anterior maxillary level. It allows to avoid the unsightly black holes for the patient.

Materials and Methods: We conducted a literature review of various articles published on Pubmed until the end of September 2015.

Results: We stated the results of different researchers who studied the factors that could influence the interdental papilla integrity. These factors are essentially: the distance between the contact point and the bone crest, the buccolingual thickness of the papilla base, the age and the distance between the contiguous teeth roots.

Discussion: The factor that most interested researchers is the distance between the contact point and the bone crest; all researchers confirm that papilla regeneration depends essentially on this distance. Researchers found contradictory results concerning the influence of the buccolingual thickness of the papilla base on the papilla regeneration.

Some researchers found correlations between the two factors previously described.

The majority of authors found that the papilla integrity is influenced by age, but conflicting results were announced. Concerning the buccolingual thickness of the papilla base, contradictory results were described.

Keywords: papilla, embrasure, contact, bone crest, roots.

INTRODUCTION

The interdental papilla does not only present a protection role for the periodontium but also plays a very important role in esthetics, especially at the anterior maxillary level by filling the cervical embrasure and thus avoiding the unsightly black holes for the patient. Several researchers have studied the factors that could influence the integrity of this papilla using different methods. In

this work, we present a literature review of the results obtained.

1. The distance from the contact area to the bone crest (figure 1): The influence of the distance between the most apical point of the inter-dental contact surface and the alveolar ridge of the interdental papilla integrity was the subject of several research papers.

A study focussing on anterior teeth was conducted by Chen MC et al ^[1] in

2010 on 30 adult subjects with healthy gums and well-aligned anterior teeth, it consisted in placing a radiopaque material on the interdental papillae tip and at the level of the mucogingival junction, then using a computer software, radiographic measurements of the teeth shape were performed; the level of the alveolar bone and the anatomy of the interdental space were fixed.

This study showed that the presence of the interdental papilla seems to be more certain than the distance between the most apical point of the interdental contact surface and that the alveolar ridge is low. In fact, the papilla is always present when this distance does not exceed 5mm. When this distance is 6mm, the papilla presence rate reaches 50 %.

When the distance between the alveolar ridge and the interdental contact point passes from 4 to 6mm, we can note a sharp decline in the percentage of the present papillae.

When this distance is 7mm and more, we find only 23% of the interproximal spaces occupied by a papilla.

This study confirms the work conducted by Change LC et al [2] in 2007 and which reports that this papilla is typically absent when the distance is superior than or equal to 7 mm.

Perez F et al [3] found, following a study conducted on 45 patients, that the distance from the contact point to the bone crest present a significant influence on the presence of the papilla for both anterior as well posterior teeth.

Cao J et al [4] focused on maxillary anterior teeth through a preliminary study using cone beam and measuring the height and thickness of 62 interdental papillae. They found that complete filling of the papilla volume is reached when the distance from the contact point to the bone crest is (3.67 + or - 0.51) mm.

Montevecchi M et al [5] found, through a study performed on 292 papillae

between the four maxillary incisors that the vertical distance between the two central incisors should be superior to 2 mm compared to the others.

Sun -A Kim et al [6] found, based on a study conducted on 100 subjects in 2011, that the buccolingual base of the papilla does not affect the papilla height and volume and that the distance from the contact point to the bone crest is the only variable which showed a significant difference between the complete presence or deficiency of the papilla. This study confirms that when this distance is < 5mm, the embrasure is completely occupied by the interdental papilla.

A study conducted in 2014 by Kolte et al [7] on 259 interdental papillae in 60 patients showed, during periodontal surgery, that the interdental papillae are present in 85.7 % of the cases and that the distance contact point-bone crest is 4 mm.

2. The buccolingual thickness papillary base (figure 2): The interproximal papilla fills the gingival embrasure presenting a determined shape by the contiguity ratio of the two proximal teeth and by the width of the proximal surfaces.

Chang LC et al [8] studied the various morphologies of the embrasure on the central papilla height of the subjects presenting a papilla recession. They found that the height of the papilla is not influenced by this morphology.

Chow YC et al [9] found that the interproximal gingival thickness affects the gingival papilla appearance.

This result was contested by Sun -A Kim et al [6] who found that the buccolingual base of the papilla does not affect the papilla height volume.

Joo-Hee Kim et al [10] confirmed the result of Sun-A Kim et al. [6] They also added that the tooth shape influences the papilla shape; the more the teeth are closer to the triangular form, the more the interproximal papillae are flattened.

Cao J et al [4] found that complete filling of the papilla volume is obtained

when the average thickness of the papilla at the level of the bone crest is (8.38 + or - 0.75) mm. They also reported that the papilla height present a positive correlation with the papilla thickness.

Montevecchi. M et al [5] reported that the horizontal distance between the two central incisors should be more than 1mm compared to the other papillae.

Siqueira S Jr et al [11] found that in order to have a papilla filling, the horizontal distance should be ≥ 4 mm for a vertical distance ≥ 5 mm.

3. The Age: The influence of age on the presence and the situation of interdental papilla were studied by Chang et al in 2007. [2]

Through the periapical radiographs, the distance from the contact point to the bone crest, the distance from cement-enamel junction to the bone crest and papillary height were the retained and measured variables. The age of the 330 subjects was taken into account; the possible correlation between the different factors and the presence of inter-dental papilla was tested.

This study showed an evident positive relation between central papilla recession and age on the hand and a negative relation between age and the papilla height on the other hand. The study conducted by Chang et al in 2009 [8] confirms this positive relation between

papilla recession and age. In fact aging has an effect on the distance from the contact point to the crest of bone which is directly responsible for the presence or absence of the interdental papilla.

Chow YC et al [9] studied 672 papillae between the two maxillary central incisors and at the level of the first premolars. They found a significant association between age and papilla presence.

Montevecchi et al [5] confirmed that the papilla aspect is influenced by age; with age, recession becomes more important.

Perez F et al [3] found a contradictory result and reported that the presence of the papilla does not depend on age and that it is more frequent in the anterior teeth.

4. The distance between the roots of contiguous teeth (figure 3): The presence of the interproximal papilla can be conditioned by the distance between the roots of two adjacent teeth.

In 2006, Cho HS et al [12] conducted a study to show the influence of the interproximal distance on the presence or absence of the interdental papilla. A total of 206 papillae from 80 patients were examined after minimizing the papilla inflammation using a non-surgical periodontal therapy.

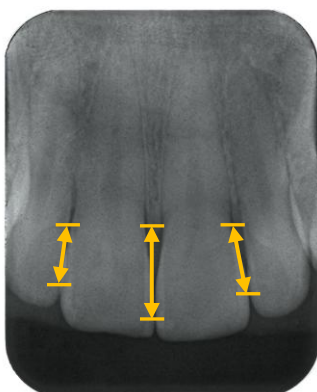


Fig 1

Figure1: Distance from the contact point to the bone crest

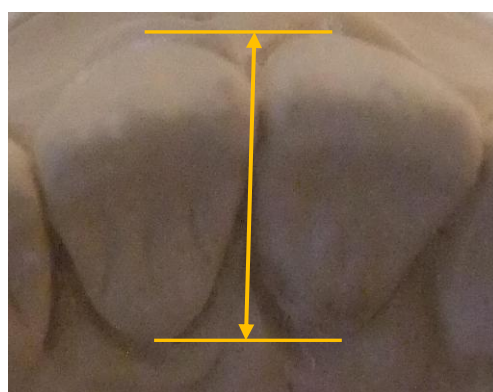


Fig 2

Figure 2: Buccolingual thickness papillary base

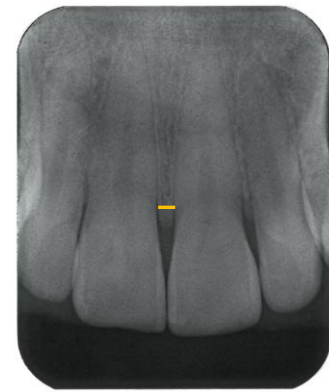


Fig 3

Figure3: Horizontal distance between the roots of contiguous teeth

The existence of the papillae was determined according to the following categorization:

- The papillae were considered absent if they do not extend to the contact point between the teeth
- The papillae were determined as present if they filled the whole interproximal space.

This study showed that the number of papillae filling the interproximal space decreases with the increase of the interproximal distance between the roots in a significant way.

This correlation is more important when the interproximal distance is 6 mm between the roots.

Martegani et al, [13] following a study performed on 178 interdental embrasures, showed the presence of a correlation between the distance from the contact point to the bone crest and the interradicular distance when the latter is <2.4 mm, which influences the complete presence or deficiency of the papilla.

They concluded that the contact point- bone crest distance and the interradicular distance present independent and combined effects of the presence or absence of the interdental papilla.

Sun -A Kim et al [6] found, based on an esthetic perspective study conducted on 100 subjects which was particularly interested in the embrasure between the two maxillary central incisors that the papilla height increases when the horizontal interradicular distance increases.

Perez F et al [3] found that the interradicular distance does not influence the presence of the interdental papilla.

Joo-Hee Kim et al [10] confirmed, after having examined 147 papillae between the central maxillary incisors that the distance between the teeth roots does not lead to significant correlation with the papilla height.

The study conducted in 2014 by Kolte et al [7] also revealed, during a

periodontal surgery, the horizontal distance between the roots of adjacent teeth and allowed to analyze their effect on the papilla. This study showed that the interdental papilla is present in 78.5 % of the cases when the horizontal distance between the roots is between 0.5 and 1 mm.

These differences in results can be due to the fact that these studies were conducted on different populations and that the authors used different research methods.

Cao J et al [4] found, based on a study carried out in 2013 on 62 maxillary anterior papillae using cone beam to visualize the papilla profile and to measure the papilla thickness and height, that the thickest and largest measures are associated with an increased chance of having a full papilla.

CONCLUSION

The influence of the distance between the most apical point of the interdental contact surface and the alveolar ridge on the integrity of the interdental papilla was confirmed by all the studies. However, some controversies were found concerning the buccolingual thickness of the papilla base, age and the distance between the roots of contiguous teeth. The correlations between these different factors and their effect on the papilla integrity need to be better studied.

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How to cite this article: Touzi S, Ben Moussa A, Kallala R et al. Analysis of the factors influencing the interdental papilla integrity: literature review. *Int J Health Sci Res.* 2015; 5(12):395-399.
