Changes in alignment related to retention

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BACKGROUND

Changes in tooth alignment occur over time, so a totally stable occlusion after orthodontic treatment is unlikely to be seen. Orthodontists attempt to control unwanted changes by prescribing different retainer types, with some being recommended for wearing indefinitely. Prolonged retention can interfere with the natural process of reducing dental arch parameters. Both removable and fixed retainers are effective in controlling relapse for up to 2 years after treatment, and some methods for controlling anterior alignment without retainers are viable for short-term stability. The preferred type and duration of retention are not yet established, but it would be helpful to know when the greatest posttreatment changes occur. This could help guide improvements in the current retention strategies.

METHODS

A 10-year study of the changes in occlusal components was undertaken, with 96 patients completing the study period. Measurements were taken at pretreatment (T0), posttreatment (T1), and 10 years posttreatment (T10) for all patients, with 70 patients evaluated after 3 years (T3) and 86 patients after 5 years (T5). The Peer Assessment Rating (PAR) Index and Little's Irregularity Index (LII) were the measurement tools used. Unweighted PAR scores were analyzed for differences between all the subperiods. The effect of fixed retention–associated changes on posttreatment changes was analyzed for each jaw.

RESULTS

At pretreatment, the mean weighted PAR score was 24.0. This was 2.6 at posttreatment, 3.6 at T3, 4.5 at T5, and 5.1 at T10. Percentage improvements in the PAR index were 89.2% at T1, 85.0% at T3, 81.3% at T5, and 78.8% at T10. The differences in total weighted PAR scores were statistically significant between all of the time periods.

Unweighted PAR scores showed significant reductions between pretreatment and T1. Except for the centerline component, these scores increased somewhat from T1 to T10, but at T10 all were significantly lower than those at pretreatment.

The trend between the various time points was small, insignificant changes in the components of the occlusion, with only the anterior changes reaching significance between T3 and T5 and between T5 and T10. Even these were minor changes. In addition, the measurements for LII, overjet, overbite, canine/molar relationship, and maxillary/mandibular canine distances mimicked those for the PAR scores. Except for significant but small changes in anterior measurements, the changes overall were essentially nonexistent.

When the maxilla was considered, the combination of a fixed retainer and a removable retainer for 10 years after treatment reduced the posttreatment increase in LII by 0.6 mm compared to patients who only had a removable retainer. In addition, the increase in mandibular LII was 1.1 mm lower when patients wore a fixed retainer for 10 years compared to 3 years and 0.7 mm lower for 10 years compared to 5 years. Posttreatment differences in LII between the values at 3 and 5 years were not significant.

DISCUSSION

Changes in the occlusal parameters slowly deteriorated over the 10-year period after orthodontic treatment. However, although the changes themselves reached statistical significance over the 10-year period, they remained of limited or no clinical importance. Patients wearing a removable maxillary retainer had a significant added benefit when they also wore a fixed retainer for 10 years, but the clinical importance of the benefit was minor.

Clinical Significance

Among these orthodontic patients, the various components of the occlusion gradually developed minor deterioration over the course of 10 years after treatment. It appears that wearing a fixed maxillary retainer for 10 years offered just a minor benefit in maxillary alignment stability over wearing a removable maxillary retainer for 3 years. Mandibular fixed retention for 10 years offered moderately better alignment compared to wearing retention for 3 years and slightly better alignment compared to wearing retention for 5 years. It should be noted that these findings may not apply to patients who have special clinical circumstances, such as anterior tooth trauma, large diastemas, autotransplants, anterior tongue thrust, periodontitis, or extensive anterior space closures.

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