

Characterization of Enamel Surface After Orthodontic Brackets Debonding: An In Vitro Study

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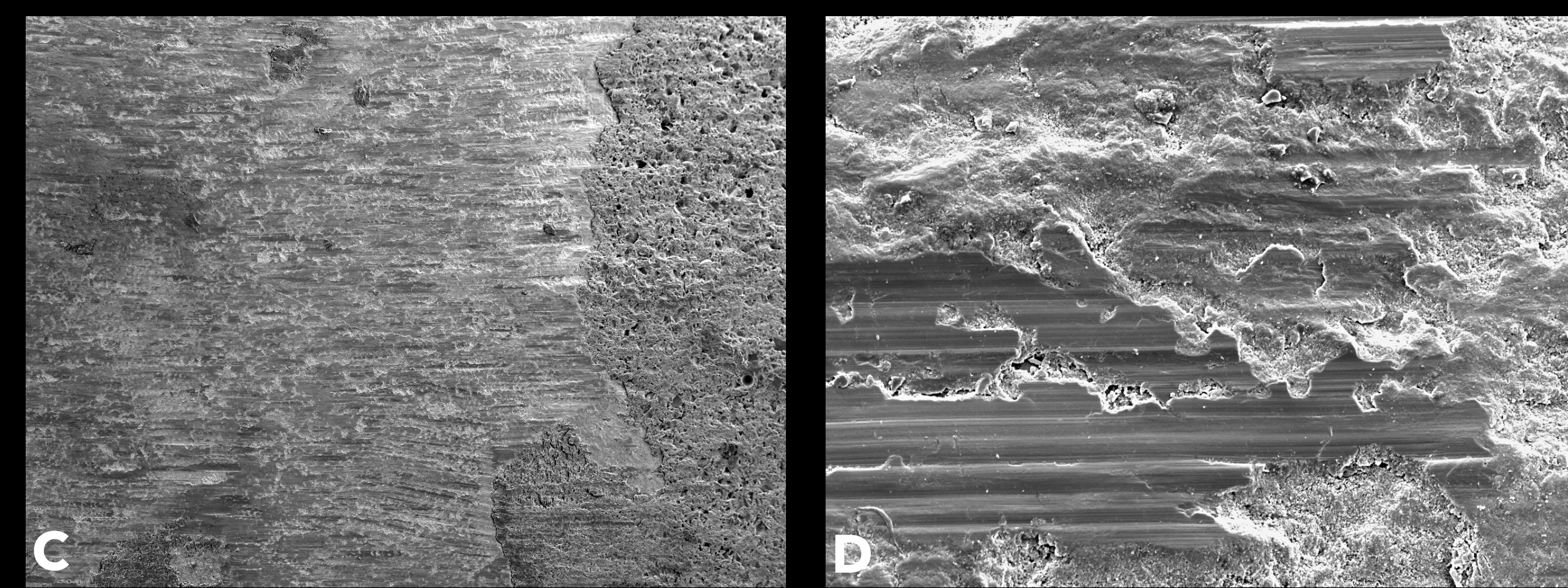
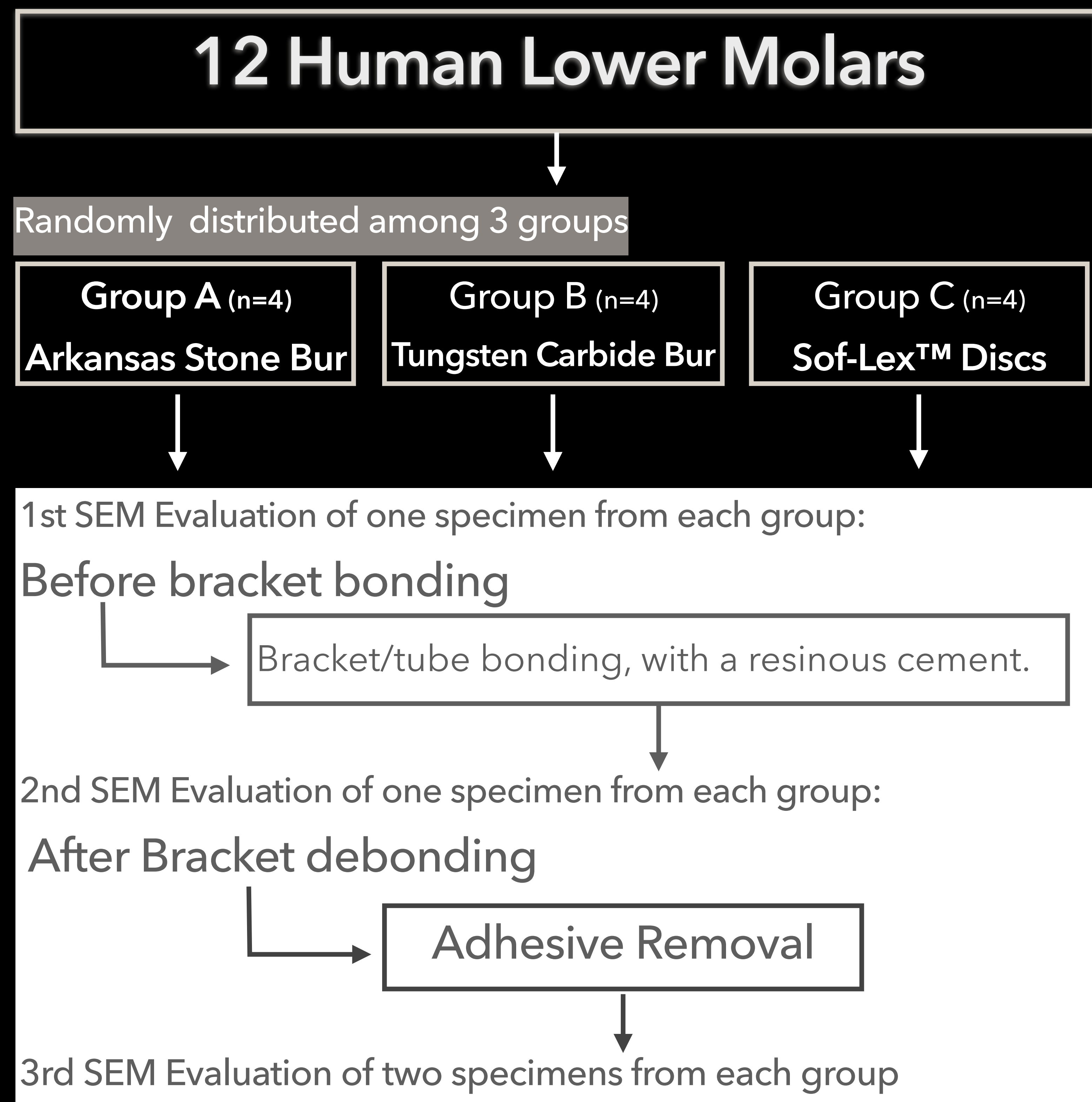
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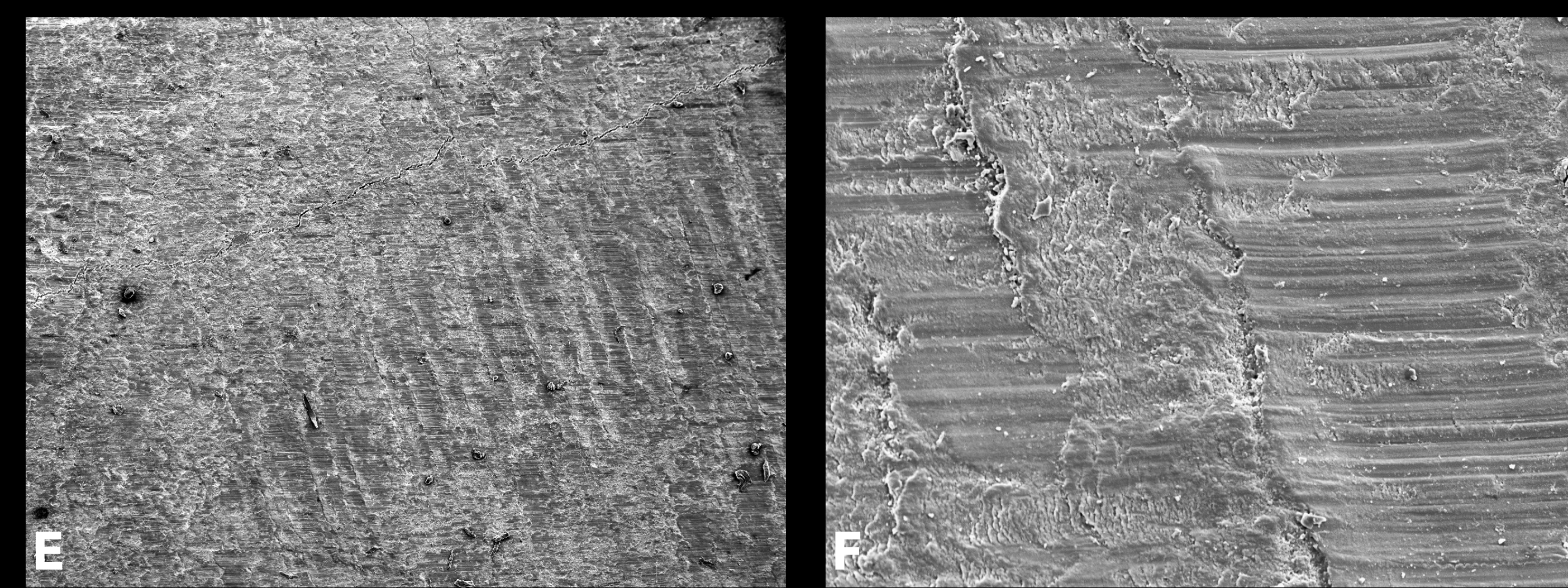
Introduction

The use of adhesive composites for orthodontic attachments bonding to enamel has become routine clinical practice¹. Since mechanical removal of remaining adhesive can induce enamel surface damage², the search for an efficient and safe method has resulted in a wide array of instruments for this procedure. The aim of this study is to characterize the effects on enamel surface of three different adhesive-removal methods, after bracket debonding.

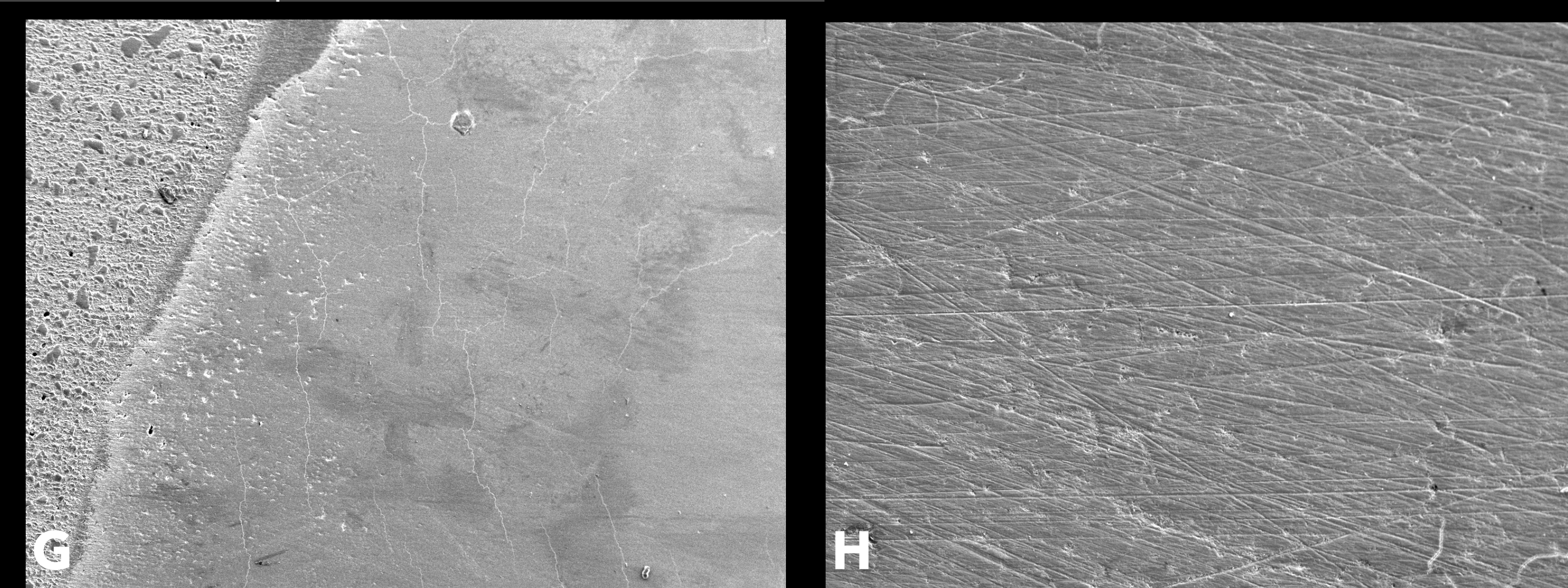
Materials and Methods



C) SEM image of group A Enamel surface after remnant adhesive removal with Arkansas stone bur: a horizontal risked pattern is formed (left side) and some remnant adhesive is present (right side). D) presence of amorphous areas due to smear layer deposition intercalated with polished remnant adhesive areas.

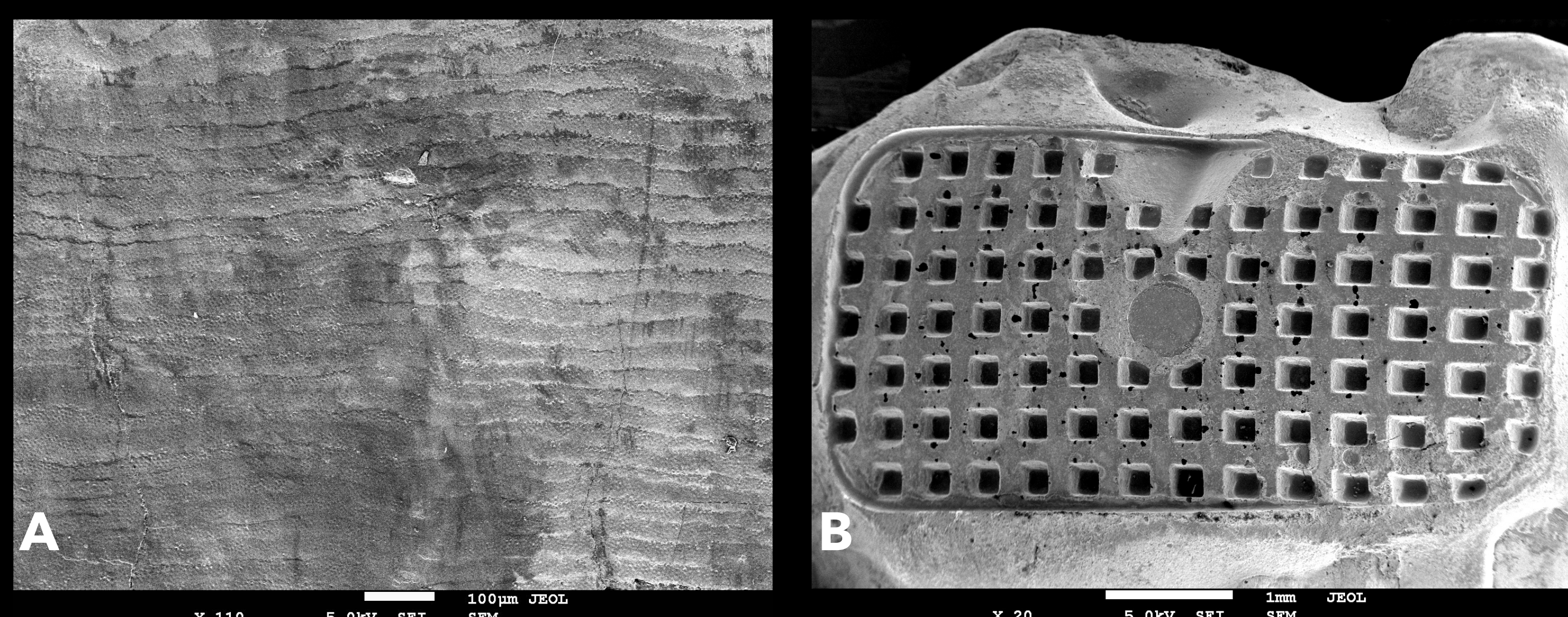


E) SEM image of group B Enamel surface after remnant adhesive removal with tungsten carbide bur: a rough surface with a vertical grooved pattern is formed. F) horizontal risks are formed within the horizontal grooves. Some unpolished areas can be observed as a result of smear layer deposition, with small risks dispersed all over the enamel.



G) SEM image of group C Enamel surface after remnant adhesive removal with Sof-Lex™ polishing discs: polished remnant adhesive is present on the left side, and a thin remnant adhesive layer with an homogeneous smooth appearance is formed in areas where nearly all adhesive was removed (right side). H) polished surface is present.

Results



A) SEM image of group B Enamel surface before bracket bonding: presence of perikymatas lines and physiologic scratches represents all surfaces preceding the bracket/tube. B) SEM image of Enamel surface after bracket debonding (group B): this image represents the most frequent adhesive failure mode where all remnant adhesive is adhered to enamel surface.

Conclusions

Although none of the three methods proved capable of removing all remnant adhesive after bracket debonding, Sof-Lex™ polishing discs had the best results in terms of homogeneity and scratch size.

References

1. Bishara, S. E., Ostby, A. W., Laffoon, J., & Warren, J. J. (2008). Enamel cracks and ceramic bracket failure during debonding in vitro. *Angle Orthod*, 78(6), 1078-83.
 2. Pont, H. B., Özcan, M., Bagis, B., & Ren, Y. (2010). Loss of surface enamel after bracket debonding: an in-vivo and ex-vivo evaluation. *AM J Orthod Dentofacial Orthop*. 138(4), 387.e1-9; discussion 387-9.