Chapter 3 AIMS AND OBJECTIVES

Since placing a glass-ionomer cement (GIC) liner or using a self-etching adhesive to improve sealing ability and reduce postoperative tooth sensitivity in posterior occlusal resin composite restorations is controversial, the research questions of this thesis are:

1) Can a (conventional or resin-modified) GIC lining or a self-etching adhesive improve the sealing ability of posterior occlusal resin composite restorations, when compared with a total-etching adhesive?

2) Is the prevalence of postoperative tooth sensitivity after posterior occlusal resin composite restoration with a GIC lining or a self-etching adhesive less than that after restoration using a total-etching adhesive without a liner?

The research project is divided into two main parts. The first part, which is a series of laboratory studies, is further divided into three sub-parts as outlined below:

1) Effect of dentine conditioning on dentine permeability and micro-shear bond strength.

Objective: To compare fluid flow rates across dentine surfaces treated with four conditioners, and the effects of conditioning on adhesion of GIC and two-step, resin-based adhesives (total-etch and self-etch).

2) Sealing ability of occlusal resin composite restoration using four restorative procedures.
Objective: To investigate fluid flow after posterior resin composite restoration using four restorative procedures. Micro-gap, internal dye leakage and micro-permeability of bonded interfaces were also investigated.

3) Fluid flow after resin composite restorations in extracted carious molars.

Objective: To investigate the effect on fluid flow of restoration of carious molars with resin composite bonded with a total-etching adhesive, with or without GIC lining.

The second part is a randomized controlled clinical trial which was conducted on patients at the Department of Operative Dentistry, Mahidol University, Thailand. The purpose of this clinical trial was to compare short-term postoperative tooth sensitivity in daily life and to cold stimulation after occlusal resin composite restorations with different restorative procedures, bonded with a total-etching adhesive or a self-etching adhesive and with or without a GIC lining.

The null (H₀) and alternative hypotheses (H₁) that were tested were as follows:

1) H₀: a) There is no significant difference in fluid flow rates among various conditioned dentine surfaces.

   b) There is no significant difference in micro-shear bond strengths among GIC and two resin-based adhesives in relation to degree of surface wetness of dentine.

H₁: a) There is a significant difference in fluid flow rates among various conditioned dentine surfaces.

   b) There is a significant difference in micro-shear bond strengths among GIC and two resin-based adhesives in relation to degree of surface wetness of dentine.
2) H₀: a) There is no significant difference in fluid flow rates after restoration among four restorative procedures*.

    b) There is no significant difference with regard to the extent of gap formation among four restorative procedures.

    c) There is no significant difference with regard to the extent of dye leakage among four restorative procedures.

H₁: a) There is a significant difference in fluid flow rates after restoration among four restorative procedures.

    b) There is a significant difference with regard to the extent of gap formation among four restorative procedures.

    c) There is a significant difference with regard to the extent of dye leakage among four restorative procedures.

*Four restorative procedures were: (1) bonded with a total-etching (TE) adhesive without lining; (2) lined with resin-modified GIC and then bonded with the TE adhesive; (3) lined with high powder:liquid ratio GIC and then bonded with the TE adhesive; and (4) bonded with a self-etching adhesive without lining.

3) H₀: a) There is no significant difference in fluid flow rates after restoration with or without GIC lining.

    b) There is no significant difference in fluid flow rates between carious and intact teeth.
H₁: a) There is a significant difference in fluid flow rates after restoration with or without GIC lining.

b) There is a significant difference in fluid flow rates between carious and intact teeth.

4) H₀: a) There is no significant difference in postoperative sensitivity between teeth associated with restoration with and without GIC lining.

b) There is no significant difference in postoperative sensitivity between teeth associated with restoration bonded with total-etching adhesive and self-etching adhesive.

H₁: a) There is a significant difference in postoperative sensitivity between teeth associated with restoration with and without GIC lining.

b) There is a significant difference in postoperative sensitivity between teeth associated with restoration bonded with total-etching adhesive and self-etching adhesive.
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Title: Effects of glass-ionomer cement lining on sealing ability and postoperative tooth sensitivity after resin composite restoration of posterior teeth

Date: 2009

Citation: Banomyong, D. (2009). Effects of glass-ionomer cement lining on sealing ability and postoperative tooth sensitivity after resin composite restoration of posterior teeth. PhD thesis, Faculty of Medicine, Dentistry & Health Sciences, Dental Science, The University of Melbourne.

Publication Status: In Press

Persistent Link: http://hdl.handle.net/11343/35095

File Description: Chapter 3