

Gingival enlargement in orthodontic patients: Effect of treatment duration

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Introduction: In this study, we aimed to assess the effect of the duration of fixed orthodontic treatment on gingival enlargement (GE) in adolescents and young adults. **Methods:** The sample consisted of 260 subjects (ages, 10-30 years) divided into 4 groups: patients with no fixed orthodontic appliances (G0) and patients undergoing orthodontic treatment for 1 year (G1), 2 years (G2), or 3 years (G3). Participants completed a structured questionnaire on sociodemographic characteristics and oral hygiene habits. Clinical examinations were conducted by a calibrated examiner and included the plaque index, the gingival index, and the Seymour index. Poisson regression models were used to assess the association between group and GE. **Results:** We observed increasing means of plaque, gingivitis, and GE in G0, G1, and G2. No significant differences were observed between G2 and G3. Adjusted Poisson regression analysis showed that patients undergoing orthodontic treatment had a 20 to 28-fold increased risk for GE than did those without orthodontic appliances (G1, rate ratio [RR] = 20.2, 95% CI = 9.0-45.3; G2, RR = 27.0, 95% CI = 12.1-60.3; G3 = 28.1; 95% CI = 12.6-62.5). **Conclusions:** The duration of orthodontic treatment significantly influenced the occurrence of GE. Oral hygiene instructions and motivational activities should target adolescents and young adults undergoing orthodontic treatment. (Am J Orthod Dentofacial Orthop 2017;152:477-82)

The effect of fixed orthodontic appliances on periodontal parameters has been shown previously.¹⁻⁵ In general, favorable conditions for plaque stagnation as well as difficulty in performing usual oral hygiene measures have been associated with poorer periodontal health among orthodontic patients.^{1,2} Nevertheless, some studies have suggested that gingival changes during the use of fixed orthodontic appliances do not cause permanent aggression to periodontal support tissues.³⁻⁵

Gingival enlargement (GE) is excessive growth of the gums where the inflammatory tissue may be in a limited region, or it may be generalized.^{1,3} The mechanism by

which it occurs during orthodontic treatment is not fully understood, wherein artificially deep periodontal pockets are established.⁶⁻¹⁰ Few studies have assessed the occurrence of GE during orthodontic treatment. In 2014, Eid et al¹¹ and Zanatta et al¹² found a positive association between the use of fixed orthodontic appliances and gingivitis and GE. However, neither study had a control group (without brackets), and they combined in the same category orthodontic patients undergoing treatment for 12 months or more and for 18 months or more.^{11,12} Thus, the effect of longer periods of orthodontic treatment was not studied.

A previous study showed that anterior GE promotes a negative impact on oral health-related quality of life of orthodontic patients, thus emphasizing the need for further investigations on this issue.¹³ Therefore, in this study, we aimed to assess the effect of the duration of fixed orthodontic treatment on GE in adolescents and young adults.

MATERIAL AND METHODS

In this cross-sectional study, we selected participants who sought or were undergoing fixed orthodontic treatment in an orthodontic graduate program in Santa Maria, Rio Grande do Sul, Brazil. The study protocol was approved by the ethics committee of the Federal

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All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest, and none were reported.

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University of Santa Maria (number 0109/2013). Patients or their legal guardians were informed about the study objectives and authorized their participation by signing a written informed consent form.

The required number of subjects was estimated based on an expected difference among groups of 20%. Considering a power of 80% and a confidence interval of 95%, 65 persons per group were required. The sample was stratified into 4 groups according to the duration of fixed orthodontic treatment: G0 (control), including candidates for corrective orthodontic treatment, examined previously for fixed appliances; G1, composed of patients undergoing fixed orthodontic treatment for 1 year (10-14 months); G2, composed of patients undergoing fixed orthodontic treatment for 2 years (22-26 months); and G3, composed of patients undergoing fixed orthodontic treatment for 3 years (34-38 months).

Patients aged 10 to 30 years were considered eligible for this study. To be included in G1, G2, and G3, participants should be using fixed orthodontic appliances for a specific period of time, as previously described. Fixed corrective orthodontic treatment was carried out with conventional metal brackets, straight wire technique, orthodontic arches fixed with simple elastic bandages, and without metal ligatures, elastic chains, or proximal enamel stripping. Orthodontic rings (bands) were adapted to the molars with glass ionomer cement. Initially, orthodontic movement of alignment and leveling were performed to correct the horizontal and vertical discrepancies with subsequent space closure, when necessary, and finishing that included compensatory folds in the arches, such as torque, intrusion, and extrusion. Patients in need of traction of impacted teeth and wide repositioning of teeth lingually or buccally (>2 mm) were not included in the sample. To be included in group 0, subjects should not be using or have previously used fixed orthodontic appliances. Patients suffering from congenital abnormality, systemic illness, cysts, or crevices, or with special needs or using systemic medication for the treatment of chronic diseases that might interfere with gingival overgrowth were excluded from the sample. Patients who required chemoprophylaxis before clinical examination were also excluded.

Initially, the subjects answered a structured questionnaire on sociodemographic characteristics and oral hygiene habits. Clinical examinations were performed in a dental unit, using a dental mirror, a periodontal probe type Williams (Golgran, São Caetano do Sul, Brazil), and a World Health Organization probe.

Clinical examination included assessment of the plaque index of Loe and Silness,¹⁴ evaluation of the gingival index of Loe,¹⁵ professional prophylaxis with sodium bicarbonate spray (Jet Laxis Uno; Schuster, Santa

Table I. Description of the assessed indexes

Plaque index ¹⁴	
0	Surface without plaque
1	Plaque at the gingival margin and the tooth, visible only after probe use
2	Moderate accumulation of plaque at the gingival margin and the tooth, visible to the naked eye
3	Abundant accumulation of plaque at the gingival margin and the tooth
Gingival index ¹⁵	
0	Normal gums
1	Mild inflammation, with a slight change in color and slight swelling but no bleeding on probing
2	Moderate inflammation with redness, swelling, and bleeding on probing
3	Severe inflammation with redness and severe edema, tending to ulceration and spontaneous bleeding
Seymour index ¹⁶	
Gingival thickening	
0	Normal
1	Thickening ≤ 2 mm
2	Thickening > 2 mm
Gingival encroachment	
0	Normal
1	Papilla involving 1/3 of adjacent tooth crown half
2	Papilla involving 2/3 of adjacent tooth crown half
3	Papilla involving $> 2/3$ of adjacent tooth crown half

Maria, Brazil), tooth drying with air-water syringe, relative isolation with cotton rolls, assessment of the excess composite resin at the cervical side of the brackets, where 0 was considered absent and 1 present, adapted from the study of Zanatta et al,¹ and assessment of the Seymour index¹⁶ to record the occurrence of GE in the anterior segment by visual inspection. Buccal and lingual papillae of the 6 anterior teeth, maxillary and mandibular, were examined. Gingival thickening and gingival encroachment onto adjacent crowns were graded. The sum of both scores (thickening and encroachment) resulted in an enlargement score for each gingival unit. The maximum score with this method was 5, and the sum of all papillae provided 1 score per patient (range, 0-100). These indexes are described in [Table I](#).

One examiner (A.S.P.) performed the clinical examinations. Training sessions were performed to ensure examiner reliability in regard to the indexes. Repeated examinations were performed in 16 subjects (6%), and a kappa value of 0.95 was obtained for the Seymour index. Since plaque accumulation and gingival bleeding are variable conditions, examiner calibration was not assessed for these indexes.

Statistical analysis

The main outcome of this study was anterior GE. The prevalence of anterior GE was defined as the proportion of subjects with a Seymour index value of 30 or greater

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