The Effect of Bracket Ligation Methods on Canine Retraction (An In-Vitro Study)

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Abstract

Most of orthodontic treatments involve sliding mechanic especially during canine retraction, but this is usually associated with unwanted tooth movement. So, this study aimed to compare different type of ligation methods to obtain maximum tooth movement with least undesirable rotation.

Copper boxes were fabricated with brass posts and filled with wax (50% base plate wax and 50% utility wax). In each box, four acrylic canine teeth were attached to a straight .016 x .022 stainless steel (SS) archwire through .018 titanium brackets. The archwire was held by titanium molar tubes attached to the brass posts. Each bracket was ligated to the archwire using a different ligation method (figure-O elastics, figure-8 elastics, SS ligatures and Leone Slide ligature elastics).

The test apparatuses with the ligatures in place were stored in distilled water at 37ºC in a water bath. They were divided into five groups according to the time of storage (24 hours, 1 week, 2 weeks, 4 weeks and 6 weeks), after which the temperature was raised to 50ºC for one hour to uniformly diffuse the heat in the wax. Then the canines were retracted at 50ºC for 20 minutes by using 12mm nickel titanium (NiTi) closed coil springs (extended 7mm) and the amount of retraction and degree of tooth rotation was measured and assessed.

Slide elastics showed the highest distance of tooth movement and degree of canine rotation followed with figure-O elastics, while figure-8 elastics show the least amount of retraction distance and degree of rotation.

SS ligatures showed moderate tooth movement with minimum degree of rotation, because it engages the archwire inside the bracket slot. Hence, the study recommends the use of loose SS ligatures for canine retraction in sliding mechanics while Slide elastic ligatures are best to be used in leveling and aligning stage of crowded teeth since it reduce friction with archwire.