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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.

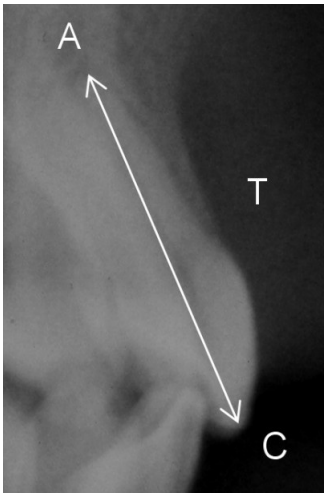

Fig. 2: Root length measurement (modified from Copeland and Green1)A = Apex, C = Cusp, T = Tooth length

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 ofsignificance of 0.01. The results were found to be significant ($p<0.01$).

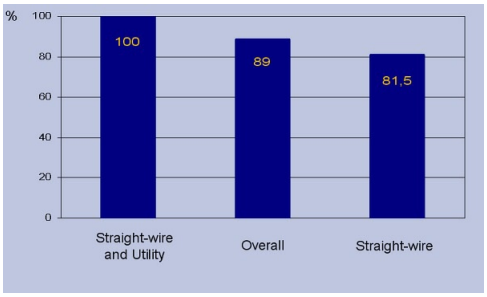

Fig. 3: Incidence of root resorption after orthodontic treatment.

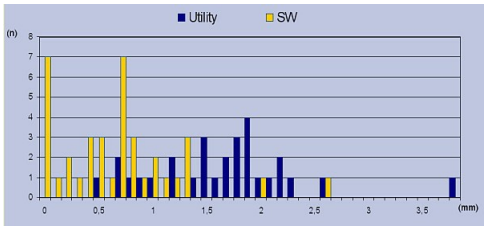

Fig. 4: Distribution of root resorption within the two different treatment groups.

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 acccurate 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

1. Brezniak N, Wasserstein A. Root resorption after orthodontic treatment: Part 1. Literature review. Am J Orthod Dentofacial Orthop 1993;103:62-6.
2. Copeland S, Green LJ. Root resorption in maxillary central incisors, following active orthodontic treatment. Am J Orthod 1986;89:51-5.
3. Linge L, Linge BO. Patient characteristics and treatment variables associated with apical root resorption during orthodontic treatment. Am J Orthod Dentofacial Orthop 1991;99:35-43.
4. McFadden WM, Engström C, Engström H, Anholm JM. A study of the relationship between incisor intrusion and root shortening. Am J Orthod Dentofacial Orthop 1989;96:390-6.

This Poster was submitted by Dr. Wibke Steffen.

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Poster Faksimile:

A RADIOGRAPHIC EVALUATION OF APICAL ROOT RESORPTION FOLLOWING INTRUSION THERAPY

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Aim

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.

Patients and Methods

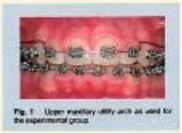

Fig. 1 Upper maxillary utility arch as used for the experimental group.

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.

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

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.

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 61.5% (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 0.7mm (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 ($p<0.01$).

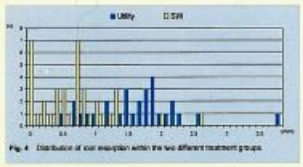

Fig. 4 Distribution of root resorption within the two different treatment groups.

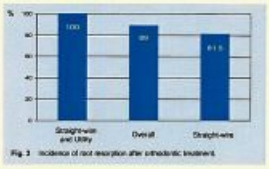

Fig. 3 Incidence of root resorption after orthodontic treatment.

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 anterior teeth, than panoramic radiographs[4]. The amount of root resorption of 1.7mm within group 1 as well as the measurements of group 2 (0.7mm) are comparable to those measurements found in the literature[1,3,4].

Conclusion

In the present study it was found that intrusion with the utility arch type of 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

1. *Brezniak N, Wasserstein A.* Root resorption after orthodontic treatment: Part 1. Literature review. Am J Orthod Dentofacial Orthop 1993;103:62-6.
2. *Copeland S, Green LJ.* Root resorption in maxillary central incisors, following active orthodontic treatment. Am J Orthod 1986;89:51-5.
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