

Effect of Marginal Leakage around Class II Composite Resin Restorations

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The desire for improved esthetics have led to the appearance of "posterior composite resins" for occlusal restorations. Forty extracted permanent human molars and premolars of mesial or distal class II cavities were included. There was no leakage found at 58% and 89%. The lowest degree of leakage for all filling methods was found at the occlusal margin.

Key words: Leakage, Class II, Composite resin

The application for class II restorations has not yet been fully accepted. Insufficient sealing of margins is a major disadvantage of these materials^{1,2,3}. Leakage occurs especially at the gingival margins, where little or no enamel is present, and where it is technically difficult to obtain dry margins for etching⁴. Gaps at the interface between resin and tooth may result from polymerization contraction of the setting resin, and give rise to hypersensitivity, penetration of bacteria, and eventually to secondary caries. After restoration, the size and shape of the gaps may be affected by masticatory forces, thermal changes, and water absorption. Polymerization techniques had no influence on microleakage^{5,6}.

The investigations of leakage at the margins of class II composite resin restorations in primary teeth, revealed that compared to fillings prepared with Enamel bond, leakage at the cervical margin was reduced by the application of visible light cured Scotchbond⁷.

Leevailoj et al⁸ reported that flowable composites helped reduce microleakage at gingival margins of Class II restorations. Gingival margins had higher microleakage than occlusal margins. The halogen light units in the polymerization of hybrid composite was found to produce significantly lower microleakage at both occlusal and cervical margins⁹.

The object of this study is to compare leakage at the cervical and occlusal margins of restorations prepared by incremental filling with leakage obtained after filling in bulk.

Materials and methods

The mesial or distal class II cavities were prepared in 40 extracted permanent human molars and premolars included in this study. The teeth were kept in tap water in a refrigerator for up to 1½ month. All gingival margins were prepared in enamel. The pulpal and axial walls were covered with a lining of visible light cured Dycal. Visible light cured Scotchbond was applied to both enamel and dentin of the teeth. The enamel margins were etched with a gel for 60 seconds, rinsed for 20 seconds, and dried.

Results

The extent of leakage at the occlusal margin was generally lower than at the cervical margin. There was no leakage was found at 58% to 89% of the margins. The differences resulting from the different methods of incremental application were not significant. There was no significant difference in leakage between the three groups of occlusal margins (Table 1).

Table 1: Assessment of marginal leakage by depth of dye penetration

Degree of dye penetration	Bulk		Incremental			
	No.	%	Gingivooocclusal		Buccolingual	
			No.	%	No.	%
Occlusal margins						
0	8	58.0	12	83.0	13	89.0
1	3	24.0	1	7.0	1	7.0
2	1	7.0	-	-	-	-
3	1	7.0	1	7.0	-	-
Cervical margins						
0	2	13.0	9	62.0	8	57.0
I	5	38.0	3	20.0	4	27.0
II	4	29.0	2	13.0	1	7.0
III	2	13.0	-	-	1	7.0

Discussion

Curing an increment of a filling can be expected to result in a smaller contraction gap than curing an entire filling placed in bulk. The incremental filling results in less microleakage than filling in bulk is comparable with earlier studies concerning leakage⁷ and the width of microgaps¹⁰.

According to Donly et al¹¹ found that faciolingual incremental curing are better than those of gingivooocclusal incremental curing. The difference they found between bulk filling and curing gingivooocclusal increments was statistically significant. Attar et al¹² also studied the effect of flowable increments on reducing the gingival microleakage was found to be statistically significant for all restorative materials. The results are comparable to the present study.

The degrees of leakage found in the present study of permanent teeth were generally lower than those that had been observed on primary teeth⁴.

An additional difference between the present study and previous ones^{4,7} was that in this study visible light cured Dycal rather than chemically cured Dycal was used. Hence minor differences in cavity preparation, filling and finishing can also be attributed to operators. The lowest degree of leakage for all filling methods was found at the occlusal margin.

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