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THE INFLUENCE OF THREE DENTIN TREATMENTS HAVING DIFFERENT CRYSTALLOGRAPHY ON THE CHEMICAL AND MORPHOLOGICAL NATURE OF THE DENTIN-BOND INTERFACE

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ABSTRACT

This study was designed to evaluate the effect of three different materials having different crystallography such as ferric chloride, hydroxyapatite and zeolite on the chemical and morphological nature of the dentin interface and it's relation, if any, to the bond strength of the composite resin. Shear bond strength measurements, infrared spectroscopic and scanning electron microscopic evaluation were performed. Under the condition of the present investigation the following conclusions were quite evident: 1) The treatment of the dentin surface following conditioning and prior to priming is of prime importance and has a direct effect on surface topography, chemical structure and physical nature of dentin. 2) The adsorption of ferric chloride, hydroxyapatite and zeolite crystals to dentin has a direct effect on the micro-mechanical retention of dental composite and in turn on its marginal adaptation. 3) Monomer penetration and encapsulation of hydroxyapatite and zeolite crystals enhanced the mean values of the shear bond strength.

INTRODUCTION

Dentin is the fundamental substrate of restorative dentistry, and its properties and characteristics are key determinants of nearly all restorative, preventive and disease processes. Efforts to bond to dentin have been far ranging and can be broadly classified into methods designed to chemically or mechanically bond to the various components of the dentin. These approaches include efforts to bond chemically to the mineral phase, collagen; or precipitates following chemical modification[1] In addition, a variety of micromechanical bonding approaches have been investigated: initially through formation of tags in the tubules, and more recently by modification of intertubular areas through partial demineralysation[1] and attachment of polymer to precipitates[2] formation of hybrid dentin-polymer structure by impregnation of monomers into partially demineralysed dentin and subsequent polymerization[3], and penetration into laser-modified dentin[4,5].

Dentin has been characterized as a biologic composite of a collagen matrix filled with submicron - to nanometer sized, calcium deficient, carbonate rich apatite crystallites dispersed between parallel micron-sized hyper-mineralized, collagen-poor, hollow cylinders (dentinal tubules containing peritubular dentin) [6].

The bulk composition of dentin is about 50 vol % mineral 20 vol % water and 30 vol % organic

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