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EFFECTIVENESS OF THE APPLICATION OF HYALURONIC ACID GEL IN GINGIVAL RECESSION

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ABSTRACT

The interdental papilla is a small part of the free gum that fills the space between the teeth, apical to its contact area. The objective of this study was to analyze the effectiveness of the application of hyaluronic acid gel in gingival retraction. The methodology used was a literature review with an exploratory qualitative approach, using academic platforms and bibliographies: SCIELO, PUB MED and GOOGLE ACADEMICO. The inclusion criteria were articles from the last few years in Portuguese and English. The efficacy of the use of HA gel in reducing the area of the black triangle was 85.06%. In addition, the length of the papilla increased by 70.256%, while the distance from contact to the papilla decreased by 83.026%. At the different time points, the values of the variables studied at the three levels were significantly different ($p< 0.05$). We conclude that HA injection with a concentration of 1.6% in two points of the interdental papilla was effective in the reconstruction of the interdental papilla in the esthetic zone, especially in long-term follow-ups (especially 6 months).

Keywords: Aesthetics. Gum. Hyaluronic Acid. Interdental Papilla.

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Revista ARACÊ
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INTRODUCTION

The interdental papilla is a small part of the free gum that fills the space between the teeth, apical to its contact area [1]. Although it comprises a small percentage of visible oral soft tissue, it has unique morphology, histology, and molecular structure. In addition, the interdental papilla plays an important aesthetic role in the anterior maxilla, as its absence leaves a small black triangle visible between the adjunct teeth [2-3].

Food impaction, speech difficulties, tooth sensitivity, root caries, abrasion, erosion, and plaque buildup are all consequences of this deficiency. As the number of patients requesting cosmetic dental treatments increases, dentists are required to pay more attention to the visual harmony of gingival topography [3].

The etiology of interdental papilla deficiency is multifactorial. Gingival recession, a prevalent periodontal problem that results in apical displacement of the gingival margin and subsequent exposure of the root surface to the oral cavity, is one of the most common causes [3].

Gum recession can occur for several reasons, the most common being dental plaque [7]. It can also be caused by sudden brushing, tooth malposition, bone dehiscence, root alignment and angulation, strong muscle insertion, frenulum tension, smoking, and occlusion trauma [4].

Some iatrogenic factors, such as some orthodontic and prosthetic treatments, can also contribute to gum recession. Interdental papilla deficiency can be caused by periodontal surgery in case of contraction of oral soft tissues during the healing phase4.

To reconstruct a reduced interdental papilla, dentists must first eliminate etiological factors before utilizing a combination of different surgical procedures, as none of them provide optimal results when used alone [5] .

However, surgical reconstruction of the interdental papilla remains one of the most difficult and unpredictable aesthetic procedures. Factors such as interdental bone loss or alteration of interdental contact can aggravate the situation, causing loss or deficiency at the height of the dental papilla. In addition, as there is no reliable blood source, the use of small bone/gingival grafts can lead to unpredictable results [6]. Consequently, non-surgical procedures, such as orthodontics or restorative procedures, may be necessary after this surgery [7].

Although largely ignored, less invasive methods such as the use of hyaluronic acid (HA) are present for interdental papilla reconstruction. HA is a linear polysaccharide found

Revista ARACÊ
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in the extracellular matrix of connective tissue, also known as synovial fluid. Due to its physiology and structure, it contributes significantly to the uniformity of tissues and has some antibacterial and anti-inflammatory characteristics. In addition, HA has numerous therapeutic applications. For example, it is applied to surgical sites to prevent scarring from forming. It is often used in orthopedics to treat osteoarthritis and rheumatoid arthritis [8] .

In addition, many studies on this material have been carried out in the field of tissue engineering, as it plays an important role in migration, organogenesis, and cell development. In dermatology, HA has also been used as a filler in dermatology to restore lost tissue mass. According to a review of the dental literature, the application of HA can reduce localized bleeding during probing and reduce the depth of probing in patients with gingivitis and periodontitis [9].

In addition, the use of HA weighing 1300 K-Dalton in guided tissue regeneration (GTG) surgeries can reduce bacterial contamination. It is worth noting that this substance did not provoke an immune response in direct contact with bones or soft tissues. Some recent studies have also shown promising results in terms of the use of HA injection for interdental papilla reconstruction [10-11].

These studies, however, only reported the use of HA at a single injection site. In addition, they mostly used low-viscosity HA, which is believed to have contributed to the relapses seen during follow-up sessions.

In view of this scenario, the objective of this study was to analyze the effectiveness of the application of hyaluronic acid gel in gingival retraction.

SUBJECTS AND METHOD

In this study, the methodology that will be used is the bibliographic research, of the exploratory type, through the qualitative approach, as it will seek information through bibliographic review, on the subject, applying as a means of investigation the bibliographic foundation, using, in this way, secondary sources of information.

Exploratory research, according to Gil (2009) "aims to provide an overview of a given fact, of the approximate type". The bibliographic research "Covers all bibliography already made public, in relation to the theme of the study, publications, magazines, monograph..." For Gil (2009) the bibliographic research aims to: Provide greater knowledge for the researcher about the subject, so that he can formulate more precise problems or create hypotheses that can be researched by future studies.

Revista ARACÊ
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The bibliographic review contributes to the knowledge of the existing information on the existing theme, focusing on the aspects addressed by other authors.

This study will be carried out through a bibliographic survey of books, public health manuals and scientific articles in Portuguese and English published in the VHL (Virtual Health Library), SciELO (Scientific Electronic Library Online) and GOOGLE SCHOLAR databases. The search for references was developed by searching for publications referring to the period of the last 10 years through the descriptors: Aesthetics. Gum. Hyaluronic Acid. Interdental papilla.

Articles published in full and in the last 10 years, which contained relevant discussions on the topic in question, will be used as inclusion criteria. Among the exclusion criteria are abstracts of articles and databases published with more than 10 years.

RESULT

The search in the databases resulted in 20 studies, including scientific articles and books. The methodology shows the search terms used and the inclusion and exclusion criteria for data collection. After the first evaluation of the captured studies, applying the inclusion criteria, it resulted in 14 studies and they were selected for analysis.

Buffon and Glesse12, analyzing the stability of HA when inserted into the tissue, developed a technique called three steps with the objective of creating a stable foundation that can allow the body to regenerate naturally. The first step is the injection of a hyaluronic acid barrier at the gingival margin, directed to the place where the increase in volume is desired. The second step is the application inside the inserted gum, and the third 2mm below the highest point of the papilla. This technique was used in three clinical cases in which they obtained improvement in the necrotic interdental papilla, improvement of aggressive periodontitis, and reconstruction of the papilla around the implant.

The treatment procedures were performed by a third-year experienced periodontology resident. Patients initially received local anesthesia (2% lidocaine + epinephrine 1:100,000). Then, 0.2 mL of HA gel was administered perpendicular to the injection sites with a 31G-0.3 ml insulin syringe. For each papilla, two injection sites were selected, one located 2-3 mm below the tip of the papilla and the other at the interdental tip. Injection was continued until the paste became ischemic. These sites were then massaged towards the incisal edge to make the enlargement of the papilla similar to a real niche. This procedure was repeated three times at two-week intervals [13] (Figure 1).

Revista ARACÊ
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Figure 1: Hyaluronic acid (HA) injection sites

On the day of the injection, the patients were instructed not to brush or floss the injection region. They were allowed to brush the coronal area of the gum the next day, but flossing was not allowed until two weeks after the last injection [13].

DISCUSSION

A review of the existing literature revealed that few studies have been conducted on the use of HA in [1-2-10-12 papillary reconstruction]. The present study was the first to examine HA in higher concentration (1.6%) injected in two areas of the interdental papilla (2 mm below the tip of the papilla and 2 mm above the tip of the papilla). The results indicated statistical and clinical improvements at the three- and six-month follow-ups. Thus, the use of the HA gel was successful in the reconstruction of interdental papillary deficiencies and in the reduction of the area of the black triangle. During the six-month follow-up, papillary disabilities improved by 85.06%.

Similarly, Becker *et al.10* reported an improvement of 94% in papillary deficiencies and 76% in areas adjacent to the implants. In addition, Sadat Mansouri *et al.,* [14] observed a 22-100% improvement in papillary deficiencies.

Awartani *et al.,* [2] also found a 41-62% reduction in the area of the interdental black triangle, and Lee *et al.,* [1] showed a 92.55% success rate in interdental papilla reconstruction in the anterior maxillary and mandibular areas. In the same vein, Tanwar *et al.,* [12] conducted a case study and used only one interdental site to inject HA gel. At the three-month follow-up, the results indicated that the reconstruction of the lost papillae was satisfactory. Overall, these studies demonstrated that the injection of HA gel, as a safe

Revista ARACÊ
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substance, significantly reduced the area of the interdental black triangles, which was consistent with the results of the present study.

The results of the present study indicated that papillary defects improved between injection sessions, similar to the findings of Becker *et al.,* [10]. However, no significant improvement in this regard was detected between the third injection session and the first follow-up session (after three months). However, compared to baseline measurements, the differences observed at the three- and six-month follow-ups were significant. In the study by Awartani *et al.,*[2] the improvement of papillary defects between injection sessions was not statistically significant. No information was provided in other studies on improvements between injection sessions. However, all previous investigations, such as the current one, have indicated a decrease in the area of interdental papillary defects (black triangles) over time [1-14].

In the present clinical study, all patients received HA gel injections in three sessions at two-week intervals, with two injection sites 2-3 mm below the paste tip and the paste tip. It is noteworthy that the number of HA gel injections was not the same in previous studies conducted by Becker *et al.,* [10] , Lee *et al.,* [1] and Sadat Mansouri *et al.,* 14. Becker *et al.,* [10] administered injections twice at eight sites and three times at 12 sites.

On the other hand, Sadat Mansouri *et al.,* 14 performed injections a maximum of three times if the black triangles were not eliminated during the treatment sessions. The number of injections administered in the study by Lee et al.,[1] varied depending on the severity of the papillary defects. This may be one of the reasons for the disparities in the results of these studies.

In the present investigation, three- and six-month follow-ups were considered, and significant and desirable results were observed during long-term follow-ups. These results were in agreement with those reported by Sadat Mansouri *et al.,* [14] (with follow-ups of three and six months) and Awartani *et al.,* [2] (with follow-ups of four and six months). In the study by Becker *et al.,*[23] if patients were sufficiently cooperative, follow-ups continued up to 25 months.

The findings of the present study indicated that the results of the treatment did not regress over time, as observed in the follow-ups. This was consistent with the research findings of Sadat Mansouri *et al.,* [14]; However, Awartani *et al.,* [2] reported that treatment outcomes regressed over time (between the four- and six-month follow-ups). Thus, larger areas of black triangle were found at the six-month follow-up than at the four-month follow-

Revista ARACÊ
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up.

The brand of HA gel applied and the dimensions of the treated papillae were cited as probable reasons for these findings. In a study by Lee *et al.,* [1], the areas of the interdental papilla that were completely filled after injection (areas in which the black triangles were completely eliminated) remained the same at the six-month follow-up, while some recurrences were found in the areas of the interdental papilla that were not fully healed.

Some of the limitations of the present study were the small statistical population of patients and regions investigated, as well as the short follow-up times. Another limitation of the study was the use of two-dimensional analyses to examine three-dimensional changes in the mass in the interdental papilla or in the areas adjacent to the implants. On the other hand, this trial had several strengths, including the use of HA gel with a concentration of 1.6%, the performance of three regular injections at two sites for all interdental papillae studied with an interval of two weeks, and the follow-up of patients for up to six months.

Further research with larger statistical populations is recommended to assess improvements in papillary defects using three-dimensional analyses. Furthermore, considering the increased use of dental implants and the challenges involved in anterior papillary reconstruction, it is essential to develop a study to investigate the success rate of HA gel injection in areas adjacent to the implant.

CONCLUSIONS

The injection of HA gel with a viscosity of 1.6% in two points of the interdental papilla was effective in the reconstruction of the interdental papilla in the aesthetic zone, especially in long-term follow-ups (six months). To date, further studies with different HA gel viscosities, larger samples, and longer follow-ups are needed to investigate long-term relapses and the need for retreatment.

Revista ARACÊ
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