Ormco Unveils Symetri™ Clear ceramic twin bracket system

New Bracket Incorporates Advanced Manufacturing Technologies in Polycrystalline-Alumina to Forge Next-Generation of Ceramic Brackets

By Ormco

ORANGE, Calif.: Ormco Corporation, a leading manufacturer and provider of advanced orthodontic technology and services, today announced the next generation of aesthetically-pleasing ceramic twin brackets Symetri™ Clear. Adding to Ormco’s expansive product portfolio of both lingual and self-ligating bracket systems, Symetri Clear is a refined, aesthetic bracket system incorporating design features that apply expert clinical advice and analysis, end-user feedback and technological advancements and achievements of the Company.

“Over the past 30 years, ceramic materials have evolved to bring more sophistication to manufacturing capabilities, and to deliver an appearance that meets the aesthetic interests of patients. Ormco has been keen on developing proprietary technologies and manufacturing products that leverage the advancements in materials, and also serve clinical demands,” said Matt Tumer, president of Ormco. “Backed by over seven years of research and development, we’re pleased to bring our latest innovation, Symetri Clear, to the conventional twin market.”

Boasting a low profile and ample torque and tie-wing strength, Symetri Clear addresses and minimizes the challenges that may come with leveraging a ceramic system—bracket breakage, wire notching and difficulties while debonding. Symetri Clear is designed to debond in one piece without fracturing requiring minimal forces. Initially offered in the McLaughlin, Bennett, Trevisi prescription, Symetri Clear was designed with upwards of seven years of dedicated research and development, focusing on clinical analysis, end-user feedback and Ormco’s proprietary development of technological advancements in ceramics. Serving the needs of doctors and patients, the twin bracket is designed with round surfaces and edges, creating enhanced patient comfort and greater radii on sliding surfaces.

Combining state-of-the-art manufacturing technology and the latest in ceramic materials, Symetri Clear provides the benefit of aesthetics and offers easy, non-destructive, single-piece debonding. Its noteworthy clinical features include:

- **Low Profile:** Up until now, a lower profile bracket may have been associated with limited bracket strength or compromised performance. Symetri Clear changes that. With optimized in/out dimensions and a low profile bracket, may have been associated with limited bracket strength or compromised performance. Symetri Clear changes that. With optimized in/out dimensions and a low profile bracket, Symetri Clear is less likely to interfere with opposing occlusion.

- **Advanced Aesthetics:** Symetri Clear has been designed with more rounded surfaces that diffuse light better than a flat surface. This enhances the bracket’s ability to blend with tooth enamel, adding to its aesthetic appeal for patients.

- **Ease of Debonding:** Ormco’s patented laser-etched pad technology allows for a precise, controlled surface that results in reliable bonding and safe, easy, non-destructive single-piece removal.

To learn more about Symetri Clear, please visit www.ormco.com/products/symetri/ or connect with your Ormco sales representative directly.

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**Digital Orthodontics Symposium 2019**

Save the date: 12 April 2019, Dubai, UAE

By Dental Tribune MEA / CAPPmea

DUBAI, UAE: The event is open to all orthodontists and general practitioners interested in the latest orthodontic progressions in the digital era. The event will attract delegates from across Middle East, Africa and Asia coming April.

The event will gather top key opinion leaders with a focus on the latest trends and developments in digital orthodontics. Digital dentistry can assist us in many ways, by assessing space and measuring the amount of crowding in cases, predicting treatment outcomes, assisting patients’ communication but also storing virtual reality models digitally and treatment planning. With the introduction of 3D printing in dentistry, the opportunities in orthodontics have expanded from digital impression taking to developing virtual treatment plans and 3D printing of dental models. The Digital Orthodontics Symposium will illustrate the necessity for orthodontists to look into and high-ly consider digitalizing their work- ing ways to save time, money and provide more efficient and effective treatments for the patients.

Delegates will have a sneak peak at the latest technologies at the exhibition area where the dental industry will present its latest research, develop- ment, equipment and solutions to serve better the dental professionals.
Incisal apical root resorption evaluation after low-friction orthodontic treatment using two-dimensional radiographic imaging and trigonometric correction

By Fabio Savoldi, Stefano Bonetti, Domenico Dalessandri, Giulietto Mandelli, Conrado Paganeli, Italy

Abstract

Background: Root resorption shall be an undesirable, inevitable consequence of orthodontic treatment, which is known as apical root resorption, and may be related to distortions and changes in root inclination.

Aim: The aim of this investigation was to evaluate the severity of apical root resorption of maxillary and mandibular incisors after low-friction orthodontic treatment, using the combination of panoramic and lateral cephalograms, and applying a trigonometric correction.

Settings and Design: A hospital-based retrospective study at the orthodontic Department (Dental School, University of Brescia, Speciali Civili di Brescia, Brescia, Italy).

Materials and Methods: Ninety-three subjects (53 females and 40 males; mean age, 14 years) with mild maxillary and mandibular central and lateral incisors underwent slight resorption following an integrated straight wire (ISW) protocol. The pre- and post-treatment root lengths of the maxillary and mandibular incisors were measured on panoramic radiographs. A trigonometric factor of correction for the pre-treatment length was calculated based on the difference between the pre and post-treatment incisal inclination on lateral cephalograms.

Statistical Analysis: Changes in lengths were investigated using the Student’s t-test for paired values (p ≤ 0.05).

Results: Maxillary central incisors showed no change (0.05, 0.06%), maxillary lateral incisors showed a small increase (0.05, 0.18%) that was attributed to the completion of root formation in younger patients, mandibular central and lateral incisors underwent slight root resorption (3.1%, 5.4%). A statistically significant difference was found for the mandibular incisors but not for the maxillary ones.

Conclusion: In patients with mild crowding and consequent low amount of root movement, a low-friction orthodontic treatment may lead to slight apical root resorption, mainly involving lower incisors. The use of a trigonometric correction in the panoramic radiographic analysis may reduce the limitations of this 2D evaluation.

Introduction

With the exception of cases that involve desiccated teeth, root resorption is an undesirable and unpredictable occasional consequence of orthodontic treatment, which leads to shortened root lengths. It tends to occur when pressure on the cementum overcomes the reparative capacity of the innermost cellular structures. Root resorption starts adjacent to flattened tissues and is associated with the removal of this zone of sterile necrosis. As orthodontic forces are usually concentrated at the apex of the tooth, the resulting resorption typically travels from the root tip to the coronal surface.

Multiple patient-specific factors are associated with apical root resorption during orthodontic treatment, including morphological features such as root shape, or oral habits, biological and genetic factors, endodontic treatment, sex, age, and anomalies in dentition such as malocclusions. Moreover, treatment-specific variables include treatment with extractions, mechanical factors, treatment duration, amount and direction of the orthodontic force applied, and the amount of type of tooth movement. For example, it appears that the intrusion of teeth causes approximately four times more root resorption than extractions; however, it has also been demonstrated that extrusive movement is not without risk.

Consequently, root resorption may depend on the orthodontic technique used; since different orthodontic techniques can generate different forces and teeth movements.

Low-friction mechanics are now commonly used, and previous clinical investigations have analysed their biomechanical properties. However, differences may exist among different low-friction clinical protocols. The purpose of this study was to evaluate the amount of root resorption using a specific low-friction treatment protocol, integrated Straight-Wire (ISW).

The amount of root resorption was investigated in a retrospective study involving patients treated by the same orthodontist. Furthermore, because of the limitation existing in the evaluation of the root resorption using panoramic radiographs, we combined the analysis with lateral cephalograms and application of a trigonometric correction.

Materials and Methods

Our retrospective study investigated the orthodontic records of 93 patients (53 females and 40 males), who were selected from the orthodontic department of the Dental School of the University of Brescia in 2015, with the following inclusion criteria: there was no history of trauma or bruxism, endodontic or prosthetic treatments, or previous root reshaping involving the maxillary and mandibular incisors, and were only successfully completed cases. Only non-extension cases were included, with no criteria given relatively to the skeletal class. Their mean age was 14.3 years (SD=2.6), with a median value of 15 years.

To assess the incidence of root resorption, panoramic radiographs were used, which were evaluated using two-dimensional radiographic imaging and trigonometric correction.

Pre and post-treatment panoramic radiographs were evaluated using Adobe Photoshop CS6® (Fig. 7). Initial and final tooth lengths of maxillary and mandibular incisors (with reference to the long axis of the tooth, from the occlusal edge to the root apex, through the midpoint of the CEJ) were measured in pixel using the tool “ruler.” For each film, the length of the mesio-distal diameter of the crown of the mandibular right first molar was measured in pixels, and then all the measurements were converted using this value as the specific unit for each patient. This procedure ensured the normalisation of the data for intra-patient comparison, assuming no changes in the interproximal diameter, despite the changes in the root length. Two different clinicians performed each measurement.

In order to ensure that the shortening of the ISW (ISO) that showed in the frontal plane was not a result of the change of inclination of the teeth in the sagittal plane (Fig. 8), the values of the pre-treatment teeth lengths were corrected using the following formula:

\[ L_{\text{corr}} = L_{\text{OPT}} - L_{\text{OPT}} \times \text{cos} \alpha \]

Once this trigonometric correction was adopted, it was possible to compare the values of pre- and post-treatment teeth lengths. The same amount of correction was adopted...
for both the central and lateral incisors, even though lateral incisors could have slightly different inclinations compared to the centrals.

### Statistical Analysis

All the data were compiled in a Excel® (Microsoft, USA) worksheet and analysed using SPSS Statistics® v.22 (IBM, USA). We evaluated the normality of the data distribution by the asymmetry and kurtosis values and with the Kolmogorov-Smirnov and Shapiro-Wilk tests, p < 0.05 taken as significant. Then, a two-tailed Student’s t-test was used for paired values to evaluate the differences between the pre- and post-treatment measurements, p < 0.05 taken as significant. We estimated the inter-rater absolute agreement through intraclass correlation coefficient (ICC), using two-way ANOVA with mixed-effects average measures (ranging from 1 to 0, with 0 indicating no consistency and 1 indicating a perfect consistency among raters).

### Discussion

This clinical retrospective investigation analysed root resorption after a low-friction orthodontic treatment. Tooth length measurements were performed on panoramic radiographs that are the standard radiographic exams required by orthodontists at the initiation and end of treatment, patients did not need to undergo further radiography. As a result of difficulties in discriminating the crown from the root on panoramic X-rays, our measurements involved the whole tooth, assuming the absence of changes in the tooth crown and ascribing any possible shortening only to the root. As panoramic radiographs are not used for the qualitative evaluation of the root shape and periapical radiographs were not available for all patients, we limited our evaluation of resorption on length measurements. X-rays were in a digital format and direct measurements were not possible; therefore, we carried a pixel unit measurement on the digital format.

As panoramic radiographs are based on a parafrONTAL plane, different inclinations of the incisors between the pre and the posttreatment may result in length changes. In order to reduce the above-mentioned error, the difference between pre and post-treatment incisal inclination was measured on the respective lateral cephalograms, and each patient had his/her initial tooth length modified using a mathematical correction. This trigonometric correction can set the root length to the same as the pre-treatment root length; this would exhibit in the post-treatment panoramic radiograph to normalize the intra-tooth comparison. However, this method is based on a theoretical trigonometric formula, and further studies would be useful to evaluate its accuracy and biological cost-effectiveness.

### Results

Each pre- and post-treatment average tooth length was calculated. Then, depending on the differential inclination, the respective trigonometric correction was applied to obtain a pre-treatment length that was comparable to the post-treatment length without an inclination bias (Table 3). Table 3 summarizes the outcomes of our measurements. The values of the pre- and posttreatment measurements were normally distributed in both the Kolmogorov-Smirnov and Shapiro-Wilk tests, p < 0.05 taken as significant. Using Student’s t-tests, we found no statistically significant difference in the lengths of the mandibular incisors between the pre- and post-orthodontic treatment values for the centrals, lateral, or both sides, p > 0.05. On the contrary, there was a statistically significant difference in the shortening of the mandibular incisors between the pre- and post-orthodontic treatment values for the centrals and laterals, and on both the left and right side, p < 0.001 (Table 4).

Table 1: Average values and respective standard deviations and confidence intervals of the pre-treatment tooth length, post-treatment tooth length, and the difference between pre- and post-treatment values.

Table 2: Mean pre- and post-treatment length values of the mandibular incisors and the respective confidence intervals. The measurements use the mesiodistal diameter of the crown of the mandibular right first molar as unit.

Table 3: Mean pre-treatment and post-treatment length values of the mandibular incisors and the respective confidence intervals.

Table 4: Intraclass correlation coefficient (ICC) values of the pre- and posttreatment measurements, representing the inter-rater absolute agreement.

Table 5: Analysis of the normal distribution of the tooth length data.

Our group of patients was selected with a mild grade of crowding, because our aim was to evaluate the most representative sample concerning a non-extractive orthodontic protocol by means of a specific straight-wire, low friction technique. In order to allow a qualitative comparison, if our results were transferred into the scale of Malmgren (grade 0 to 4), the mandibular incisors would be represented by grade 0 or 1 and the mandibular incisors by no more than grade 2, none of our patients had grade 3 resorption. Although previous studies found an overall percentage of root resorption of 7.8% SD = 6.4%, higher degrees of root resorption could be the result of many variables, including lower amounts of root movement. For this reason, our findings could be less...
evident than the results reported by the literature.

As reported by other authors,, a slight increase in root lengths was shown in the mandibular lateral incisors (5.4 ± 1.8 mm), although this was not statistically significant in our study (p > 0.05). This could be attributed to the completion of root development in younger patients, which would be in accordance with the median age of our sample (9 years) and with the root completion sequence.

Limitations

Even though we followed a stand- ardized sequential X-ray construction during the X-ray exams, a different level of distortion may exist between pre- and post-treatment radiographs. This bias was induced by measuring the mesiodistal diameter of the crown of the mandibular right first molar and using it as a baseline unit for all the other measurements on the same X-ray, in order to normalize the in- trapatient comparison. However, a certain degree of distortion may be present.

To distinguish between the left and right central incisors on the cephalometric radiographs is difficult, so we therefore selected the most inclined teeth in the maxillary and mandib- ular arches as then applied to the ob- tained correction to both the central and lateral incisors. Even though our estimate was specific for this central incisor, it was useful for the laterals but less effective. Therefore, the lat- eral incisors values reported in our results may be less realistic than the values related to the central incisors. Further researches including differ- ent amount of crowding and compar- isons with other X-ray examina- tions, e.g. high accuracy CBCT linear measurements, shall assess the re- liability of the methods used in this preliminary study.

Conclusion

In patients with mild crowding and consequent low amount of root movement, a straight wire low-friction orthodontic treatment can lead to observable decreases in mandibular central and lateral incisor root lengths on both the right and left side approximately of 3%. However, our analysis on panoramic radiographs found no evidence that resorption involved the mandibular incisors. The use of a trigonometric correction may reduce the limita- tion of the 2D radiographs, but fur- ther studies are needed to assess its accuracy.

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References