Evaluation of Marginal Adaptation in Class II Cavities Restored with Bulk-Fill Materials and Self-Etch Adhesive

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ABSTRACT

Objective: To compare the marginal gap of different bulk fill materials in Class II cavity preparations. ***Materials and Methods***: Fifty extracted maxillary premolars were mounted into phenolic rings and divided into five groups of 10. Proximal matrices were made with polyvinyl siloxane. Specimens received standardized MOD cavity preparations. A 2-step self-etch adhesive (OptiBond XTR) was applied and the preparations were restored with materials placed and light-cured as follows: Filtek Supreme Ultra in 2mm increments (FSI); Filtek Supreme Ultra in bulk (FSB); SonicFill in bulk (SF); SureFil SDR flow in bulk, covered with a 2mm occlusal layer of Filtek Supreme Ultra (SDR); Tetric EvoCeram Bulk Fill in bulk (TEB). Specimens were finished and polished using impregnated aluminum oxide discs (SofLex 3M ESPE) according to manufactures recommendations. The margin gap was measured in the buccal, lingual and gingival wall using a Keyence VHX1000 digital microscope at 200x magnification. *Results*: Mean maximum gap margin values were in microns (lingual, gingival, buccal): FSI (.0, 5.3, 9.8), SF (.7, 1.0, 5.5), SDR (0, .9, 1.6), TEB (0, 3.9, 3.3) and FSB (0, 0, 2.3). There is significant difference of gap in the gingival (*p*<0.008) and buccal (*p*<0.290). The lingual gap (.15) was statistically smaller than the gingival (*p*< 0.001) and the buccal (*p*< 0.000). The level of significance was set at 0.05. ***Conclusions***: The tested bulk-fill composite resins showed less marginal gap than the conventional 2mm incremental technique. The lingual wall was the least affected with bulk fill.

METHODS AND MATERIALS

Fifty extracted maxillary premolars were mounted into phenolic rings and divided into five groups of 10. Proximal matrices were made with polyvinyl siloxane prior to preparation to aid in anatomical reproduction. Specimens received standardized MOD cavity preparations based on the mesio-distal and bucco-lingual dimensions of the specimens (Figure 1). A 2-step self-etch adhesive (OptiBond XTR) was applied and the preparations and restored with materials as follows: Filtek Supreme Ultra in 2mm increments (FSI, pos. control); Filtek Supreme Ultra in bulk (FSB, neg. control); SonicFill in bulk (SF); SureFil SDR flow in bulk, covered with a 2mm occlusal layer of Filtek Supreme Ultra (SDR); Tetric EvoCeram Bulk Fill (TEB). Specimens were finished and polished using impregnated aluminum oxide discs (SofLex) according to manufacturer's recommendations. The marginal gaps were measured on the buccal, lingual, and gingival walls using a Keyence VHX1000 digital microscope at 200x magnification. When a gap was observed, it was measured with a standardized ruler in microns (Figure 3).
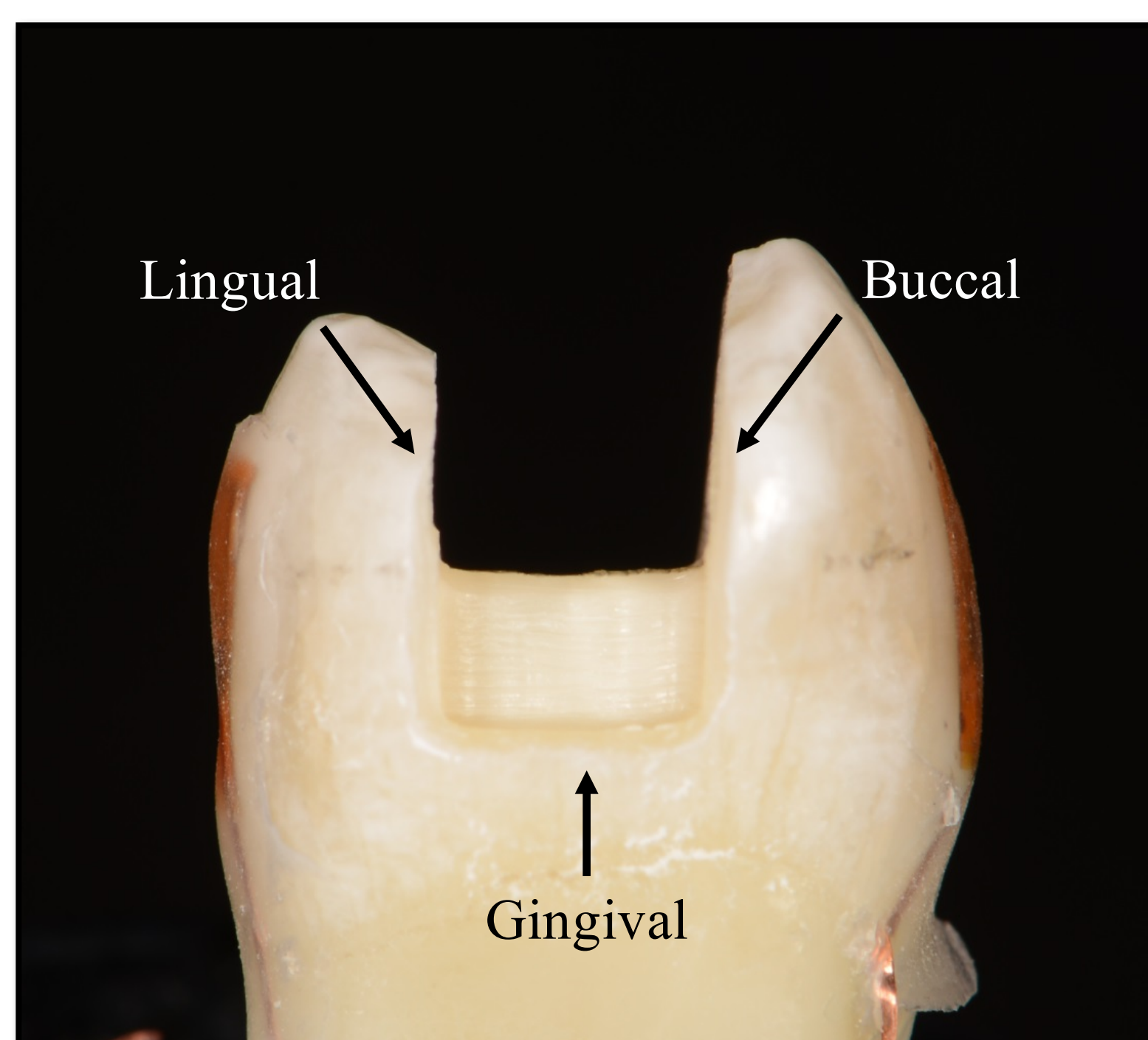

Figure 1. Standardized class II preparations.

Figure 2. Marginal adaptation without a gap.

Figure 3. Restoration showing a marginal gap.

RESULTS

Mean marginal gap values were in microns and are expressed in Table 1. There is significant difference of marginal gap in the gingival (*p*< 0.008) and buccal (*p*< 0.029) margin between the five groups (Table 2). The lingual gap (.15) was statistically smaller than the gingival (*p*< 0.001) and the buccal (*p*< 0.000). The level of significance was set at 0.05.

Groups	Lingual Wall	Gingival Wall	Buccal Wall
FSI (3M) +	.00 (.00)	5.33 (6.16)	9.87 (10.33)
SF (Kerr)	.73 (2.94)	1.00 (3.87)	5.53 (7.15)
SDR (Dentsply)	.00 (.00)	.93 (3.61)	1.60 (4.29)
TEB (Ivoclar)	.00 (.00)	3.93 (7.00)	3.33 (8.89)
FSB (3M) -	.00 (.00)	.00 (3.61)	2.33 (8.89)

Table 1. Mean margin gap and standard deviation in microns.

	Lingual Wall	Gingival Wall	Buccal Wall
Chi-Square	4.000	13.896	10.800
df	4	4	4
Asymp Sig.	.406	.008*	.029**

Table 2. The output shows there is a significant group difference gap in Gingival wall * and Buccal wall **

CONCLUSIONS

1. The tested bulk-fill composite showed less marginal gap than the conventional 2mm incremental technique.

2. The lingual wall was the least affected with bulk fill.

3. Surefil SDR (Denstply) demonstrated better marginal adaptation than the rest of the bulk fill material tested.