



September 24, 2017

Enclosed, please find our revised version of the manuscript (ID-1441). We would like to say that we really appreciate the comments and suggestions.

Our comments on the revision are listed below:

Manuscript's title

1. The title seems vague and does not encompass the main idea expressed in the objectives (i.e., evaluate the marginal adaptation of composite resin associated with different liners in proximal cavities). The authors could provide a more clarifying title.

Answer: The title was modified: Evaluation of the marginal adaptation of adhesive materials in proximal cavities in enamel and dentin.

Abstract

2. This reviewer considers that the objectives stated in the abstract does not represent accurately the design developed in the manuscript. Please, read the reviewer's concerns about the objective section of the manuscript (see question #5).

3. In the abstract, the authors wrote "Forty extracted human molar teeth were randomly assigned in eight experimental groups" – presumably five teeth per group (n=5). However, table 1 (in the manuscript) indicates that the number of samples per group was ten (n=10). Please, correct any discrepancies between the abstract and the remainder of the manuscript. The reviewer expressed further concerns about the randomization of samples in question #9.



4. Please, give careful attention to the reviewer's comments about the results section (see question #15) and the conclusion (question #19) to revise the results and conclusion in both the abstract and the manuscript body.

Answer #2, #3, #4: We restructured the abstract according to the adjustments in the article.

Introduction

5. In the objective section (page 1 lines 18-22), the authors indicated that this work aimed to evaluate the marginal adaptation – in either enamel or dentin – of composite resin associated with different liners in proximal (slot) cavities. This description gives the impression that the authors planned to investigate how the use of different liners interferes in the marginal adaptation of the composite resin (i.e., at the margins between tooth and restorative composite). However, the remainder of the manuscript reveals new pieces of information that are not congruent with the stated objectives. For example, it is reported that only the cervical margins of the slots/cavities were analyzed (as for the presence of gaps) and that the “open sandwich” technique was used to restore the slots of group RMGIC (resin-modified glass ionomer cement). Apparently, analyzing the cervical margin of “open sandwich” restorations (between tooth and RMGIC) brings no relevant information on the marginal adaptation of the composite resin itself.

a) What specific question did this study plan to answer by analyzing the percentage of gaps at the cervical margin of “open sandwich” restorations?

Answer: We understand that the cervical margin of class II cavities is the most critical region for adaptation of the restorative material, so the study evaluates the marginal adaptation in the cervical region of the vertical slot cavities.



b) Based on the reviewer's concerns above, rewrite the objective section in the manuscript (also in the abstract), so that the readers can interpret what exactly the authors studied.

Answer: We rewrote the objectives of this study in page 1, lines 18-21. "The objective of the study was to evaluate the marginal adaptation, in enamel (E) and dentin (D), of adhesive materials, such as composite resin (CR), flowable resin composite (flow), bulk fill flowable liner (bulk) and resin modified glass ionomer cement (RMGIC) in slot cavities."

6. The hypothesis (page 1 lines 21-22) seems vague – and it does not match the characteristics of a design analyzed with a two-way ANOVA (which is used to analyze the independent and joint effects of two different independent variables in a single study). Please, provide a well-defined hypothesis.

Answer: We rewrote hypothesis in page 1, lines 21-23. "The hypothesis tested was that different materials did not influence the marginal adaptation in enamel and dentin."

Materials and Methods

7. On Page 2 lines 5-7:

a) Please, provide further details on how the tooth's occlusal enamel was ground to obtain a flat dentin surface (ex.: the type of grit paper used to grind/polish the surfaces);

Answer: We included more details regarding the planning of the teeth's occlusal surface in page 2, lines 30-33. "The occlusal surface was planed in a water-cooled



mechanical grinder and polisher (ER-27000; Erios) at a speed of 300 rpm 120-grit abrasive paper was used for three minutes, ...”

b) The following steps were unclear to the reviewer: “teeth were shaped with vinyl polysiloxane, and the mold was used as matrix for cavity restorations”. Rewrite this part so that someone not familiar with the method can interpret it properly. A schematic diagram could help in the understanding of the sample preparation procedures (but this is merely a suggestion).

Answer: We rewrote this part in page 2, lines 33-35, and we added figure 1. “... teeth were shaped with vinyl polysiloxane prior to cavity preparation, and the mold was used as matrix for cavity restorations (Figure 1).”

8. On page 2 lines 8-11, the authors should provide a detailed description of the slot preparation (with the cavity preparation machine):

- a) Were the cavities prepared as vertical slots?
- b) Please, make it explicit if the two slots were created in the same tooth, indicating the surface (ex.: mesial, distal) of the tooth where each slot was prepared;

Answer #8a, #8b: We rewrote about slot preparation in page 2, lines 37-44. “For each tooth, two vertical slot preparations with standard sizes (depth: 2.0 mm, height: 2.5 mm, width: 2.0 mm) were created, in mesial and distal of the same tooth, with burs #245 (KG Sorensen, São Paulo, SP, Brazil) on a machine for making cavities (ELQUIP, São Carlos, SP, Brazil). This device has three digital micrometers coupled to the table, a coordinate system supporting a high-speed



turbine that determines the depth of wear and the inclination of the rotating device. The burs were replaced after five preparations.”

c) Presuming that two slots were prepared in each tooth, is it the case that one slot had its cervical margin located in enamel and the other had its cervical margin in dentin? It is not clear in the description of slot preparation how the cervical margins – in either enamel or dentin – were obtained.

Answer: We changed the sentence and added more details in page 2, lines 45-49. “Cervical margins were defined in enamel and dentin in relation to CEJ. Thus, for the cervical margins in enamel the preparation was carried out short of CEJ and for dentin, besides CEJ. Considering that for each tooth two cavities are made, forty cavities were made with enamel margin and forty cavities with margin in dentin.”

9. The description of the randomization seems inaccurate to the reviewer:

a) On page 2 line 15, the authors mention that teeth were randomly assigned into groups as reported in table 1. Considering $n=10$ (n representing the number of teeth) for each of the 8 groups in table 1, a total of 80 teeth is expected – not 40 as reported on page 2 line 3. [The reviewer presumed it was possible to use 40 teeth though, because 2 slots were prepared in each tooth, yielding a total of 80 restorations]. The authors should elaborate a precise description of the randomization procedure. As an example (only if applicable), the authors may indicate that the 40 teeth were firstly assigned into 4 groups according to the liner: CR, flow, bulk and RMGIC. Then, that 2 slots were



prepared in each tooth – one slot with cervical margin in enamel (E) and the other with cervical margin in dentin (D);

Answer: We added more details about these in page 2, lines 36-49. “The forty teeth were randomly assigned into eight experimental groups (5 teeth per group) according to table 1. For each tooth, two vertical slot preparations with standard sizes (depth: 2.0 mm, height: 2.5 mm, width: 2.0 mm) were created, in mesial and distal of the same tooth, with burs #245 (KG Sorensen, São Paulo, SP, Brazil) on a machine for making cavities (ELQUIP, São Carlos, SP, Brazil). This device has three digital micrometers coupled to the table, a coordinate system supporting a high-speed turbine that determines the depth of wear and the inclination of the rotating device. The burs were replaced after five preparations.

Cervical margins were defined in enamel and dentin in relation to CEJ. Thus, for the cervical margins in enamel the preparation was carried out short of CEJ and for dentin, besides CEJ. Considering that for each tooth two cavities are made, forty cavities were made with enamel margin and forty cavities with margin in dentin.”

b) To keep table 1 as it is, please highlight that n represents the number of restorations in each group (10 per group, total of 80) – not the number of teeth.

Answer: We wrote in the table that n=10 restorations.



10. On page 2 lines 16-24, the authors should provide relevant details about the restorative procedures for the different groups (CR, flow, bulk and RMGIC):

- a) Describe the restorative procedures as a logical sequence of steps;
- b) Was the “open sandwich” technique utilized only for the RMGIC groups?
- c) Which walls (ex.: axial, gingival) of the slots were lined with the flowable and bulk resins? Or were these materials also applied as in the “open sandwich” technique?

Answer #10a, #10b, #10c: We rewrote the sentence in page 3, lines 50-59. “The restoration were made with Filtek Z350 composite resin (3M Espe, St. Paul, MN, USA) by the incremental technique, with or without liner; by using flowable resin Filtek Z350 (3M ESPE, St. Paul, MN, USA) and Surefil SDR (Dentsply, Konstanz, Germany) and RMGIC Vitremer (3M Espe, St. Paul, MN, USA). Flowable and bulk resin composites and RMGIC were placed in a single increment (2.0 mm) by “open sandwich” technique. Polymerization was performed with a DB 686 LED appliance (Dabi Atlante, Ribeirão Preto, SP, Brazil). The adhesive treatment of substrates was performed according to the manufacturers’ recommendations, and the excess material was removed with a scalpel blade.”

11. This reviewer believes that table 2 should bring more information about the chemicals:

- a) An extra column could be inserted to inform basic characteristics of each material in terms of composition or classification;



Answer: We agreed with reviewer and we inserted the composition of materials in Table 2.

b) In the 1st column, it is not clear which resin is the bulk-fill one. Please, make a distinction between the flowable and bulk resins in the table.

Answer: We inserted this information in Table 2.

12. On page 3 lines 6-8, there is scarce information regarding the mechanic loading protocol and the sectioning of the restored teeth with the cutting machine (ex.: direction of the cuts in relation to the tooth's long axis). If possible, refine the description of these points.

Answer: We inserted more details about this in page 5, lines 67-72. "Subsequently, the specimens were stored in deionized water for 24h. After this they were subjected to 2000 cyclic loading, 120N, 2Hz (Elquip, São Carlos, SP, Brazil) at 37°C, and then sectioned sagittal direction in relation to the tooth's long axis by a cutting machine (Isomet low speed saw - Buehler, Lake Bluff, IL, USA) to analyze the marginal adaptation of the restored cavities."

13. On page 4 lines 11-12, the authors indicate that the percentage of gaps ("%GAPS") – which is the dependent variable – was analyzed in a two-way ANOVA, but the independent variables (or factors) were not cited. Please, rewrite the description of the statistical method, so that both the dependent and independent variables are shown (ex.: %GAPS were analyzed in a two-way ANOVA, with "X" and "Y" as the independent variables).



Answer: We rewrote the sentence in pages 5-6, lines 81-85. “Gap percentage values of restorative treatments, in enamel and dentin, were analyzed by 2-way ANOVA followed by the post hoc Tukey test ($\alpha=0.05$).”

Results

14. Issues with figures.

a) In figure 1, the group names in the x-axis does not match the group names in table 1;

b) In figure 1, the y-axis should be named (ex.: percentage of gaps);

Answer #14a, #14b: We corrected the group names in the x-axis in Figure 1 (now Figure 2) and we inserted the name in the y-axis.

c) Since the error bars were not added to figure 1, consider providing a separate table showing the group means and standard deviations (and comparisons of means). Such table would complement figure 1;

Answer: We added a new table (Table 4) with these details.

d) This research relied on the analysis of scanning electron microscopy (SEM) images. Why haven't the authors provided any representative SEM micrographs used in the analysis of the percentage of gaps? Micrographs are welcome to exemplify the structures under investigation.

Answer: We inserted micrographs in Figure 3 in Results.

15. This reviewer considers that the results of two-way ANOVA on %GAPS were not reported accordingly:



a) When reporting results of a two-way ANOVA, think about addressing the following first:

- Does independent variable “X” influence %GAPS? (p=xxx)
- Does independent variable “Y” influence %GAPS? (p=xxx)
- Does the effects of X and Y combined differentially affect %GAPS, or in other words, is there an interaction between factors X and Y? (p=xxx)

b) In case of interaction, a table showing the comparisons of group means (post-hoc test) makes the interpretation of results easier for the reader.

Answer #15a, #15b: We inserted more details about these results in Table 3 and Table 4.

16. With regard to the following citation (page 4, lines 17-20) “the combination of composite resin with modified glass ionomer resin by using the open sandwich technique had the highest percentage of marginal gap in enamel (E-VIT: $57.91 \pm 35.56\%$) (p=0.001) and dentin (D-VIT: $72.98 \pm 29.05\%$) (p=0):

a) To merely express that the %GAPS of groups E-VIT and D-VIT were the highest among groups, there is no need to indicate the p value (not applicable). A p value is indicated only to highlight that there is (or not) a significant statistical difference between two different group means (and there is one corresponding p for each pairwise comparison);

Answer: We rewrote this sentence in page 6, lines 91-97. “There was a significant difference between different experimental treatments in relation E-RMGIC and D-



RMGIC and others groups ($p < 0.01$) (TABLE 4). The combination of composite resin with modified glass ionomer resin by using the open sandwich technique had the highest percentage of marginal gap in enamel (E-RMGIC: $57.91 \pm 35.56\%$) and dentin (D-RMGIC: $72.98 \pm 29.05\%$). There was not difference between enamel and dentin ($p = 0.0979$)."

b) In the results section, the group names differ from the names in table 1 (ex.: E-VIT versus E-RMGIC, E-Z350 versus E-CR). The author must keep the group names precise and constant throughout the manuscript.

Answer: We corrected and standardized the groups names.

Discussion

17. The paragraph on page 5 lines 2-13 practically repeats what was presented in the introduction of the manuscript. The reviewer judges this part is unnecessary.

18. Try highlighting in the discussion the "strong point" of your work (what previously unanswered question did your findings provide?).

Answer #17, #18: We rewrote the first paragraph in the discussion in page 7, lines 108-114. "Gaps can compromise the restoration due to infiltration of fluids and bacteria that can lead to the development of secondary caries [8, 9]. This study investigated the percentage marginal gap by means of SEM analysis of different treatments with composite resin, and flowable, bulkfill, and RMGIC by open sandwich technique in enamel and dentin cervical margins. The hypothesis tested was rejected because different materials influenced the marginal adaptation in enamel and dentin."



Conclusion

19. The major goal described in the objective section – after the suggested edits – must meet in a corresponding conclusion. Think about writing a clear and specific conclusion (just an aleatory example: the use of the liners “X” and “Y” with the composite resin resulted in reduced percentage of gaps at the cervical margin of proximal restorations in comparison to liner “Z”).

Answer: We rewrote the conclusion in page 10, lines 179-183. “It was concluded that the different restorative treatments had the same behavior in enamel and dentin cervical margins. Restorations with flowable composite resin liner and bulk fill did not influence marginal adaptation, however the association RMGIC with composite resin increased the percentage of marginal gap in the slot cavities.”

All the authors have read and agreed with this revised version. Thank you very much for your editorial assistance.

Regards,

Sincerely

The Authors.