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One Year Clinical Evaluation of Class V composite Restoration Using Tow different Placement Techniques

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Abstruct

Several techniques are proposed for the restoration of Class V cavities but there is no agreement in the literature as to which technique is more effective. The aim of this study was to compare a one-year clinical performance of class V composites using different placement technique.

Thirty-eight class V cavity preparations in identical patients were prepared. One complete unit of composite and three increments of composite were used for restoration of class V preparations. The clinical criteria consisted of post-operative sensitivity, marginal discoloration, recurrent caries and marginal adaptation that were evaluated after one year.

The t-test and Chi-square Pearson were used for analysis of data ($P \leq 0.05$). There was no significant difference between the two techniques regarding post-operative sensitivity and marginal adaptation. Marginal discoloration using three increments was significantly less than that of one complete unit.

There was no significant difference in post-operative sensitivity between the two techniques. Marginal discoloration using 3 increments was significantly less than that of one unit. No significant failure was observed when using any of the techniques.

Keywords: Composite, filling techniques, Class V, Discoloration, Marginal adaptation.

Introduction

Resin-based restorative materials have been a common choice of dental practitioners for restoring cervical lesions due to their esthetic quality and ability to be bonded to the tooth structure. However, cervical lesions have been a restorative challenge for dentists for many years. Several restorative techniques have been proposed to minimize the polymerization shrinkage consequences and achieve a better marginal adaptation in Class V cavities.[1,2] Because the bond strength to enamel is usually greater than to the dentin, it has been suggested Class V cavities could be restored in multiple layers. [3] Incremental insertion techniques have been suggested as a way to improve composite curing in depth and minimize the effect of the confinement on contraction stress development. [4] Stress would be reduced with such techniques because the confinement of each increment would be lower than that of the entire cavity. However, some authors have not found significant differences between bulk and incremental insertion in terms of magnitude and distribution

of stress at the bonded interface. [5, 6] The aim of this study was to compare a one-year clinical performance of class V composites using different placement technique.

Materials and Methods

Twenty one patients with a mean age of 20 were selected. Thirty-eight class V cavity preparations were performed. Patients without any wear, extensive caries, Para functional habits, and pre-operative sensitivity were selected. At least two different restorations (one complete unit of composite and three increments of composite) done for each patient. Standardized saucer-shaped cavities were prepared in each tooth (3.0 mm occlusal-gingival, 3.0 mm mesial/distal, and 2.0 mm depth) on the buccal surface of teeth. The cavosurface margin was not beveled [7, 8] and a conventional liner or base materials were not applied. [9]

After completion of cavity preparation and rinsing with water, the isolation was performed with a cotton roll and volume high evacuation. The teeth were assigned into 2 groups (n=18). The restorations were placed by a single calibrated operator. In all groups the total-etch technique was performed prior to the application of the adhesive layer. A 35% phosphoric acid (Scotchbond, 3M Dental Products, USA) was applied initially to the enamel margins and then extended from the cavo-surface margins to the floor of the cavity for 15 s. The acid was rinsed away with air/water spray for 20 s and excess moisture was removed with cotton 'pellet' applied on the dentin while the enamel was gently air dried. This was followed by the application of the dentin bonding agent (Gluma, Heraus Kulzer, Germany) on dentin and light cured for 20 seconds. Then packable resin composite (Solitaire, Heraus Kulzer, Germany) was inserted Composite resin was polymerized as one complete unit in groups 1 and cured in 3 increments in group 2 (Figure1). Finishing and polishing were performed. Clinical criteria have been illustrated in (Table 1).

Results

After one year, 38 cases were evaluated which contained equal amounts of one complete unit of composite and three increments of composite class V were used for restoration.

The t-test showed that there was no significant difference between the two composite filling technique with respect to post-operative sensitivity ($P = 0.79>0.05$). The Chi-square Pearson correlation co-efficient for marginal discoloration showed that there was a significant difference between these two techniques ($P=0.025<0.05$). This means that marginal discoloration was significantly higher in one complete unit of composite class V restoration. [Figure 2 (a, b, c), 3, 4].

The Chi-square Pearson correlation co-efficient for marginal adaptation showed that there was no significant difference in marginal adaptation between the two techniques ($P=0.5$).However, recurrent caries were not observed in both experimental groups.

Discussion

The restoration of cervical defects or Class V cavities is a common procedure in restorative practice. Because the margins are often placed in dentin, dentists continue to seek an ideal technique to restore these defects. Polymerization shrinkage of composites and microleakage can cause an immediate inflammatory

reaction in pulp. [9,10,11] In our study after one year examination showed that there was no significant difference between the two composite filling technique with respect to post-operative sensitivity. A new research has shown that if cavities could be sealed well, toxicity by etching agents and hydrophilic monomer of dentin adhesives would not have any effects on pulpodentin complex and the most important factor for inflammation of pulp is microleakage.[12] Composite resins shrink during polymerization, creating contraction stresses that result in marginal gap formation, leading to microleakage.[13,14] Microleakage can be prevented if the bonding at the interface withstands the stresses generated during polymerization of the composite and function of the restoration, preserving the marginal adaptation. The bond itself depends, among other factors, on the control of placement. [15] Several placement techniques have been suggested aiming to reduce the shrinkage stresses caused by the polymerization and an enhanced marginal adaptation.[16,17,18] However, the most effective placement technique is unknown. Within the study by Luis et al.[19], the method of composite increment placement did not influence the marginal adaptation of moderate Class V composite restorations. This is agreeing with our study. Lioumis etal[20] and Lagouvardos et al[21] reported that the most common reason for replaced resin composite restorations were secondary caries, discoloration and loss of filling.

Classification of discoloration is based on penetration of dye into the pulp.[22] In our study, statistical analysis showed that marginal discoloration in one complete unit of composite class V restoration significantly higher than incremental technique, but this discoloration was superficial; and generally in both groups it was superficial and could be removed by polishing.

Conclusion

After one year in this clinical study it was observed that:

1. There was no significant difference in postoperative sensitivity between the two techniques.
2. Marginal discoloration using three increments was significantly less than that of one complete unit.
3. There was no significant difference in marginal adaptation between the two techniques.
4. Most of marginal discolorations were superficial.
5. There was no case of recurrent caries in both techniques.
6. No significant failure was observed when using any of the techniques.

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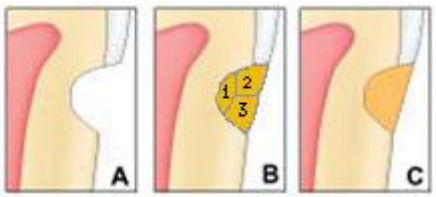
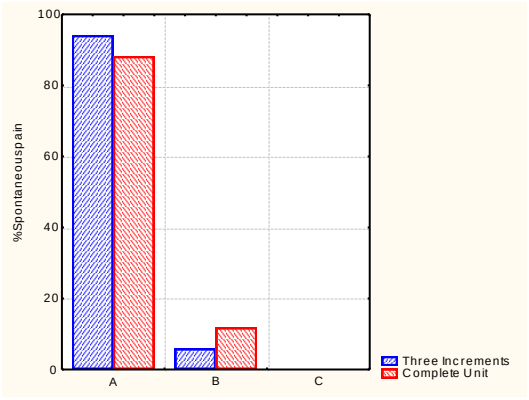


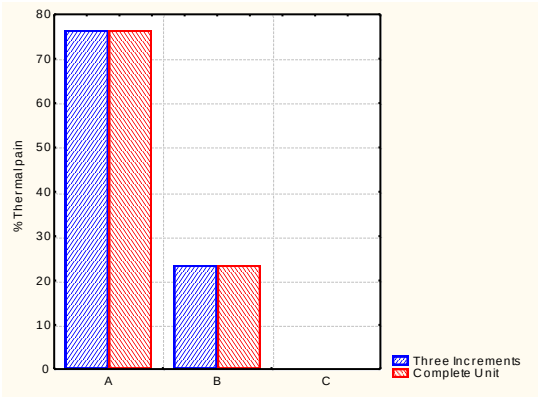
Figure 1: Schematic representation of the experimental design. a) Class V cavity with margins in enamel and dentin; b) enamel increment placed and cure; c) Bulk placement.

Table 1: Direct clinical evaluation criteria rating aspect

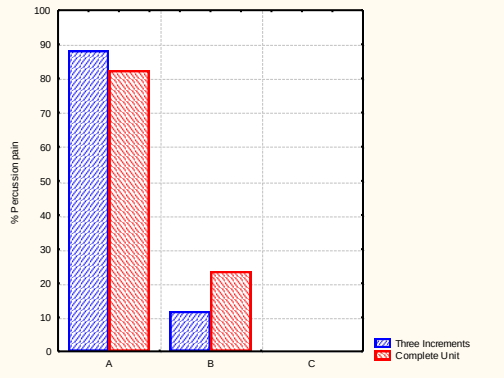
Rating	Aspect
	Post operative sensitivity (Spontaneous - thermal - percussion)
(A)	There is no evidence of sensitivity
(B)	There is evidence of a mild sensitivity
(C)	There is evidence of a severe sensitivity
	Cavosurface Marginal Discoloration
(A)	There is no discoloration anywhere on the margin between the restorations and the tooth structure
(B)	There is discoloration anywhere on the margin between the restoration and the tooth structure but the
(C)	discoloration has not penetrated along the margin of the restorative material
	Marginal Adaptation
(A)	There is no visible evidence of a crevice along the margin into which explorer penetrates.
(B)	There is visible evidence of a crevice along the margin into which the explorer penetrates, but the dentin or base is not exposed
(C)	There is visible evidence of a crevice along the margin into which the dentin or base is exposed.



a: The Rate of Spontaneous Pain in Restorations



b: The Rate of Thermal Pain in Restorations



c: The Rate of Percussion Pain in Restorations

Figure 2: The Rate of Post operative sensitivity (a: Spontaneous –b: thermal – c: percussion) in Restorations

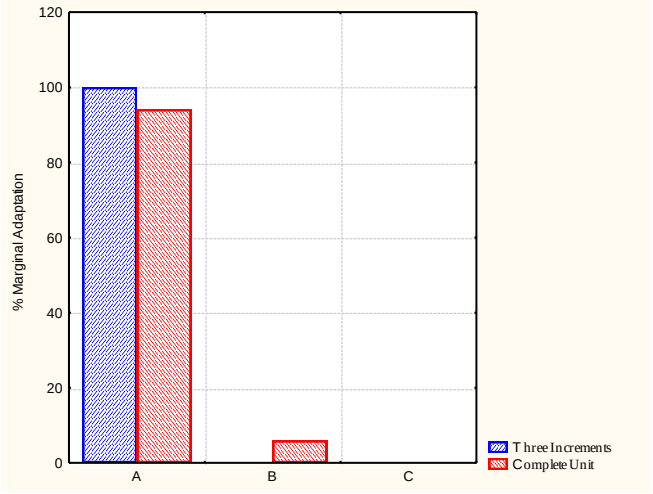


Figure 3: The Rate of Marginal Adaptation in Restorations

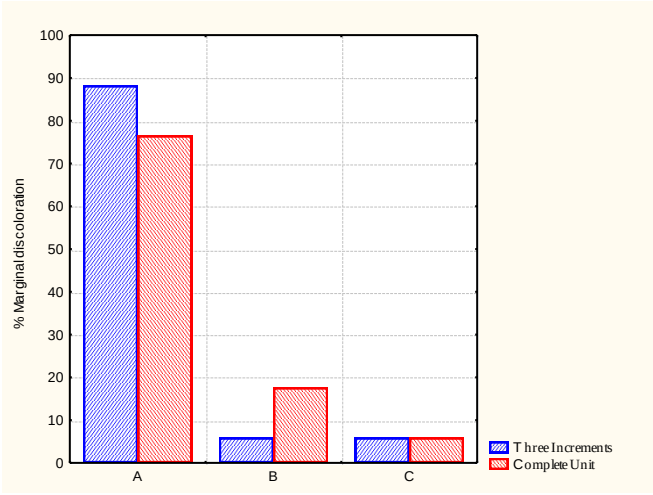


Figure 4: The Rate of Marginal Discoloration in Restorations