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Immediate versus Delayed Force Application after Orthodontic Bonding; An In Vitro Study

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Abstract:

Statement of Problem: Bracket de-bonding during initial orthodontic archwire placement immediately after bracket set up or following re-bonding a single bracket can be a clinical concern. Purpose: The aim of this in vitro study was to assess the effect of time on the shear bond strength of a no-mix orthodontic composite adhesive. Materials and Methods: Seventy freshly extracted human upper first premolars were collected and stored in normal saline solution. The teeth were cleaned, polished, and randomly separated into 7 groups of 10. First premolar mesh-backed standard edgewise brackets were bonded to all specimens using a no-mix orthodontic composite adhesive. In the first 6 groups, the brackets were de-bonded 2, 5, 10, 15, 30 and 60 minutes after the primary setting time and the shear bond strengths were determined with the Universal testing machine. The teeth in group 7 were stored in 100% humidity at 37°C for 24 hours before de-bonding. Data were statistically analyzed with one-way ANOVA and the Duncan multiple range analyses via SPSS software. Results: The minimum shear bond strength of 14.03 MPa was observed in group 1. A statistically significant difference was found between the shear bond strength of group 1 and the other groups ($P < 0.05$). The shear bond strength increased significantly with time up to the first 5 minutes after bonding, but did not change afterwards. Conclusion: The bracket and composite adhesive used in this study demonstrated initial bond strengths of sufficient magnitude to withstand the immediate application of orthodontic forces, even 2 minutes after the primary setting time. Therefore, the operator should not be concerned with bracket de-bonding due to primary arch wire placement during the first minutes after bracket set up or following re-bonding a single bracket.

Keywords:

[Universal testing machine](#) , [No-mix composite](#) , [In-vitro study](#)

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