Letters to the editor*

The value of procedural specifications

Sincerely we congratulate the authors for their article, "Benzalkonium chloride in an orthodontic adhesive: Its effect on rat enamel demineralization using color-based image analysis," published in the January 2019 issue (Torres-Garcia ML, Llavore LD, Bungay A, Sarol JD Jr, Pineda RR, Penas KD. Am J Orthod Dentofacial Orthop 2019;155:88-97). It was a pleasure reading the article which examines the effect of an orthodontic bonding adhesive that contains benzalkonium chloride (BAC) which has the potential to reduce the amount and percentage of demineralization in the enamel. So we would like to present some consultation regarding this.

When performing the bonding procedure of the brackets being replaced every week for a total of 7 weeks, using the same specimen could have altered the structure of the enamel because the consecutive use in each week of the etchant can affect the pattern of surface engraving of the enamel and the reduction of the micromechanical retention can negatively affect the strength and durability of the union, causing an inadequate follow-up and that could lead to a nonspecific method of evaluation.[1]

The type of evaluation to determine the percentage of enamel demineralization can be questionable because it does not have the specifications of the delimitation of the surface area of the tooth, so the evaluation could give us unreliable data in the study.

Readers appreciate the contribution to scientific knowledge. Thank you.

Magali L. Quispe Figueroa
Lima, Perú

REFERENCE

1. Pouyanfar H, Tabaii ES, Aghazadeh S, Nobari SPTN, Imani MM. Microtensile bond strength of composite to enamel using universal adhesive with/without acid etching compared to etch and rinse and self-etch bonding agents. Open Access Maced J Med Sci 2018;6: 2186-92.

*The viewpoints expressed are solely those of the author(s) and do not reflect those of the editor(s), publisher(s), or Association.

Author's response

We appreciate your encouraging comments and value your observations. We agree that the application of an acid etchant can affect the surface roughness of enamel and micromechanical retention of an orthodontic adhesive. However, it is important to consider that in our study, all brackets attached to the experimental samples, which included brackets bonded with conventional orthodontic adhesive and adhesive incorporated with benzalkonium chloride (BAC), were debonded. To rebond the brackets, the etchant was applied to all experimental samples the same number of times, with the same technique, and the same etchant. Therefore, etchant application per se, whether it was done once or multiple times on the same specimen, was not considered to be a confounding variable and could not have altered the results of the study.

The delimitation of the surface area of each sample in our study was determined with the use of the Python programming language and the Opencv library. In preparation, the maxillary bone was colored with black permanent marker to isolate the molars in the photographs and mounted on a labeled black square background over 1-mm gridlines. It was ensured that the distance and angle between the camera lens and the tooth surfaces were the same for all subjects. Binary thresholding was used to segment the other areas from the teeth. Any pixel with a hue >40 was considered to be background, with everything else retained. Connected components analysis was performed to group neighboring nonblack pixels for segmentation from the background. The largest groups from the results of components analysis underwent another thresholding to segment the outline of the tooth. Flood-fill algorithm was applied to the segmented outline to produce a mask corresponding to the tooth areas.

In our article, we also included in detail how the demineralized areas on the teeth were determined. The pixels with hue ε [0,11], saturation ε [65,255], and value ε [180,250] were considered to be demineralized areas. Pixel values from 200 to 255 were simplified and converted to white, and those with pixel values from 0 to 199 were converted to black. The conversion of an image to black and white automatically removed noise or the unwanted information in a digital image. This transformation converted the images to measurable binary form which can be further enhanced to create more solid lines. Binarization plays an important part in improving,