Chapter 1 INTRODUCTION

PROBLEM STATEMENT

Resin composite, a tooth-coloured restorative material, is widely used in anterior and posterior restorations. Resin composite has many advantages as a tooth-coloured restorative material, with conservative preparation of tooth structure and bonding to enamel and dentine when used with a dental adhesive. However, polymerization shrinkage during the setting of resin composite is a major concern (1). This shrinkage may lead to gap formation at the interface between the restorative material and tooth structure, especially dentine. Moreover, the adhesive layer is likely to be permeable to fluids, molecules and/or ions. Dentinal fluid can thus flow outward to fill the gap and also through the permeable adhesive layer. Hydrodynamic stimulation, such as with cold water, hot water or occlusal force, can induce dentinal fluid movement within the dentinal tubules (2). If the rate of the fluid movement is high enough, it will create a sufficient force above the threshold necessary to stimulate pulpal sensory nerves, and consequently tooth sensitivity could occur. The prevalence of short-term tooth sensitivity after posterior resin composite restorations has been reported from 0-40%, and seems to depend on the restorative materials used, techniques and evaluation criteria (3-13). In cases in which tooth sensitivity is present, mild or moderate sensitivity is common while severe tooth sensitivity rarely occurs.

Many approaches have been suggested to reduce postoperative tooth sensitivity after resin composite restoration placement. One author (14) has
recommended that postoperative tooth sensitivity may be reduced by using a lining material, such as glass-ionomer cement (GIC), to cover the dentine surface before placing the final restoration. GIC lining may seal the dentine and reduce gap formation under the restoration. Therefore, dentinal fluid flow caused by stimulation, such as thermal change or occlusal loading, may be minimal, and consequently postoperative tooth sensitivity may decrease. However, other researchers have not agreed with this recommendation. No significant difference in postoperative tooth sensitivity has been reported after resin composite restoration were placed whether or not a lining was used (15, 16).

Using a self-etching primer adhesive, instead of a total-etching adhesive, is promulgated as another possible method to reduce postoperative tooth sensitivity (14). The smear layer on the cavity surface is only partially removed by the acidic primer in a self-etching adhesive, while it is entirely removed with phosphoric acid in the total-etching approach. Hence, dentine permeability after priming with acidic primer may not increase as much as after etching with phosphoric acid; the high dentine wetness after phosphoric acid etching may also affect the bond quality. Thus, postoperative tooth sensitivity is less likely to occur in a tooth restored with resin composite using a self-etching adhesive.

In summary, the effects of GIC lining and use of a self-etching adhesive on improving the sealing properties and reducing the postoperative tooth sensitivity associated with posterior resin composite restorations are still unclear. Therefore, the purpose of a series of laboratory and clinical studies in this thesis is to investigate the ability of GIC lining and a self-etching adhesive to reduce fluid flow in dentine and
postoperative tooth sensitivity in posterior resin composite restorations when compared with the use of total-etching adhesive alone.
REFERENCES


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