Recession occurrence in patients treated with fixed appliances – preliminary report

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Abstract

Purpose: The aim of the study was to evaluate the dependence of gingival recession, malocclusion and factors that may lead to recessions of the gingiva in patients applying for orthodontical treatment.

Material and methods: The study involved 52 randomly selected patients treated with fixed appliances due to occlusal irregularities and dental abnormalities. Data obtained from the examination and selected parameters from cephalometric analysis were placed in a chart including ANB skeletal class and Wits parameter, lower incisor position IMPA, dental abnormalities, extractions due to orthodontic indications and recession etiopathic factors.

Statistical analysis of obtained data was conducted using variance analysis. Statistically significant were assumed those calculations for which value of significance level p ≤ 0.05.

Results: Recession was observed in 18 patients of the 52 examined. Skeletal I class was found in 11 patients (61.12%) and in 8 cases Wits parameter corresponded with skeletal class III (44.4%). Among the patients examined normal incisor inclination was observed in 6 patients (33.33%), whereas 12 cases revealed inclination irregularities (66.66%).

Clinical examination disclosed dental defects in 13 patients (72.22%) and in 12 cases recession etiopathic factors were recognized (66.66%). Statistically significant differences between periodontal biotype and gingival recession of 43, 31, 33 teeth were estimated.

Conclusions: Anatomical factors, malocclusion and dental irregularities were fund to be the main cause of the single and/or multiple recessions. Patients applying for orthodontic treatment due to occlusal abnormalities should remain under particular control in case of symptoms suggesting the incidence of recession, particularly when recessions are already present.

Key words: gingival recession, fixed appliances, etiopathogenesis.

Introduction

Gingival recession according to McComb [1] defines a static state where we can observe a considerable dislocation of gum margin what as result leads to losing the width of attached gingiva and development of recession. For the patients suffering from gingival recession it invariably means hypersensitivity of dentin leading not only to paracervical defects of non-carietic origin but also to the root decay.

Etiopathogenesis of the recession is intricate and the generation of the abnormalities results from interaction of various factors which are often impossible to identify thus the assessment of their impacts remains as such [2,3]. According to Zachrisson et al. [4] the primary agent responsible for recession occurrence is improper teeth cleaning technique. The high level of oral cavity cleaning processes does not necessarily prevent recession. This situation applies mainly to patients, with no plaque records, who brush their teeth too often applying evidently too strong force on the toothbrush, giving rise to mechanical damage of paradontal area thus causing gingival recession [2,3,5-7]. The other noticeable factor is definite lack of oral hygiene, resulting in plaque inducing inflammatory reaction. Bacteria found in plaque and their metabolic products impair the connective tissue the width of attached gingiva at the teeth surface, which invariably leads to recession [8-10]. Accumulation of the plaque on teeth and elements of fixed appliances can be a significant problem [11]. In etiology of recession it is weighty to take into consideration action of occlusal trauma, which enable bacterial
penetration, favour mechanical irritation during hygienic activities and result in gingival recession [12].

It is widely known that malocclusion deprived the proper treatment increases the risk of caries, inflammatory states of oral mucose, paradontal illnesses and recession. It may be ensued from the clinical observation [13,14] that anterior displacement is critical recession formative agent which may result in substantial gum impairment. Gingival recession may originate before orthodontic treatment, during but also as a result of it. Recession occurring in singular teeth is connected with presence of partial anterior crossbite, especially in patients at young age. Crucial for the rise of recession are also: general condition of soft tissues (too thin gums and improper lip frenulum, tongue, cheek frenulums) [15], bone conditions (thin bone layer on the root or lack of it), teeth related agents (impairment of teeth topography such as crowding or vestibular inclination) [16]. Recession is also frequently observed in supracuspal patients with retraction of upper incisors or protrusion of lower incisors or few forms of mesioclusion or distoclusion. Patients with complex pathognosic signs, which predispose to recession, should have their teeth relocated in the course of orthodontic treatment inside the alveolar bone [17] and properly selected range of orthodontic forces should be applied in order to execute the relocation [18].

The major aim of this study is to assess the relation between the gingival recession and etiologic factors in patients applying for orthodontic treatment.

### Material and methods

The case study group consisted of 52 randomly chosen patients (age range 12-39 years) calling for check-ups at the course of fixed appliance treatment resulting from malocclusion and teeth abnormalities. All the patients were examined in artificial light, with the use of probe, mirror, and paradontometer using criteria consistent with the WHO directives, enclosed in “Oral Health Surveys Basic Methods” [19]. Subsequently acquired data and the values selected from the cefalometric analysis were marked on the table designed for the conducted research according to the scheme: skeletal class according to ANB angle and Wits parameter – showing mutual vertical relations of the jaws, the lower incisor position IMP A, defining the inclination of incisors in relation to the mandibular plane, teeth improperties – crowding, protrusion, dental extractions due to orthodontical indications, periodontium biotype (thin gingiva and the root bone layer), improper upper and lower lip frenulum, shallow oral vestibule.

Among 52 patients 18 were reported, on the basis of interdisciplinary and clinical records, to have recession. Statistical analysis of obtained data was conducted using variance analysis. Statistically significant were assumed those calculations for which value of significance level p ≤ 0.05.

### Ethics

The Ethics Committee of Medical University of Białystok accepted the study.

### Results

The results of the above research are visualized in the Table 1. Eighteen patients out of 52 had the recession diagnosed which constitutes 34.62%. The total number of teeth with recession was 70, where 5 cases (7.14%) were localized in the maxilla and

<table>
<thead>
<tr>
<th>No</th>
<th>Sex</th>
<th>Age</th>
<th>Fixed appliance treatment duration</th>
<th>Skeletal class ANB/WITS</th>
<th>Incisor position before treatment</th>
<th>Presence of crowding and rotations</th>
<th>Extractions</th>
<th>Favouring factors</th>
<th>Teeth with recession</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>F</td>
<td>23</td>
<td>7 months</td>
<td>I</td>
<td>88.91</td>
<td>+</td>
<td></td>
<td></td>
<td>Gingival biotype</td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>24</td>
<td>6 months</td>
<td>III</td>
<td>85.13</td>
<td>+</td>
<td></td>
<td></td>
<td>Gingival biotype</td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>14</td>
<td>12 months</td>
<td>I</td>
<td>86.61</td>
<td>-</td>
<td></td>
<td></td>
<td>Incorrect lip frenulum</td>
</tr>
<tr>
<td>4</td>
<td>F</td>
<td>16</td>
<td>2 months</td>
<td>III</td>
<td>91.89</td>
<td>+</td>
<td></td>
<td></td>
<td>Gingival biotype</td>
</tr>
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<td>5</td>
<td>F</td>
<td>17</td>
<td>6 months</td>
<td>II</td>
<td>87.65</td>
<td>+</td>
<td></td>
<td></td>
<td>Gingival biotype</td>
</tr>
<tr>
<td>6</td>
<td>F</td>
<td>21</td>
<td>1 year, 18 months</td>
<td>I</td>
<td>88.58</td>
<td>+</td>
<td>4+ +4</td>
<td>+</td>
<td>Gingival biotype</td>
</tr>
<tr>
<td>7</td>
<td>M</td>
<td>24</td>
<td>7 months</td>
<td>III</td>
<td>80.51</td>
<td>+</td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
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<td>F</td>
<td>20</td>
<td>22 months</td>
<td>III</td>
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<td>4+ +5</td>
<td>+</td>
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<td>4+ +4</td>
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<td>Gingival biotype, shallow vestibulum</td>
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<td>1 month</td>
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<td>6+, +4, +4, - +4</td>
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<td>4 months</td>
<td>II</td>
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<td>+</td>
<td></td>
<td>+</td>
<td>-</td>
</tr>
<tr>
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<td>M</td>
<td>39</td>
<td>1 year, 11 months</td>
<td>III</td>
<td>105.88</td>
<td>+</td>
<td>4+ +4</td>
<td>+</td>
<td>Gingival biotype</td>
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<tr>
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<td>22</td>
<td>2 years</td>
<td>II</td>
<td>107.57</td>
<td>+</td>
<td></td>
<td></td>
<td>Shallow vestibulum</td>
</tr>
<tr>
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<td>2 years</td>
<td>I</td>
<td>102.32</td>
<td>+</td>
<td></td>
<td>+</td>
<td>Incorrect lip frenulum</td>
</tr>
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<td>F</td>
<td>20</td>
<td>17 months</td>
<td>I</td>
<td>93.92</td>
<td>+</td>
<td>4+ +4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
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<td>F</td>
<td>17</td>
<td>19 months</td>
<td>III</td>
<td>85.26</td>
<td>+</td>
<td>4+ +4</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>18</td>
<td>M</td>
<td>13</td>
<td>2 years</td>
<td>II</td>
<td>97.44</td>
<td>+</td>
<td></td>
<td>+</td>
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</tr>
</tbody>
</table>

### Table 1. Patients calling for check-ups at the course of fixed appliance treatment resulting from malocclusion and teeth abnormalities
Recession occurrence in patients treated with fixed appliances – preliminary report

65 (92.85%) concerned the mandible. The maxillary recessions comprised mainly canines (4 teeth) and one incisor. The greatest number of gingival recessions in the lower jaw was observed in the anterior segment – 29 teeth (41.42%). 11 recessions were related to mandibular premolars, which established 15.71% recessions in general.

In 5 patients aged 12-14 single recessions occurred (Fig. 1), whereas in older patients – multiple ones were present (Fig. 2). Statistically significant differences between the age of patients and recession incidence were estimated (p<0.003).

Mutual relation of the jaw basis was described through the analysis of the ANB angle and Wits parameter. In 11 cases (61.12%) the I skeletal class was estimated (ANB=2±3°), 3 cases (16.67%) were related with the II class (ANB>5) and 4 patients (22.22%) were ordered to the III class group (ANB<-1). Normal Wits parameter (0±2 mm) describing the I skeletal class of the jaw basis relationship was found in 2 patients (11.11%). Both Wits II skeletal class (>2 mm) and III skeletal class (<2 mm) was observed in 8 patients (44.44%) respectively. Statistically significant correlation between Wits parameter and gingival recession was estimated.

6 patients (33.33%) represented correct value (90°±3°) of the angle between the lower incisor and the mandibular plane – IMP A. 7 (38.88%) of the orthodontically exposed patients manifested protrusion of the lower incisors (IMPA>93°) and 5 patients (27.77%) – retraction (IMPA<87°). High percentage (72.22%) of dental irregularities such as crowding and rotations was estimated.

In the course of treatment 17 extractions in 7 patients were performed. Upper and lower first premolars prevailed among the extracted teeth (14 teeth).

The clinical examination of 12 patients (66.66%) revealed presence of recession favoring factors. In 10 patients a single etiologic factor was recognized, 7 patients had two and 1 person had three favoring factors. In the majority of cases one could observe thin gingival and bone plate on the vestibular surface of the root – 9 cases (75.00%) (Fig. 3). Statistically significant differences between periodontal biotype and gingival recession of teeth 43 (p<0.048), 31 (p<0.016) and 33 (p<0.006) teeth were estimated. The incorrect attachment of the lower lip frenulum was considered to be the main cause of the recession at the tooth 41 in 2 patients (16.66%). These variables, were found to be statistically significant (p<0.034). In 2 patients a shallow labial vestibule was recognized to be an etiologic factor for recession appearance in relation to teeth 44 (p<0.020), 42 (p<0.020) and 34 (p<0.002).

Discussion

Epidemiologic research over the gingival recession, prove the illness to be a social problem in the broadest sense of the word [20,21]. Depending on the age of patients, the recession occurs from 6.3 to 100% of population, where the rate of it rises with the age [22], which has also been proved in our research.

Impairment of teeth topography such as crowding or labial positioning of teeth have substantial influence on the formation of the width of attached gums. The recession formation is inclined by the inappropriate positioning of the teeth in the arch. This creates places of poorer resistance of the periodontal tissues resulting from thinning of the gums and narrowing of its width. These are also the potential areas for accumulation of the plaque. Syryńska et al. [23] in her 6 year research over children proved that rotations, proclination and crowding of teeth significantly narrowed the attached gums width in particular teeth. Clinical research of our group (age range 12-14 years) has also proved recession in particular teeth resulting from dental inaccuracies.

The most adverse influence had the teeth with vestibular inclination in the jaw. Such situation is connected with lowering of the bone and gum thickness which propped up by the impair-
ment ensuing from intense brushing inevitably results in recession of gingiva. In the analyzed data, the positioning of the lower incisors were documented in 38.88% of the trial group. Louis A. Buckley [24] and few other researchers revealed the relation between the crowding of the lower incisors, their vestibular inclination and the impairment of the gums. They have also proved crowded teeth to be far more difficult to clean thus prevent the plaque. All these factors inevitably lead to impairment of periodontium. 13 out of 18 patients with diagnosed recession had their dental inaccuracies reported. They called regularly for check-ups during their fixed appliances treatments. The whole group has undergone a detailed oral cavity hygiene instruction before and during the check-ups, so the plaques together with dental inaccuracies are doubtful etiological factors in the diagnosed cases of recession.

Excessive recessions of the marginal periodontium are also observed in deep bite cases with retusion of upper incisors and protrusion of lower incisors, or few forms of mesioclusion or distocclusion [25].

Geiger [26] in his work concerning orthodontic treatment and associated periodontal problems presents slightly different perception of gingival recession. He invariably links the disease with too thin gingiva and bone layer covering the root, impairment of tooth topography, shallow labial vestibule and incorrect labial frenulums. Anatomic factors together with pathological attachments of low labial frenulums, shallow vestibule or high mentalis muscle attachment, where increased tissue tension occurs, favour recession manifestation. In the study group described, the most common multiple recession etiologic factor were thin gingiva and bone plate covering the root as well as shallow lower vestibule, whereas single recession were related to the incorrect attachment of the lower lip frenulum.

The described study particularly attached importance to the Wits parameter, characterizing the linear relationship of the jaw basis. In our work the III skeletal class occurrence corresponded with the presence of one etiologic factor – mainly biotype. Thin bone and gingiva covering the root from the vestibular surface are quite often a characteristic feature of periodontium in patients with the III skeletal class, particularly in cases with retrusive lower incisors.

Decrease of the IMPA values below 87° thus lingual proclination of the lower incisors may occur independently from the skeletal component or exist as a form of dental compensation of the skeletal irregularity.

Conclusions

Anatomic factors together with dental and occlusal improprieties may originate singular or multiple recessions. Orthodontic patients calling for treatment due to malocclusion should be under professional supervision when symptoms suggest the recession occurrence especially when clinical examination may diagnose already existent gingival recession.

References