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Original Article

Comparison of Different Debonding Techniques in Orthodontics

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***ABSTRACT*:**
Introduction: Enamel fracture and cracks is a major concern during debonding. Therefore, it is important to evaluate an appropriate debonding process for removing brackets used in orthodontic practice. **Method**: Patients in the age range of 13 to 25 years were selected. straight cutting plier, bracket removing plier and ultrasonic tip were tested for debonding. **Results**: The bracket removing plier produced the most consistent separation at the bracket-adhesive interface, leaving the enamel surface intact. **Conclusion:** Debonding with band removing pliers reduces the risk of enamel cracks; therefore, this method is safer than other methods used for removing brackets.
Key words: Debonding, tooth brackets, enamel fracture.

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INTRODUCTION:
Enamel fracture and cracks is a major concern during debonding. This can lead to tooth sensitivity, and increase the risk of caries and pulp inflammation. The adhesion between the resin and bracket base has increased to a point where the most common site of bond failure during debonding has shifted from bracket base- adhesive interface to enamel adhesive interface which could increase the risk of enamel damage.[1,2]Several debonding methods are available, among these pliers for mechanical removal, different diamond burs of high and low speed, abrasive discs, rubber tips, ultrasonic units and air abrasion techniques are the most commonly used techniques.[3-7] Restoration of the enamel after orthodontic treatment includes two major steps: debonding and enamel surface polishing. Therefore, it is important to evaluate an appropriate debonding process for removing brackets used in orthodontic practice.

METHODOLOGY:
Patients having Angle class I malocclusion and permanent teeth, except the third molars were selected for the study. Patients in the age range of 13 to 25 years were selected. All fixed appliances were bonded and removed by the same orthodontist, and the same brand and model of stainless steel brackets were used on all patients (Standard Edge-wise 0.022×0.030 in). Before appliance removal, each patient was instructed about the study objectives. Three different methods of bracket removal were used. The first debonding method tested was a straight cutter plier (SC). The second method tested was a bracket removal plier (BRP) and the third was an ultrasonic method that employed specially designed tips (UST). Prior to debonding with all experimental methods, the archwire was removed. The amount of composite remaining on the enamel surface was examined immediately after bracket removal. After debondingand prior to microscopic evaluation, the enamel was stained with fuccina to facilitate the composite visualization and quantification. A portable electron microscope was used to evaluate the adhesive remnant index (ARI) The scale had scores ranging from 0 to 3, where 0=no adhesive remaining; 1=less than half of adhesive remaining, 2= more than half of adhesive remaining; and 3=all adhesive left on the tooth, with distinct bracket base impression. All values were assigned by a single orthodontist.

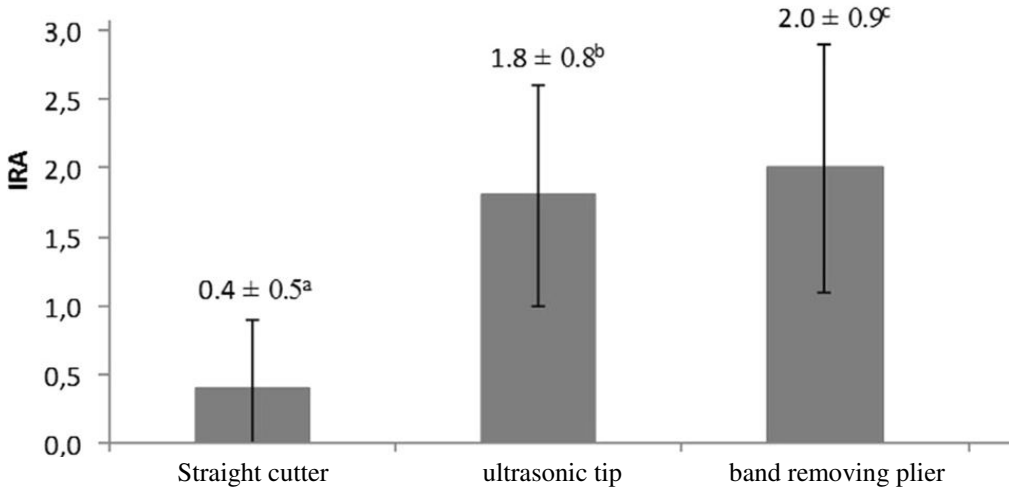
STATISTICAL ANALYSIS:
For descriptive analysis of ARI values, mean and standard deviations were calculated. The level of significance was predetermined at 5 % (p =0.05)

RESULTS:
The bracket removing plier produced the most consistent separation at the bracket-adhesive interface, leaving the enamel surface intact. Ultrasonic tip proved to be efficient in residual resin removal.The ARI for band removing plier was noticeably smaller than those registered for the other groups.

DISCUSSION:
ARI is an important indicator to assess the integrity of the enamel surface after bracket debonding. It is a four scale index to determine the amount of adhesive remnants on the enamel surface after debracketing and was introduced by Artun and Bergland[8].Artun and Bergland showed that the enamel would be protected if the adhesive line of fracture was located exclusively within the adhesive layer; thus, a thin layer of adhesive would remain attached to the enamel after debonding, covering 100 % of the bracket base's previous location, instead of having a line of fracture at the enamel-adhesive interface[8].
Portable electron microscope used to evaluate the ARI can be introduced directly into the oral cavity. Significant ARI differences were seen among the three debonding methods tested. However clinically similar results were seen with the three methods, showing on average, approximately half of the enamel surface with remaining adhesive.
Straight Cutter generates forces directly to the adhesive layer and below the bracket base which is immediately transferred to the underlying enamel, thereby presenting higher risks of injury to the enamel as suchthe use of Straight cutter seems to be far from the ideal debonding method when compared to other bonding methods, since it has greater potential to cause enamel damage which caused greater patient discomfort. A study done by konsel et al showed that the majority of the brackets debonded with Straight cutter showed significant structural deformations at the base and/or at the slot[9].
Some damage to the enamel inevitably occurs throughout orthodontic treatment, including during debracketing. No ideal method exists capable of perfectly removing all adhesive remnants without leaving marks and scratches. It is up to the orthodontist, however, to learn methods to minimize damage to the tooth enamel.

CONCLUSION
Debonding with band removing pliers reduces the risk of enamel cracks; therefore, this method is safer than other methods used for removing brackets.

Band removing plierStraight cutter



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