

## CHAPTER I

### INTRODUCTION



#### Background and Significance

Nowadays, the most frequently used tooth filling materials are amalgam and resin composite. Although amalgam has been proven to be a superior material, it is not the material of choice when esthetics is of primary concern. Resin composites have been mainly used in patients who are concerned about their esthetics.

Resin composites are bonded to remaining tooth structures with bonding agents. Using bonding agents and composite materials, a minimal intervention can be performed (Joynt *et al.*, 1991). Adhesion between resin composite and tooth structure is important in maintaining the filling. Poor adhesion can increase micro-leakage, resulting in failure of the restoration.

The procedure to restore a tooth with resin composites is considered to be technique-sensitive. One of the problems associated with the bonding procedure of direct resin composite restorations is clinical contamination. Contaminants can easily contact the field of the operation especially when performing direct restorations near gingival areas (Kidd, Smith and Watson, 2003). Thus, when working near gingival areas, gingival displacement is required to achieve a clear gingival margin surface of the cavity and to control sulcular seepage and hemorrhage.

Before the gingival displacement procedure with a rubber dam or gingival retraction cord, a topical anesthetic agent is sometimes used to reduce pain during such procedures for people who are afraid of local anesthetic injections. A topical anesthetic gel used for such procedure may not be totally rinsed off from the operation field because of its stickiness and high viscosity property. Topical anesthetic gel residue might be considered as a clinical contaminant that affects the bond strength of dentin adhesives.

Various kinds of contaminants, such as blood, saliva, gingival fluid, mouth rinse, aluminum chloride, and bleaching gel, can have effects on the bond strength of adhesive systems to dentin (Xie, Powers and Mc Gunkin, 1993; Powers, Finger and Xie, 1995; Benderli, Gokc and Buyukgokcesu, 1999; Kaneshima *et al.*, 2000; Chiba *et al.*, 2004; Park and Lee, 2004; Say *et al.*, 2004), including residue from topical anesthetic gel used for gingival retraction procedures. However, there are few studies that focus on the effects of topical anesthetic gel on the bond strength of dentin adhesives to dentin. Thus, the objective of this study is to investigate the effect of a topical anesthetic gel on the bond strength of three bonding adhesive systems, a two-step self-etch adhesive system, an all-in-one self-etch and a one-bottle total-etch adhesive system.

#### Keywords

Bonding Agent or Dentin Adhesive, Bond Strength, Topical Anesthetic Gel

#### Objectives

The objectives of this study are to investigate the effect of a topical anesthetic gel contamination on the tensile bond strength of a two-step and a one-step self-etch adhesive system, a two-step total-etch adhesive system to dentin.

#### Research Hypotheses

1. By using dentin adhesives, the bond strengths of resin composite to dentin are not different from those dentin contaminated with local anesthetic gel.
2. The bond strengths of 3 dentin adhesives used in this study are not significantly different from each other.

### Statistic Hypotheses

1. The mean bond strength of topical anesthetic gel contaminated dentin and resin composite is not significantly different from the mean bond strength of normal dentin to resin composite at 0.05 significant level when using 3 bonding adhesive systems.

2. The mean bond strength of resin composite to dentin by using each adhesive system is not statistically different from each other at 0.05 significant level.

### Variables

Independent factor is the dentin bonding agents.

Dependent factor is the bond strength value of resin composite to dentin.

### Intervention

A topical anesthetic gel

### Pre-agreement

1. One operator will perform the study.
2. Extracted non-carious and non-defect human premolars will be used in this experiment.

### Limitation of the Study

Since this is an *in vitro* study, therefore the environments are different from the oral cavity.

### Definitions

Dentin adhesive : dentin bonding agent

Total-etch adhesive : etch & rinse, primer, adhesive

Self-etch adhesive : etch & prime, non-rinsing adhesive

Bond strength : bond between resin composite to tooth structure

### Expected Outcomes

The expected advantage of this study is to maintain the bond strength of resin composite and dentin by controlling the factors that might affect the bond strength. If a topical anesthetic gel does not affect the bond strength, it can be used prior to a placement of a rubber dam clamp and retraction cord to avoid an injection of a local anesthesia. However if the bond strength is affected by a topical anesthetic gel, an appropriate method that can maintain the bond strength would be considered.

### Type of Research

Experimental laboratory research