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Gingival Enlargement in Patients with Fixed Orthodontic Appliances

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Abstract

Root filling cements have been of great help in endodontic treatment due to their ease of use and clinical management, the choice of sealer being essential and the properties that each of them predisposes to its biocompatibility, which is why we have made a comparison between calcium hydroxide (sealapex) and epoxy resin (AH-Plus), so that sealapex maintains stable biocompatibility and releases calcium hydroxide that favors the internal structures of the periodontium, however it does not have a very fluid dispersion inside the canal, making it difficult for the material to adhere to the root walls, while the AH. Plus cement has better adherence and fractionally easy adaptability to the root walls, however the level of antimicrobial activity that each one has precedes a study carried out against the microorganisms of streptococcus faecalis being so that the sealapex has a h to the inhibitory 6.0mm and the AH-Plus cement a 7.92mm halo provided an effective inhibition of invading microorganisms, as detailed in the analysis, the AH-Plus cement, being a resinous base, has the property of adequately adhering This generates a peripheral sealing of the site and an easy biocompatibility of the periodontal structures, being that after a correct obturation, the preferred restorative material must be taken into account so as not to generate micro leaks which can spread by starting a bacterium. that disintegrates the entire endodontic treatment.

Keywords: *Composite resin, glass ionomer, filling cements*

1. Introduction

Gingival enlargement is an abnormal, exaggerated and disfiguring increase in gum volume. This term is coined to describe this type of lesions in order to avoid equivocal pathological connotations used in

the past, such as hypertrophic gingivitis or gingival hyperplasia, which refer mainly to histopathological features (Campolo González et al., 2016). This injury is not only caused by hereditary factors or poor oral hygiene (Manzur-Villalobos & Org, n.d.).

There are multiple types of gingival enlargement, which are classified according to their causal factors such as: inflammatory (acute and chronic), associated with systemic diseases (hormonal alterations, leukemia, vitamin C deficiency, neoplastic (benign or malignant tumors), associated with tooth eruption processes, induced by drugs (Campolo González et al., 2016)

Among the problems that patients with orthodontic treatments usually present is gingival enlargement that can occur due to various factors. There is a high rate of patients who during orthodontic treatment present difficulties due to the appearance of gingival enlargement that can occur due to various factors, such as orthodontic treatment, since records report an incidence of 55% (Gabriela Rodríguez Vásquez et al., 2017).

Nowadays orthodontic treatments are very common within our society. The main reason that leads the patient to consultation is aesthetic, and although for the professional who is going to perform the treatment, functional needs are prioritized, the patient's expectations of the result cannot be rejected. Therefore, this research will allow the dentist to determine the factors that generate gingival enlargement in patients with orthodontics, in order to have an early diagnosis that will lead to timely and quality treatment before said injury, always seeking the welfare of the patient.

Taking into account the above, the objective of this research is to determine the causal factors that generate gingival enlargement in patients with fixed orthodontic appliances.

2. Methods

Protocol:

The protocol was designed according to Cochrane standards for systematic reviews. The search criteria complied with the Preferred Reporting Items for Systematic reviews and Meta-Analysis Protocols (PRISMA) guidelines (Page et al., 2021).

Inclusion and exclusion criteria:

The inclusion criteria were: studies published in the last 5 years, clinical case studies, literature reviews, studies conducted in Spanish, English or Portuguese, studies addressing gingival enlargement in patients with fixed orthodontic appliances.

The exclusion criteria were: studies older than 5 years, conducted on animals, studies in a language other than Spanish, English or Portuguese, theses and non-indexed articles.

Search strategy:

We searched the following databases from 2020 to 16 March 2022: 1) PubMed, 2) Google Scholar and 3) Elsevier via ScienceDirect. The search strategy used was: (Gingival Hyperplasia) and (Orthodontic Appliances, Fixed).

Study Eligibility and Data Extraction:

We screened the full texts of potentially relevant studies to support as much information as possible to enrich the research. A matrix was generated for data extraction from selected studies.

Figure 1 details the identification of the studies used and how their screening was generated.

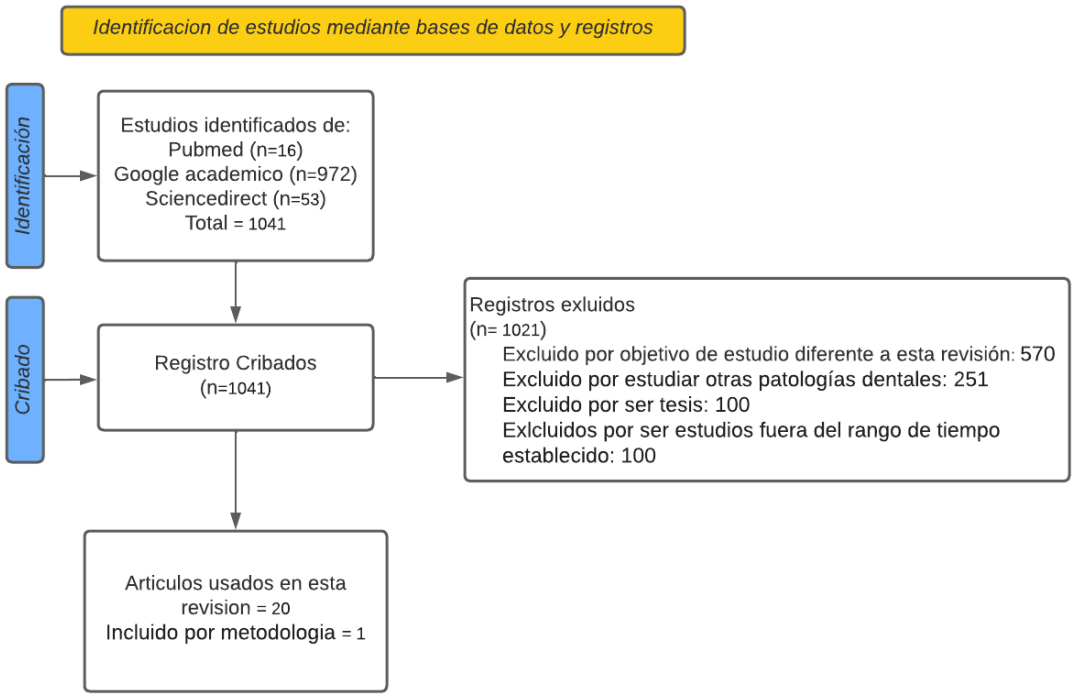

Figure 1. Identification flowchart. Own elaboration.

3. Results And Discussion

Gingival enlargement is an excessive growth of the gum with increased volume in response to local and systemic conditions, this can be localized or generalized. Clinically it begins as a circular enlargement of the interdental papillae and extends to the vestibular and lingual gingival margins, without exceeding the mucogingival junction. It can be associated with drugs such as anticonvulsants, calcium channel blockers and cyclosporine, as well as characterized by an inflammatory response to bacterial plaque. Factors that favor plaque accumulation and retention include poor oral hygiene, irritation from anatomical abnormalities, and application of orthodontic forces and defective restorations. The placement of orthodontics can influence the accumulation of dental biofilm and the colonization of bacteria, with which, the patient becomes more prone to bleeding and inflammation (González-Quesada & González-Quesada, 2020; Soriano Angulo & Cáceres La Torre, 2016; Soriano Angulo et al., n.d.).

Main drugs causing gingival enlargement.

Among the drugs that have this effect is phenytoin is an anticonvulsant agent used in the treatment of epilepsy that induces gingival enlargement, this gingival hyperplasia significantly affects the upper jaw, since phenytoin and its metabolites have a direct action on the population of fibroblasts of high activity present in the mucosa, which leads to a subsequent increase in collagen making (Córdova-García et al., 2020).

Nifedipine, a calcium-antagonist drug widely used in cardiovascular treatment, which rudely reduces the hypertensive peak in acute stages, being the correct option when diuretic beta-blockers and vasodilators have not been effective also generates gingival enlargement. Gingival lesions occur 1 to 9 months after drug administration, when they are not complicated by secondary inflammation, lobed papillae of pink, firm, granular and little bleeding are observed (Darío Rivarola Céspedes, 2011).

Cyclosporine A is an immunosuppressant that is administered orally and intramuscularly. Doses above 500 mg, results in gingival enlargement. The tissue will be pink, resilient, dense, dotted surface with little tendency to hemorrhage and lobed, however, compared to Phenytoin it is a more hemorrhagic tissue. The compound administration of cyclosporine A and nifedipine or another calcium channel

blocker (in case of heart transplant patients) increases the severity of gingival enlargement, being similar in renal transplant patients (Darío Rivarola Céspedes, 2011).

The proposed treatment for gingival enlargement is based on the discontinuous use of medication by the patient's treating physician, as it often results in cessation and probably regression of gingival enlargement. In the same way, it is recommended to start with Phase I or hygienic proceeding to the meticulous elimination of all local irritants, accompanied by a correct daily hygiene by the patient, with the aim of eliminating the secondary inflammatory component and the consequent reduction of the volume of enlarged tissue (Darío Rivarola Céspedes, 2011).

Orthodontics as a cause of gingival enlargement

The placement of orthodontic appliances hinders the maintenance of good oral hygiene, particularly in the interproximal spaces, where it presents greater difficulty, in addition, it entails adverse changes in the composition of the bacterial plaque, both quantitatively and qualitatively, increasing periodontal susceptibility as the risk of caries. Reporting an increase in *spirochetes*, periodontal pathogens such as *Prevotella Intermedia, Aggregatibacter actinomycetemcomittans, Porphyromonas gingivalis or Fusobacterium Nucleatum* (as well as in *Candida* sp.) (Ristic et al., 2008; Tapia et al., 2019; Manuelli et al., 2019).

Patients under orthodontic treatment have difficulty in maintaining good oral hygiene, being more susceptible to presenting at any time of treatment some type of gingival problem, such as gingival enlargement, a reaction of the gum against the formation of plaque facilitated by orthodontics. Orthodontic treatment uses forces to induce tooth movements, which within a few hours of its application will produce cellular and vascular changes in the periodontium, depending on the magnitude, direction and duration (Gingival Effects Of CY, Alfonso the Wise UX, 2018).

The accumulation of supragingival plaque causes inflammatory alterations of the gingival tissues. However, responses to these aggressions vary greatly by individual. They will depend on the host's immune response to these aggressions and on the quality and/or quantity of the biofilm (Antoniazzi et al., 2009; Tatakis & Trombelli, 2004).

Gingival changes during orthodontic treatment are transient and do not imply a permanent alteration of periodontal tissue, others report that poor hygiene is responsible for gingival growth. Although these conditions create artificially deep periodontal pockets, they should not be neglected and require treatment. In addition, it causes a negative blow to the quality of life related to oral health of orthodontic patients with anterior gingival enlargement (Vincent-Bugnas et al., 2020).

Considering that orthodontic treatments are often initiated during adolescence when compliance and adherence to an oral hygiene routine are quite difficult to obtain (Kasmaei et al., 2014).

In his systematic review Bollen A, Cunha-Cruz J, Bakko D et al, mentions that orthodontic therapy leads to a better periodontal state in cases of previous crowding or occlusal interferences corrected by orthodontics, thanks to its greater ease in the elimination of plaque and reduction of occlusal trauma, however on other occasions periodontal tissues can be damaged during treatment due to the difficulty present in oral hygiene during the same, thus providing the accumulation of plaque and inflammation (Gingival Effects Of CY, Alfonso the Wise UX, 2018)

Clinical Evidence

Reichardt E. et al, mentions that in one week after the placement of fixed orthodontic appliances, significant changes occurred in the microbial plate of the metal surfaces and the surface of the adjacent tooth. The brackets were fixed with composite in the anterior region and the bands were fixed with cement in the posterior region. Both substantially enlarged surface size, which could benefit bacterial colonization. Although composite causes less roughness compared to cement, brackets facilitate numerous niches for microbial biofilm and plaque development, benefiting even more in the anterior location (Reichardt et al., 2019).

In the research of Rodríguez A., et al, he conducted a qualitative study with the objective of determining the prevalence of gingival enlargement and retraction in patients with orthodontic treatments. Through a total study of 200 patients from the Catholic University of Honduras. A Chi-square contingency test was used, having a significance of 0.21. Obtaining as a result of the study to 55% (110 patients) who presented gingival enlargement, likewise, 10% (21 patients) presented gingival retraction, being gingival grading the one with the highest prevalence. Therefore, during orthodontic treatment, biofilm retention is reflected, preventing good oral hygiene of the patient.

The accumulation of plaque and / or appliances used in orthodontics, cause the appearance of gingival hyperplasia. Pinto A, at el, explain that this fact may be due to the duration of treatment, since their study in adolescents and young adults, shows that the time of orthodontic treatment significantly influenced the appearance of gingival hypertrophy (Pinto et al., 2017).

Erbe C, et al. describe that inevitably, the placement of fixed orthodontic appliances creates areas of plaque retention that make cleaning difficult. However, the constant presence of bacterial plaque is inevitably accompanied by numerous side effects such as gingivitis, gingival enlargement, enamel demineralization (leading to precarious leukomas and even caries) and in extreme cases, loss of insertion (Erbe et al., 2019).

Most authors stated that little interest in the habit of oral hygiene is a prevalent factor during fixed orthodontic treatment, presenting 88% of deficiency in oral hygiene in patients evaluated with orthodontic treatment (Gabriela Rodríguez Vásquez et al., 2017).

The study conducted by Reichardt E, explains that brackets provide numerous niches for microbial biofilm and plaque development, being complemented by Pinto A, at the. Referring that the accumulation of plaque and / or appliances used in orthodontics, cause the appearance of gingival hyperplasia, inevitably leading to numerous side effects such as gingivitis, gingival enlargement, demineralization of the enamel and in extreme cases, loss of insertion (Reichardt et al., 2019; Pinto et al., 2017; Erbe et al., 2019).

In the case of patients who present gingival enlargement associated with drugs such as anticonvulsants, calcium channel blockers and cyclosporine, the authors recommend periodic monitoring of these patients, since consultation with the treating physician and control of microbial plaque are imperative points. Transplant patients, patients with cardiovascular pathology and epileptic patients are patients at risk for developing gingival enlargements due to drugs. In these patients it is recommended to start a hygienic phase, which consists of the elimination of all local irritants, accompanied by proper daily hygiene by the patient, with the aim of eliminating the secondary inflammatory component and the consequent reduction of the volume of enlarged tissue, accompanied by the replacement of medications by other more beneficial (Darío Rivarola Céspedes, 2011).

4. Conclusion

Gingival enlargement is conceived as an excessive growth of the gum with increased volume in response to local and systemic conditions, this can be local or general. Clinically it begins as a circular enlargement of the interdental papillae and extends to the vestibular and lingual gingival margins, without exceeding the mucogingival junction. Gingival enlargement may be associated with drugs such as anticonvulsants, calcium channel blockers and cyclosporine, as well as characterized by an inflammatory response to bacterial plaque. The periodic control of these patients is of vital importance, since the interconsultation with the treating physician and the control of microbial plaque are points of imperative character because in this way we will obtain the expected functional, aesthetic and psychosocial results. Gingival diseases associated with bacterial plaque have a high prevalence, and it is our duty to instruct and motivate patients in adequate control both to prevent their development, and to maintain the stability of the periodontium over time. Gingival enlargements within your treatment, in addition to requiring the hygienic phase of periodontal treatment, may need the surgical approach. For this reason, patients who are going to start an orthodontic treatment, should have a good periodontal status and continuous monitoring throughout the treatment, as a means to prevent or alleviate the

development of gingivitis, gingival recessions, loss of gingival attachment and periodontal support, dental caries; alterations that orthodontics, by itself, facilitates. It should be borne in mind that, if there is gingival enlargement, the application of forces will not be able to be neutralized in the same way that they would be neutralized in a tooth with an integral and healthy periodontium, which will produce an important dental displacement with appearance and aggravation of periodontal lesions, generating problems in the expected results.

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