

# Gingival recession in orthodontic patients 10 to 15 years posttreatment: A retrospective cohort study

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**Introduction:** The aims of this study were to retrospectively investigate the long-term development of gingival recession in a cohort of orthodontic patients and to compare the prevalence of gingival recession in orthodontically treated patients 10 to 15 years posttreatment to that of untreated subjects with malocclusion.

**Methods:** The sample included 88 patients with mean ages of 12.1 years (SD, 2.4 years) at pretreatment, 15.1 years (SD, 2.4 years) at posttreatment, and 27.9 years (SD, 2.5 years) 10 to 15 years posttreatment. The control group comprised 102 untreated patients seeking orthodontic treatment with a mean age of 28.7 years (SD, 3.1 years). Gingival recession was evaluated on study models. **Results:** The prevalence of both labial/buccal and lingual/palatal gingival recession increased during orthodontic treatment with further increases during the long-term posttreatment period; 98.9% of the orthodontically treated participants had at least 1 labial/buccal recession, and 85.2% of the patients had at least 1 lingual/palatal recession 10 to 15 years posttreatment. In addition, the proportion of patients with multiple labial/buccal or lingual/palatal recession sites increased considerably in the same time period. The prevalences of labial/buccal gingival recession were similar in the orthodontically treated patients 10 to 15 years posttreatment and the untreated controls. Study group patients with a crossbite before treatment showed 2.73 more recessions (95% CI, 0.28-5.17;  $P = 0.029$ ) than did those without a transverse discrepancy. Untreated subjects with crowding greater than 3 mm per arch had 3.29 more recessions (95% CI, 0.73-5.68;  $P = 0.012$ ) to 4.92 more recession sites (95% CI, 1.70-8.15;  $P = 0.003$ ) than did those with mild or no crowding.

**Conclusions:** Within the limitations of this study, it seems that, in regard to the prevalence of gingival recession, orthodontically treated patients are not compromised in the long term compared with those with malocclusion that was untreated for many years. (*Am J Orthod Dentofacial Orthop* 2018;153:645-55)

Gingival recession refers to exposure of the root surface caused by displacement of the gingival margin apically to the cementoenamel junction.<sup>1</sup> Gingival recession may occur in many populations.<sup>2-8</sup> Localized or generalized, it can create an esthetic

problem and lead to dentin hypersensitivity and root caries.<sup>9</sup>

Recession of the marginal gingiva can be associated with anatomic or pathologic factors.<sup>10,11</sup> It can develop as a result of periodontitis or natural remission of the tissue through aging, which is the most common type of gingival recession.<sup>11</sup> In these patients, recession develops more commonly on the buccal than on the lingual surfaces, and the periodontal structures show no sign of inflammation.<sup>11</sup> Traumatic tooth brushing,<sup>12,13</sup> tobacco,<sup>14,15</sup> and intraoral and perioral piercings,<sup>16</sup> aberrant tooth morphology or tooth eruption, and anatomically reduced thickness of the bone or thin gingival biotype overlying the roots<sup>10,11,15,17</sup> have been also associated with gingival recession.

Active orthodontic treatment can induce gingival recession when teeth are moved outside the alveolar bone.<sup>18</sup> Difficulty with tooth brushing and plaque accumulation during orthodontic treatment and fixed retention can lead to inflammation-related recession.<sup>19</sup>

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According to Pandis et al,<sup>20</sup> there is no clear connection between the presence of fixed retainers and the development of gingival recession. However, long-term fixed bonded retainers on proclined mandibular incisors could cause attachment loss.<sup>20</sup> The evidence on the prevalence of gingival recession in orthodontically treated and untreated patients is contradictory.<sup>21-23</sup> Thomson<sup>21</sup> found no influence of orthodontic treatment on the development of gingival recession, whereas Slutzkey and Levin<sup>22</sup> and Renkema et al<sup>23</sup> reported that gingival recession was more prevalent in orthodontically treated patients than in untreated controls. These conflicting findings could be related to the difference in length of the observation periods or the different characteristics of the control groups in those studies.

Therefore, the aim of this study was to retrospectively analyze the long-term development of gingival recession in orthodontically treated patients from pretreatment to 10 to 15 years posttreatment. Moreover, we studied whether the prevalence of gingival recession in the orthodontically treated patients 10 to 15 years after treatment was different from that of untreated subjects with malocclusion seeking orthodontic treatment matched for age and sex.

## MATERIAL AND METHODS

This retrospective cohort study was approved by the ethics committee of Bern, Northwest and Central Switzerland (EKNZ 2015-349, HVF, Kat A), and every patient signed informed consent to participate. For the structure of this article, the recommendation of the STROBE Statement were followed.<sup>24</sup>

Two groups were selected: (1) a study group comprising orthodontically treated patients whose treatment was finished 10 to 15 years before this study and (2) a control group of untreated subjects with different types of malocclusions seeking orthodontic treatment.

The study group was selected from patients at a private orthodontic practice in Grenchen, Switzerland. In this practice, it was routine to keep pretreatment (initial, T1) and posttreatment records (final, T2) for at least 10 years after the last retainer follow-up visit, which was usually performed between 1 and 4 years posttreatment. To study patients at least 10 years posttreatment (T3), a recall was established for those who had their last retainer follow-up appointment in 2005, 2006, and 2007 (thus, their T2 records were taken between 2001 and 2006). Three hundred ninety-four consecutive patients who met the following inclusion criteria were eligible to be included in the study: (1) treated with fixed appliances, (2) treated by the same orthodontist, (3) maxillary and mandibular retainers bonded immediately after active orthodontic treatment, and (4) nonsyndromic.

They were invited for a recall assessment. No age restriction was applied during the sample selection; 118 patients agreed to participate; of those, 14 were “no shows.” Eventually, 104 patients were evaluated. After the recall appointment, the following additional exclusion criteria were applied: (1) orthodontic retreatment, (2) debonding more or less than 10 to 15 years ago, (3) T1 and T2 casts missing or of poor quality in the region of the gingival margin, (4) periodontal disease other than gingival inflammation, and (5) nonwhite patients. Finally, 88 patients were included. The flow chart (Fig 1) shows in detail the procedure of patient selection.

The control group was selected from 969 consecutive adults who came for consultation to the Department of Orthodontics and Dentofacial Orthopedics at the University of Bern in Switzerland between 2006 and 2016. The participants were selected if they met the following inclusion criteria: (1) availability of a full set of pretreatment records (photographs, casts, radiographs), (2) no history of prior orthodontic treatment, and (3) between 22 and 37 years of age at the assessment; the age criterion was applied to match participants from the study cohort at T3. Exclusion criteria were (1) nonwhite, (2) syndromic, (3) casts of poor quality in the region of the gingival margin, (4) periodontal disease other than gingival inflammation; 143 subjects were initially considered for inclusion in the control group (Fig 1). Thirty-three of them had previous orthodontic treatment, and 8 were nonwhite and were subsequently excluded. Finally, 102 subjects were included in the control group.

The primary outcome was the presence of gingival recession in buccal or lingual sites of the teeth, and they were scored as “yes” if the cemento-enamel junction in the center of the buccal or labial aspect was clearly exposed; otherwise, it was scored as “no.”

The participants were requested to complete a questionnaire regarding hygiene, habits, and any complications regarding their retainer. Demographic data such as sex, age, hygiene technique, type of toothbrush, and type of retainer were recorded during the clinical assessment at T3.

In the study group, plaster models made at T1, T2, and T3 were scored, using the yes/no scoring system. One rater (M.M.) rated all patients clinically at T3 and scored all plaster models at each time point (T1, T2, and T3). When judgment was difficult on the plaster models, intraoral photographs were additionally used. During the clinical evaluation (T3, 10-15 years after orthodontic treatment), oral hygiene was recorded and rated on a 3-level scale (good, average, or poor). For the hygiene technique, the participants were requested to perform their brushing method and were asked

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