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Research paper

# Assessing the effects of three resin removal methods and bracket sandblasting on shear bond strength of metallic orthodontic brackets and enamel surface

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## Abstract

### Purpose

This study evaluated the effect of three resin removal methods on the rebond shear bond strength (RBS) of orthodontic brackets and on [enamel](#) surface (under stereo and electron microscopy), when using two types of brackets.

### Methods

Seventy freshly extracted human [premolars](#) were randomly distributed among three experimental groups ( $n = 20$ ) and one control ( $n = 10$ ). Metal brackets in experimental groups were debonded and the adhesive remnant index (ARI) was scored under 10× magnification. The residual adhesives were removed by three different methods: (1) [tungsten](#) carbide bur (TCB) at high and (2) low speed, and (3) sandblasting. Experimental premolars were bonded with new and sandblasted recycled brackets (50  $\mu\text{m}$   $\text{Al}_2\text{O}_3$ , 90 PSI). All specimens were subjected to thermocycling (3000 cycles, 5–55 °C, dwell time = 30 s, and transfer time = 15 s); and were debonded using a universal testing machine with crosshead speed of 1 mm/min, and the RBS and SBS were, respectively, measured in experimental and control groups. The ARI was re-scored.

### Results

One-way ANOVA did not observe a significant difference in the bond strength of all 7 groups ( $P = .411$ ). The RBS was not significantly different from the SBS ( $P > .05$ ) according to independent-samples Student *t*-test, apart from the group high-speed TCB with new brackets. No significant difference was found between resin removal methods ( $P = .400$ ), bracket types ( $P = .713$ ), and the interaction of both ( $P = .224$ ), according to two-way ANOVA. [Kruskal–Wallis test](#) failed to observe significant differences between groups, both in  $\text{ARI}_1$  and  $\text{ARI}_2$  ( $P > .05$ ).

### Conclusion

Using TCB might be comparatively superior. Enamel sandblasting was time-consuming and

frequently damaged the enamel in all [SEM](#) figures. Using recycled-sandblasted brackets may provide sufficient RBS rates.

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## Keywords

Shear bond strength; Resin removal; Tungsten carbide bur (TCB); Enamel/resin sandblasting; Bracket sandblasting; Scanning electron microscopy (SEM)

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