

Effect of Surfactant Treatment on the Surface Roughness of Stone Casts produced from Polyvinyl Siloxane Impression



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Abstract

The surface roughness of stone casts produced from hydrophilic polyvinyl siloxane impression material was compared with hydrophobic polyvinyl siloxane impression either treated or not treated with topical surfactant. There was no significant difference in surface roughness of casts produced from hydrophilic polyvinyl siloxane impressions compared with casts obtained from hydrophobic polyvinyl siloxane impressions treated with topical surfactant. However, there was a significant trend towards increased surface roughness of casts poured from hydrophobic polyvinyl siloxane impressions not treated with surfactant compared to hydrophobic polyvinyl siloxane impressions treated with topical surfactant.

Introduction:

A working die or cast of dental stone used with the cast restorations must provide dimensional accuracy, strength, resistance to abrasion, surface details reproduction and surface smoothness. An accurate dental reproduction of smooth surface adjacent to the finish line which is not covered by die spacer is important to produce well adapted cast restoration (Rostenstiel et al., 1988).

When polyvinyl siloxane impression material was introduced many desirable properties were noted; however, it was found that their hydrophobic nature could result in poor wettability with dental stone (Chai et al., 1991, Chong et al., 1990). The finished line of the prepared teeth are masked due to limited wetting characteristics resulting in loss of smooth surface and details. To improve wettability, topical surfactants have been applied to the impression surfaces before pouring the stone cast. Subsequently, hydrophilic polyvinyl siloxane impression materials that contained surfactants in their formulation (intrinsic surfactant) have been introduced, with an intention to achieve better wettability that could produce smooth surface and surface details of dental stone dies (Pratten and Craig 1989; Vassilakos et al 1993; Panichuttra, 1991). Hydrophilic impression materials have two major objectives: (1) to enhance wetting and spreading on moist oral tissues, and (2) to ensure

better wettability by water containing slurries of dental stone (Kess et al, 2000). Pratten et al (1990) have shown that hydrophilic impression materials lose their hydrophilicity after being exposed to disinfectant solution.

One study, (Takahashi & Finger; 1991), reported that surface roughness is not related to the degree of hydrophilicity. The findings of various reports regarding intrinsic and topical surfactants are inconclusive with respect to their effectiveness on surface smoothness of the stone casts.

The purpose of this study was to compare the surface roughness of dental stone casts produced from hydrophilic polyvinyl siloxane impressions with those of hydrophobic impressions treated and not treated with a topical surfactant.

Materials and Methods:

The surface roughness of elastomeric impression material was assessed indirectly by measuring the surface profile of an improved stone cast recovered from different impressions of a glass plate.

Table 1. Materials used in this study.

Brand name	Manufacturer	Batch number
Perfourm (Hydrophobic siloxane)	Cutter Dent/Div Miles lab. Perkely, CA	35148
Express (Hydrophilic siloxane)	3M Dental Product Div., St Paul, MN.	7301H
Die Keen (Type IV dental stone)	Heraeus Kulzer, Inc	
Dentaram (topical surfactant)	Dentaram, Fed. Rep, Germany	049308

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