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In Vitro Evaluation of the Bond Strength between Ceramic Veneers and Tooth Structure Using Different Concentration of the Acid Etchant

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ABSTRACT

Purpose

To evaluate and compare the bond strength between ceramic and tooth structure by using different concentrations of acid etchants on the ceramic and also to evaluate the colour change of the ceramic after acid etching.

Materials and methods

Ninety extracted anterior teeth free of caries and attrition were collected and sectioned at crown root junction. The crowns were embedded in rectangular acrylic patterns with the labial surface facing up. 3mm diameter and 1mm depth was prepared on the middle one third of the labial surface of the embedded teeth and it was etched and followed by a primer, dentin bonding agent application. They were randomly divided into nine groups (group A to I) each with 10 samples. Ceramic samples (IPS Empress 2, 99 in number) were fabricated with dimensions 3mm diameter and 10mm height. Group A was control group, in which ceramic was not etched. Group B and C were etched with 7.5% of hydrofluoric acid for 40 seconds and 1 minute respectively. Group D and E were etched with 10% of hydrofluoric acid for 40 seconds and 1 minute. Group F and G were etched with 7.5% of hydrochloric acid for 40 seconds and 1 minute respectively. Group H and I were etched with 10% of hydrochloric acid for 40 seconds and 1 minute. These 90 ceramic samples were then luted with Variolink II on to the prepared surface of the acrylic teeth and light cured. The 9 samples (one from each group) were subjected to Scanning electron microscopic study. Nine separate Ceramic samples shade A2 (15mmx0.7mm) were etched according to

the groups (group A to I) and spectrophotometric analysis test was conducted to detect any change in the shade of the ceramic after acid etching.


Results

The highest bond strength was obtained with 10% hydrochloric acid for one minute with mean bond strength of 19.57 Mpa and the least mean bond strength was obtained with the unetched samples 14.59 Mpa. In scanning electron microscope more number of pores and grooves were observed in hydrofluoric acid than hydrochloric acid. The spectrometric analysis revealed there was a change in the color of the shade when the ceramic was etched with hydrofluoric acid. The shear bond strength was increased with increased concentration of acid etchant.

Conclusion

There was no significant difference in the shear bond strength between hydrochloric acid and hydrofluoric acid. The colour change of the ceramic was minimal when the ceramic was etched with hydrochloric acid. The hydrochloric acid can be considered as a potential acid etchant than hydrofluoric acid for improving the porcelain bond strength.

Keywords: Hydrofluoric acid, hydrochloric acid, primer, scanning electron microscope, spectrometric analysis, shear bond strength.

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