A radiographic evaluation of apical root resorption following intrusion therapy

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Introduction

Root resorption is one of the most serious iatrogenic problems associated with orthodontic treatment (4), especially anterior teeth are most frequently affected (2). The aim of the present study was to evaluate whether orthodontic patients with an additional upper utility arch for intrusion show higher amounts of root resorption of the maxillary central incisors than patients treated with a single straight-wire technique.

Material and Methods

The sample was drawn from 67 patient files at a private orthodontic practice. The experimental group (group 1) consisted of 29 patients (14 female, 15 male), treated with straight-wire technique and an additional upper utility arch for intrusion. The intrusion force was 15cN per tooth, measured after every activation. The control group (group 2; 19 male, 19 female) consisted of 38 patients. They were treated with a single straight-wire fixed appliance. The amount of apical root resorption of the maxillary central incisors was determined for each patient by subtracting the post-treatment tooth length (T2) from the pre-treatment tooth length (T1) measured directly on cephalograms. Total tooth length was measured by following the method of Copeland and Green (2). The measurement form cusp tip to root apex includes the tooth crown.

Fig. 1: Upper maxillary utility arch as used for the experimental group.

Fig. 2: Root length measurement (modified from Copeland and Green) A = Apex, C = Cusp, T = Tooth length
Results

With regard to all patients the incidence of root resorption after orthodontic treatment was 89%. Group 1 showed an incidence of root shortening of 100% after using an additional upper utility arch. Within group 2 root shortening appeared in 31 cases, the incidence was 81.5% (Fig. 3). Root shortening of the maxillary central incisors was found to average 1.7mm (0.5 - 3.8 mm) after using an additional maxillary utility arch (group 1) for 5 months (average) and an overall treatment time of 23.8 months. Using a single straight-wire fixed appliance the amount of root resorption was found to average 0.7 mm (0 - 2.6 mm) after a treatment time of 19.8 months (average) (Fig. 4). The measurements of tooth length changes from pretreatment to posttreatment radiographs were compared using a paired Student’s t-test with a level of significance of 0.01. The results were found to be significant (p<0.01).

Conclusions

The prime focus of this study was to ascertain whether patients who received an additional upper utility arch during fixed appliance treatment had greater root resorption after treatment, than patients who received a single straight-wire therapy. We decided to use lateral cephalometric radiographs for measuring, because they are more accurate to assess root resorption of the maxillary anterior teeth, than panoramic radiographs4. The amount of root resorption of 1.7 mm within group 1 as well as the measurements of group 2 (0.7 mm) are comparable to those measurements found in the literature (1,3,4).

Literature


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A RADIOPHIC EVALUATION OF APICAL ROOT RESORPTION FOLLOWING INTRUSION THERAPY

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Aim
Root resorption is one of the most common orthodontic problems associated with orthodontic treatment, especially anterior teeth are most frequently affected. The aim of the present study was to evaluate whether orthodontic patients with an additional upper utility arch for intrusion show higher amounts of root resorption of the maxillary central incisors than patients treated with a single straight-wire technique.

Patients and Methods
The sample was taken from 67 patient files at a private orthodontic practice. The experimental group (group 1) consisted of 29 patients (14 females, 15 males), treated with straight-wire technique with an additional upper utility arch for intrusion. The intrusion force was 500g per tooth, measured after every activation. The control group (group 2; 16 males, 10 females) consisted of 38 patients. They were treated with a single straight-wire fixed appliance. The amount of apical root resorption of the maxillary central incisors was determined in each patient by subtracting the post-treatment tooth length (T2) from the pre-treatment tooth length (T1) measured directly on roentgenograms.

Total tooth length was measured by following the method of Pappalardo and Green. The measurement form can be used to root apexes including the teeth crown.

Results
With regard to all patients the incidence of root resorption after orthodontic treatment was 89%. Group 1 showed an incidence of root shortening of 100% after using an additional upper utility arch. Within group 2 root shortening appeared in 31 cases, the incidence was 81.9% (Fig. 3). Root shortening of the maxillary central incisors was found to average 1.7mm (5.0 - 3.6 mm) after using an additional utility arch (group 1) for 5 months (average) and an overall treatment time of 23.6 months. Using a significance of 0.01, the results were found to be significant (p<0.01).

Discussion
The prime focus of this study was to ascertain whether patients who received an additional upper utility arch during fixed appliance treatment had greater root resorption after treatment, than patients who received a single straight-wire therapy. We decided to use lateral cephalometric radiographs for measuring, because they are more accurate to assess root resorption of the maxillary central incisors, than panoramic radiographs. The amount of root resorption of 1.7 mm within group 1 as well as the measurements of group 2 (3.7 mm) are comparable to those measurements found in the literature [1].

Conclusion
In the present study it was found that intrusion with the utility arch technique increases the incidence and the amount of root resorption for the central maxillary incisors. The average amount of root resorption in both groups showed no clinical relevance.

References