Reviewer's report

Title: Three-dimensional quantitative analysis of adhesive remnants and enamel loss resulting from debonding orthodontic molar tubes

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Reviewer: Abbas R Zaher

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Major Compulsory Revisions:
1. Statistical tests for the adhesive remnant and for the enamel loss before and after the debonding procedure was lacking. The authors relied on a descriptive analysis to describe the adhesive remnants and the enamel loss for each tooth.

2. Sample Size Calculation:
   How was the sample size estimated in order to detect significant differences in enamel loss and adhesive remnants before bonding and after debonding?

3. In Abstract, Conclusion, 1st Line:
   “Debonding Molar tubes leaves a certain amount of adhesive remnants on the enamel”
   Conclusions of the study are based only on descriptive analysis rather than statistical comparisons which challenge its soundness.

4. In Abstract, Conclusion, 3rd line:
   “….results in a significant amount of enamel loss.”
   In the present study, the amount of enamel loss was not statistically compared between the 3 groups (failure at interface between adhesive and molar tube, failure at interface between adhesive and enamel, cohesive failure within adhesive). The conclusion was drawn without supporting statistical analysis.

5. Materials and Methods
   There was no mention if the experimental teeth used in the study were inspected for soundness of buccal surface, and guaranteed to be free of cracks, large restorations or carious lesions before being included in the study as such defects might affect the study results.

6. Materials and Methods
   Debonding using ligature cutting pliers cannot guarantee standardization (Squeezing the pliers, rotational movement, pulling force) where various patterns of debonding were found to influence the amount of enamel loss (Konsel et al Angle Orthodontist 2010)

7. Materials and Methods
Analysis of enamel surface under dry conditions is important because the reflection refraction phenomena associated with wet surfaces could mask surface irregularities (Zarrinninia et al 1995)

8. Reliability of Measurements
Coefficient of reliability was not assessed in the study.

9. Results
The results of the scan regarding the enamel loss values were neither mentioned in the results section nor compared with the values of enamel loss after debonding.

10. Conclusion:
The accuracy of the blue light technology in measuring the amount of enamel loss and adhesive remnants worth to be mentioned in the conclusions of the present study. It is to be recommended for use in future studies.

Minor Compulsory Revisions:
1. In Abstract , Materials and Methods , 3rd line:
"after 24 h storing in 0.9% saline .. “
It is mentioned in the Materials and Methods Section, 2nd Paragraph, 3rd line in the article, “… were stored in 0.9% saline solution for 12 hours”

2. In Abstract , Results, 2nd Line :
“ the volume of adhesive remaining on teeth ranged from 0.047mm3 to 3.24mm3 “
While Table 1 shows that the maximum volume of adhesive remnants is 4.16mm3 not 3.24mm3.

3. In Abstract , Results , 4th Line:
“Highest maximum depth of enamel loss was 0.2mm.”
0.2mm should be corrected to 0.207 mm (According to Table 2)

4. In Abstract , Results, 5th Line:
“Median volume of enamel loss was 0.15mm3”
While in the Discussion Section, 4th Paragraph , it was stated that “ Median enamel loss volume in the present study was 0.104 mm3 “

5. In Introduction , 3rd Paragraph , 5th line :
Should be replaced with “Krell et al” (Reference 2)

6. Materials and Methods , 2nd Paragraph :
“After 20 seconds etching with 35% phosphoric acid (Ultra Etch, Ultradent, USA)
molar tubes (ERA, Farfield, USA) were bonded directly … “
It is important to clarify that after the etching procedure, teeth were rinsed with water spray and dried with oil-free air.
7. Materials and Methods, 2nd Paragraph, 3rd line :
“ Then teeth with brackets bonded … “
The word “brackets” needs to be replaced by “molar tubes”
8. Materials and Methods
Molar tubes should be pressed onto the enamel surface to minimize excess material. Variation in thickness of adhesive not only results in weakened bond strength, but have a significant influence on the amount of adhesive remaining on enamel surface (Knoll et al 1986)
9. Materials and Methods, 4th Paragraph, 7th Line :
“ Superimposition and comparison was … “
The word “was” needs to be replaced by “were”
10. Materials and Methods, 4th Paragraph, 2nd line:
“ GOM Inspect Software”
Details of the software were absent.
11. Materials and Methods, 4th Paragraph, 8th Line :
“teeth with brackets removed … “
The word “brackets” needs to be replaced by “molar tubes”
12. Materials and Methods:
Calculation of the volume of the adhesive remnants and the enamel loss using the GOM Software needs clarification.
13. Results, 2nd Paragraph, 3rd line:
“.. to 3.24mm3 “
Table 1 shows the maximum volume of adhesive remnant is 4.16mm3, not 3.24mm3.
14. Discussion, Paragraph 1, Line 2:
The statement “The area of enamel damage and the volume of enamel loss are dependent on the bracket square surface size. “ needs a supporting reference.
15. Discussion, Paragraph 2, Line 7:
The statement “using blue light technology producing a high measurement accuracy of shiny surfaces." needs a supporting reference.
16. Discussion, 3rd Paragraph, Line 2:
“…from 0.0087 mm to 0.238 mm, which is less than mean 200.2 µm reported by
Ryf et al.”

The authors compared a range to a mean value. It would have better to calculate the mean value of the current study for better comparison.

17. Discussion, 4th Paragraph, Line 2:
The number “0.416mm” should be replaced by “0.0416mm” as mentioned in Table 2.

18. Discussion, 4th Paragraph, Line 4:
“Median enamel loss volume in the present study was 0.104 mm³, which is less than 0.02 mm³”
The value 0.104 mm³ is greater than 0.02mm³, not less.

19. Conclusion:
“1. Enamel loss is an inevitable side effect of fixed orthodontic treatment.”
Inappropriate conclusion. The study doesn’t test different methods for avoiding enamel loss during fixed orthodontic treatment.
A more appropriate conclusion would be “Enamel loss due to orthodontic procedures can be successfully measured using a 3D blue light scanning technology.”

20. Figures
Figures 1 and 2 are missing figure legends, captions of X-axis and Y-axis, Numbering of experimental teeth.

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:
I declare that I have no competing interests.