

UNIVERSITI TEKNOLOGI MARA

**ROOT RESORPTION IN
ORTHODONTIC TREATMENT
BETWEEN CONVENTIONAL AND
SELF-LIGATING BRACKET
SYSTEMS BY STANDARD
TESSELLATION LANGUAGE
REGISTRATION BASE
SUPERIMPOSITION**

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ABSTRACT

Root resorption occurs in approximately ninety percent of orthodontically treated teeth and it is a three-dimensional (3D) phenomenon. However, the quantification of root resorption was often done in a two-dimensional (2D) manner using 2D radiographs. Hence, the technique used may have misrepresented the actual magnitude and location of root resorption as well as resulted in inappropriate claims made by researchers and clinicians that one treatment system is better than another. The objectives of this study are to quantify the extent of external root resorption and to compare the magnitude and pattern of root resorption as induced by two bracket systems using 3D radiography. This research is based on data obtained from 64 teeth (16 participants) from UiTM Orthodontic Postgraduate Clinics, which were divided into two groups (8 participants each) and received treatments with either conventional or self-ligating pre-adjusted edgewise bracket of 0.022-inch x 0.028-inch slot. All participants received MBT™ (McLaughlin-Bennet-Trevisi) bracket prescription with standardised arch wire sequences. They were informed of the study protocol, which included two exposures of the maxillary anterior teeth to cone beam computerized tomography (CBCT), exposure at time T1 at the beginning of the treatment and time T2, 18 months into the orthodontics treatment. 3D models of the four maxillary incisors at two time points were reconstructed for each participant and superimposed using Standard Tessellation Language (STL) registration method in Materialise Mimics (Mimics Materialise, Leuven Belgium, Version 17.1) and Materialise 3-matics (Mimics Materialise, Leuven Belgium, Version 5.1) programmes. Colour maps of the differences generated by superimposition allow for detailed examination, quantification and visualization of root surface changes in a 3D manner. Calculation and quantification of root resorption were measured in millimetres and differences were compared within and between groups using Wilcoxon Signed Rank test and Mann-Whitney U test respectively. This research showed that significant differences in root resorption were found in both groups between T1 and T2; however, no differences in the degree of root resorption were detected between the groups studied. This research concluded that although external root resorption has occurred in all teeth evaluated, the type of bracket did not demonstrate any influence on the results observed.

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