

The Effect of Surface Treatments of Exposed Dentin on Dentin Permeability and Shear Bond Strength of Resin Cement under Simulated Pulpal Pressure Condition

Napatsorn Dusadeedumkoeng¹, Pattaranat Banthitkhunanon², Sitthichai Wanachantararak³

¹Graduate student, Department of Prosthodontics, Faculty of Dentistry, Chiang Mai University, Thailand

²Department of Prosthodontics, Faculty of Dentistry, Chiang Mai University, Thailand

³Department of Diagnostic Sciences and Oral Biology, Faculty of Dentistry, Chiang Mai University, Thailand

Received: April 14, 2021 • Revised: June 1, 2021 • Accepted: July 20, 2021

Corresponding Author: **Assistant Professor Pattaranat Banthitkhunanon**, Department of Prosthodontics, Faculty of Dentistry, Chiang Mai University, Chiang Mai 50200, Thailand. (E-mail: pat.dentcm@gmail.com)

Abstract

Objective: The objective of this study was to evaluate the effect of surface treatments application of exposed dentin with Teethmate[®] (TDA) and Portland cement on dentin permeability and shear bond strength of resin cement under simulated pulpal pressure conditions in extracted human teeth.

Materials and Methods: Sixty extracted teeth were divided equally into six groups; control, TDA and Portland cement groups with and without simulated 15 cmH₂O pulpal pressure. Each surface treatment was randomly applied to dentin surface. Dentin permeability was evaluated for simulated pulpal pressure groups by recorded fluid droplets on dentin surface using replica technique. The replica was examined under scanning electron micrograph. The specimen was re-polished and re-applied with the same surface treatment. The composite rod was bonded to dentin with self-etched resin cement, and the shear bond strength was tested. The data were analyzed using Two-way ANOVA and Tukey's multiple comparisons.

Results: Specimens with simulated pulpal pressure had significantly lower shear bond strength than without pulpal pressure ($p < 0.01$). Surface treatment groups, TDA and Portland cement, showed significantly higher shear bond strength than the control group under simulated pulpal pressure condition ($p < 0.05$), while no significant difference was seen in non-simulated pulpal pressure groups. Scanning electron micrograph showed that both surface treatment groups had significantly less permeability of dentin as smaller fluid droplets were recorded.

Conclusions: Dentin surface treatments effectively reduced dentin permeability and increased shear bond strength of resin cement in simulated pulpal pressure conditions. But there were no advantages over the control group for non-simulated pulpal pressure condition.

Keywords: bond strength, dentin permeability, Desensitizer, Portland cement, resin cement