

## **Title: Effects of Orthodontic Mechanics on Root Resorption: A Comparative Study**

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**Abstract: Background:** Orthodontic treatment is a common dental procedure aimed at correcting malocclusions and improving dental aesthetics. However, one of the potential side effects of orthodontic treatment is root resorption, which can lead to permanent damage to the tooth's root structure.

**Materials and methods:** In this comparative study, 60 orthodontic patients were divided into three groups, each receiving a different orthodontic treatment approach: Group A-conventional fixed orthodontic appliances, Group B-self-ligating orthodontic appliances, and Group C-clear aligners. Digital radiographs were taken before and after treatment to assess root resorption. The extent of root resorption was quantified using a standardized measurement scale.

**Results:** The results indicated that Group A exhibited an average root resorption of 0.2 mm, Group B showed an average root resorption of 0.1 mm, and Group C had the lowest average root resorption of 0.05 mm. These findings suggest that clear aligners resulted in significantly less root resorption compared to conventional fixed orthodontic appliances and self-ligating orthodontic appliances ( $P < 0.05$ ).

**Conclusion:** This comparative study highlights the differential effects of various orthodontic mechanics on root resorption. Clear aligners demonstrated the least amount of root resorption when compared to conventional fixed orthodontic appliances and self-ligating orthodontic appliances.

**Keywords:** Clear aligners; comparative study; fixed appliances; orthodontic mechanics; root resorption; self-ligating appliances.

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