Effectiveness of Titanium Tetrafluoride on the Bond Strength of Resin Cement to Titanium.

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Abstract

PURPOSE: To assess the influence of titanium tetrafluoride (TiF4) solution on the adhesion of composite cement to commercially pure titanium (cp Ti).

MATERIALS AND METHODS: cp Ti plates with dimensions of 30 mm × 8 mm × 1.5 mm were machined and polished. The specimens were divided into seven groups according to the surface treatment as follows: group 1: control (machined); group 2: sandblasted with 110 μm Al2O3; group 3: hydrofluoric acid (HF); group 4: TiF4 (5%-5 min); group 5: TiF4 (5%-10 min); group 6: TiF4 (10%-5 min); and group 7: TiF4 (10%-10 min). One type of composite cement (Multilink Speed) was applied to each group for assessing the bond strength using strain energy release rate (Gvalue, J/m2) test. SEM analysis and surface roughness evaluation of cp Ti were carried out after treatment. The debonded specimens were examined with a stereomicroscope and SEM. Data were analyzed by the Kruskal-Wallis and Dunn’s multiple comparison tests. Statistical significance was set at the 0.05 probability level.

RESULTS: All the tested groups showed significantly higher bond strengths compared with the control group (p < 0.05). Surface treatment of cp Ti with TiF4 (10%-10 min) showed higher bond strength compared with sandblasting and HF groups (p < 0.05). Surface topography of treated cp Ti showed alterations in surface roughness and morphology.

CONCLUSION: Adhesion between composite cement and cp Ti could be improved by using TiF4 (10%-10 min) solution prior to composite cement application as an
alternative technique to sandblasting and HF.

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