DYNAMICS OF PERIODONTAL FIXING CAPACITY THROUGH ORTHODONTIC TREATMENT EMPLOYING EDGEWISE TECHNIQUE

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Out of the major periodontal functions orthodontists take great interest in its fixing capacity [1]. This term means the counterwork of the dentofacial segments (teeth with surrounding tissues) to chewing loads under physiological conditions, and to the forces developed by orthodontic appliances of various action, and by prosthetic structures replacing defects of the dental arches [2, 3, 4]. The fixing capacity of periodont, as experts claim, is determined by the dentofacial arches type as well as by their shape and size, even in case of physiological occlusion [5, 6, 7]. Given the high prevalence of dental caries and its complications, which are the etiological factors behind dentition defects and, accordingly, maxillofacial anomalies and deformities, the periodontal fixing capacity needs investigation for further selection of prosthetic structures and orthodontic appliances [8, 9, 10]. The effectiveness of dental prosthetics, taking into account the periodontal tissues status, has been described in clinical observations [11, 12]. Nevertheless, of particular importance is knowledge of the periodontal fixing capacity when choosing the optimal loads and their dosing in orthodontic treatment dynamics, in particular when using arch equipment (edgewise technique).

Aim of study

To identify the dynamics in the periodontal fixing capacity in order to regulate the optimal load through orthodontic treatment employing the edgewise technique.

MATERIALS AND METHODS

27 patients underwent treatment for dental arches shape anomalies. The treatment was carried out using non-removable arc equipment (edgewise technique) following the protocol for the occlusion issues treatment. The first stage of leveling dental arches implied using nickel-titanium alloy arcs of circular cross section. When measuring the periodont fixing capacity, the load was dosed taking into account the tooth deviation distance. The tooth was moved only halfway through its moving range. Tooth mobility was measured using the L.P. Ivanov tool, while Stens impression compound was used to fix it on the teeth in the central occlusion position. The device included a circular eccentricity scale with a probe coming to it, which allowed evaluating tooth mobility with an accuracy of 0.01 mm. The probe was installed from the lingual surface of the upper incisors, after which the scale was set to the zero position. The pressure was generated with a dynamometer, whose probe was applied to the incisors vestibular surface and the device pressure force was measured in grams. The upper incisors mobility measurements were taken before treatment, and then one day, one week, two weeks, and three weeks into the active phase of the treatment. The tooth shift was done at 0.07 mm, 0.1 mm, 0.2 mm, 0.25 mm, and 0.3 mm.

RESULTS AND DISCUSSION

The study showed that prior to treatment, moving a tooth by 0.07 mm required a force of 58.91±6.90 grams. An increase in the power up to 99.21±16.94 grams, would result in the medial incisors shifted by 0.1 mm. Moving a tooth by 0.2 mm would require a force of 149.38±5.83 grams. Any further power increase would not lead to the tooth shift. Therefore, prior to treatment, the maxillary medial incisors would not move more than 0.2 mm, which allowed selecting the optimal load for treatment, not exceeding 100 grams. However, a day later already, after applying the device, the periodontal fixing capacity decreased and it took an effort of 50.60±9.88 grams to move the teeth by 0.07 mm. As the power was taken up to 70.87±12.58 grams, the medial incisors shifted by 0.1 mm. To move a tooth by 0.2 mm, an effort of 115.00±15.75 grams was required, which was significantly lower than prior to the treatment, and indicated a decrease in the periodontal fixing capacity. The tooth mobility increased to 0.25 mm when subjected to a force of 135.17±9.67 grams. Further power increase did not lead to any tooth shift. A week later, after the device was applied, the periodontal fixing capacity decreased and an effort of 32.17±8.09 grams was enough for a 0.07 mm tooth shift. With an increase in power load up to 38.11±10.13 grams, the medial incisors shifted by 0.1 mm. Shifting the tooth by 0.2 mm would take an effort of 62.61±13.39 grams, which was significantly lower than before the treatment and revealed a decrease in the periodontal fixing capacity. Shifting a tooth by 0.25 mm would take an effort of 83.51±11.10 grams. The mobility of the tooth increased to 0.4 mm when subjected to an effort of 144.41±7.84 grams. Any further increase in the power did not lead to the tooth shift. Two weeks later, after applying the device, the periodontal fixing capacity remained almost unchanged and was close to the values obtained a week into active treatment. Shifting the teeth by 0.07 mm would take a force of 28.91±5.83 grams. As the power load increased up to 31.92±7.81 grams, the medial incisors showed a 0.1 mm shift. Ensuring a 0.2 mm shift would take an effort of 60.87±14.82 grams was required, whereas a force of 82.61±8.81 grams was required for a shift of 0.25 mm. When the tooth was shifted by 0.4 mm, a force of 143.68±6.24 grams was required. A further increase in the effort applied did not lead to a shift. After three weeks, the values remained virtually unchanged.

CONCLUSION

The periodontal fixing capacity decreased through the dynamics of orthodontic treatment, while a lower force was required for the teeth shift.

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