The effect of periodontal treatment on the basis of analysis of orthodontic treatment in patients with periodontal disease

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ARTICLE INFO

Article history:
Received
Received in revised form
Accepted
Available online

Keywords:
periodontal basis
orthodontic treatment
periodontal health indicators
CBCT measurement

ABSTRACT

Objective: To find out the effect of periodontal treatment on orthodontic treatment. Methods: A total of 30 cases from January 2013 to November 2014 were taken into the research. The periodontal health indicators (probing depth/PD, tooth mobility/TM, bleeding on probing/BOP, and clinical attachment loss/CAL) were taken into measurements, before any treatment T0, after 3-month periodontal treatment T1 and after the periodontal treatment combined with orthodontic treatment T2, respectively. Also, the changes of the distance from alveolar ridge crest to cement-enamel junction (CEJ), root length and density of alveolar bone were observed through CBCT measurement. Results: The TM in T1 was obviously less than that in T0 (P<0.05) while TM in T2 increased. The percentage of BOP in T1 was apparently less than that in T0 and T2 accounted for the smallest percentage (P<0.05). The PD in T1 was smaller than that in T0 and T2 shared the smallest depth (P<0.05). In the case of CAL, T1 was less than T0, and there was no statistic difference in T2 when compared with T1 (P>0.05). The root length in T2 and T1 shared no statistic difference and the root resorption did not occur after the orthodontic treatment (P>0.05). The distance from alveolar ridge crest to CEJ did not result in alveolar resorption after orthodontic treatment (P>0.05). The changes of density of alveolar bone in T1 were better than that in T0 while after the orthodontic treatment, it decreased. Conclusions: The periodontal treatment before orthodontic treatment plays an efficient role in controlling the periodontal disease and meanwhile, creates a good condition for further orthodontic treatment to restore both good appearance and masticatory function of teeth.

Periodontal disease is one of the common clinical dental diseases. 90% of adults in our country suffer from periodontal disease of various levels, which brings certain influence on the appearance as well as the functions of the teeth[1]. So far, the alignment of dentition, removal of occlusion and other problems related to the appearance of teeth has been difficult to handle, with periodontal treatment only. It has been suggested in many researches that the modification of occlusion, closure of interdental space and increase in density of alveolar bone should be achieved, with the orthodontic treatment on the basis of controlling the periodontal inflammation. Periodontal disease is a chronic nonspecific disease infected by multiple factors. More than 700 species of microorganisms reside in the mouth cavity. It is found that periodontal treatment can improve the flora disturbance in the root of tooth, characterized by the clinical manifestations of periodontal attachment loss (AL), bleeding on probing (BOP), alveolar resorption and loosening, and so forth. Clinically, the treatment effect of periodontal disease is assessed by periodontal health indicators, the height and density of phatnoma. This research aims to find out the effect of periodontal treatment on orthodontic treatment, through the comparisons of the changes in periodontal health indicators, teeth density and height of phatnoma before and after the periodontal treatment only as well as the treatment involving both periodontal treatment and orthodontic treatment.

I. Materials and methods

1.1 Materials

The materials included the 30 cases of periodontal disease from January 2013 to November 2014 in the Second People’s Hospital, Neijiang City, Sichuan Province, including 12 cases of male patients, 18 cases of female patients and an average age of 26.25 ± 10.23.
1.2 Diagnostic criteria

The diagnostic criteria of periodontal disease were based on the Clinical Periodontology.

1.3 Inclusive criteria

1. In accordance with the disease diagnostic criteria;
2. Aged from 18 to 60;
3. Patients with mild or moderate situation;
4. Accompanied by the problems of deep overbite, the decentralization of front teeth lip in the gap, alveolar resorption and occlusal trauma caused by crowded dentition;
5. Oral hygiene is required in the treatment;
6. Good compliance with the clinical research.

1.4 Exclusive criteria

1. Less than 18 y or more than 60 y of age; during pregnancy and lactation;
2. Affected with severe system disease and malignancy;
3. Affected with metabolic bone disease (BMD);
4. Bad compliance with the clinical research.

1.5 Treatments

1.5.1 Periodontal treatment

The periodontal treatment mainly included: supragingival scaling, subgingival scaling, plaque control, occlusal adjustment and so forth. 3-month follow-up observation was conducted after the treatment. Patients’ teeth health index (probing depth/PD, tooth mobility/TM, bleeding on probe/BOP, and clinic attachment level/CAL) was supposed to be measured.

1.5.2 Periodontal treatment combined with orthodontic treatment

Before the orthodontic treatment, the diagnosis of periodontal disease was needed. When the periodontal situation was in the stationary phase, the orthodontic treatment was performed. Occlusal adjustment was conducted by using straight arch wire technique, with increasing strength. The initial strength for adults was 20-30 g intermittent force and increased gradually according to the patients’ endurance. The increasing strength was determined by the bone resorption and alveolar bone mass. During the period of treatment, regular periodontal treatment was needed in order to control the formation of dental plaque.

1.6 Examination index

Patients’ periodontal health indicators (probing depth/PD, tooth mobility/TM, bleeding on probe/BOP, and clinic attachment level/CAL) was supposed to be measured, before any treatments T0, after periodontal treatment T1 and periodontal treatment combined orthodontic treatment T2, respectively. Based on the measurement and the result of CBCT, the distance from alveolar ridge crest to cemento-enamel junction (CEJ), and the changes of root length as well as density of alveolar bone can be observed.

1.7 Statistic process

All the collected data were properly archived and analyzed by SPSS 21.0. In this research, (t-test) was used to indicate normally distributed measurement data while non-normally distributed data were indicated by median. Kept to the normal distribution and homogeneity of variance, the two sorts of data were compared by using independent sample t and the percentages were compared by using \( \chi^2 \) to inspect \( P<0.05 \), which is of statistical significance.

2. Results

2.1 Result comparisons of T0, T1 and T2

Results showed, that the percentage of T1 BOP was obviously smaller than that of T0 and that T2 accounted for the smallest (\( P<0.05 \)). In the case of CAL, the result of T1 was still less than T0, and showed no statistic difference with T2 (\( P>0.05 \)) by comparison. The root length in T2 and T1 had no statistic difference by comparison, and there was no increase in root resorption (\( P>0.05 \)) after the periodontal treatment combined with orthodontic treatment. The distance from alveolar ridge crest to cemento-enamel junction did not result in alveolar resorption after the combined treatment (\( P>0.05 \)). The changes of density of alveolar bone in T1 were better than that in T0 and meanwhile, the density decreases after the combined treatment(\( P>0.05 \)). All of the results can be observed clearly in Table 1.

3. Discussion

In recent years, along with good social economic development, elevated life quality and more publicity from doctors, the adult orthodontics has gained more and more attention and increasing adults begin to have orthodontics.[5-7] The overall aims of indication for dental deformity and treatment of periodontal disease are to restore the physiological functions and appearance of periodontal tissue, and to maintain normal occlusion of periodontal tissue and periodontal health; as periodontal disease and dental orthodontics have the mutual effect on each other, pathological teeth malocclusion, deficiency, looseness could occur in the progression of periodontal disease, and meanwhile, periodontal disease could be more possibly caused by malocclusion.[8-11] Due to the lesion of mechanical tissue around the teeth, it could lead to inadequate strength in gums so that gums are unable to bear the normal occlusal force which would lead to the secondary occlusal trauma; as well, the looseness and displacement of teeth could destroy the former normal occlusion that has existed before.[12-14] It is of benefit if people pay enough attention to oral and dental health and modify teeth dislocation through orthodontic treatment to restore the normal occlusion. In the clinical observation, it is found that periodontal
treatment before the orthodontic treatment can improve the effect of the orthodontic treatment and make a prolonged stable therapeutic effect [15,16]. This article aims to find out the effect of periodontal treatment on orthodontic treatment, through the changes in patients’ periodontal health indicators, distance from alveolar ridge crest to CEJ by CBCT, root length and density of alveolar bone, in three stages— before any treatments T0, after 3-month periodontal treatment T1 and after the combined treatment T2.

The results showed that the tooth mobility in T1 was apparently less than that in T0, while that in T2 increased. The percentage of BOP in T1 was smaller than that in T0 and T2 accounted for the smallest percentage. The periodontal treatment played an efficient role in reducing BOP which orthodontic treatment can make less. The probing depth of periodontal pocket in T1 was shorter than that in T0 while that in T2 was the shortest. In the case of CAL, T1 was less than T0, and showed no statistical difference by comparison with T2. No statistical difference was shown in root length in both T2 and T1; the combined treatment did not cause increasing root resorption too. After the combined treatment, the distance from alveolar ridge crest to CEJ had little effect on the resorption of alveolar bone. The density of alveolar bone in T1 was greater than that in T0 while that in T2 was the shortest. In the case of CAL, T1 was the smallest percentage. The periodontal treatment played an efficient role in reducing BOP which orthodontic treatment can make less.

In conclusion, periodontal treatment before orthodontic treatment is effective in controlling the periodontal disease, and the improvements in local surroundings are favorable to the implementation of periodontal maintenance which can provide a good condition for further orthodontic treatment through which the tooth appearance and chewing function can be improved.

Table 1

<table>
<thead>
<tr>
<th>Items for measurement</th>
<th>T0</th>
<th>T1</th>
<th>T2</th>
<th>T0&amp;T1 P value</th>
<th>T1&amp;T2 P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probing depth</td>
<td>3.72±0.88</td>
<td>2.58±0.63</td>
<td>2.23±0.60</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Tooth mobility</td>
<td>0.86±0.65</td>
<td>0.36±0.23</td>
<td>0.63±0.51</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Attachment loss</td>
<td>2.68±0.64</td>
<td>1.87±0.82</td>
<td>1.73±0.81</td>
<td>&lt;0.05</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Percentages of BOP</td>
<td>55.80±10.01</td>
<td>45.20±10.63</td>
<td>43.22±11.02</td>
<td>&lt;0.05</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Root length</td>
<td>11.25±2.10</td>
<td>11.15±2.03</td>
<td>11.25±1.98</td>
<td>&gt;0.05</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Distance from alveolar ridge crest to CEJ</td>
<td>2.25±0.66</td>
<td>2.33±0.92</td>
<td>2.62±0.98</td>
<td>&gt;0.05</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Density of alveolar bone</td>
<td>395.69±63.28</td>
<td>289.53±72.35</td>
<td>256.72±71.69</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

Reference