COMMENTARY

Effect of Enamel Bevel on the Clinical Performance of Resin Composite Restorations Placed in Non-carious Lesions

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The significance of beveling enamel is based on two important aspects: bonding to enamel and esthetics.

BONDING TO ENAMEL

Bonding to enamel involves both clinical retention and enamel margin sealing ability. In laboratory tests, the composite bond strength to unprepared enamel is 10 to 15% lower than that obtained to instrumented or prepared enamel. In one study, Single Bond (3M ESPE) resulted in 31.5 MPa to unprepared enamel versus 34.9 MPa to prepared enamel.[1] Another study with the same etch-and-rinse adhesive obtained 31.3 MPa to unprepared enamel whereas the prepared enamel resulted in 37.7 MPa.[2] Under the scanning electron microscope (SEM), the cervical unprepared enamel acid-etching pattern (Figure 1) is not as well defined as the classical pattern[3] created on prepared enamel (Figure 2A and 2B). In Figure 1, we can also see the presence of hypermineralized cervical enamel that was not removed by acid-etching.[4]

The statistical difference in composite bond strength to enamel in laboratory tests and this distinct morphological aspect under the SEM may not translate into clinical relevance for direct composite restorations in non-carious cervical lesions (NCCL). Beveling the enamel margin does not result in better marginal sealing on incisal margin, nor better retention.[5] If we analyze Figure 1 that illustrate Costa and colleagues' article,[6] enamel area may represent between 15 and 20% of the NCCL total area. So, in this clinical situation, dentin bonding may be crucial in restoration retention. And, the composite bond strength to unprepared enamel (10–15% lower in bond strength[1,2]) will influence just a small enamel area and probably will not reflect in clinical significance over the first 3 years.[5]

This same NCCL (Figure 1 in Costa and colleagues' study[6]) had cervical-incisal height of 2 mm. If we prepared a 2-mm enamel bevel, the enamel area would be around 50% of the NCCL area available for bonding. In this way, bonding to enamel becomes an important factor that may influence the clinical performance/retention over time. However, another clinical important aspect is the acid-etching step. For example, if the operator extends the enamel over 1 to 2 mm from the NCCL cavo-surface margin, including the enamel that was not beveled, the final bonding area may be similar compared with beveling NCCL.

Beveling enamel is the most important aspect in Costa and colleagues' study.[6] Therefore, a detailed description of the bevel (cervical-incisal height, angle) and acid-etching step (how many millimeters over the enamel margin?) would help further studies to reproduce this methodology and compare results to make discussion more relevant.

Three previous clinical studies reported that beveling and acid-etching together did not influence the clinical performance of resin composite restoration in NCCL.[7–9] Only one article (published 10 years ago) compared the variable enamel bevel, having resulted in restorations without clinical difference over 3 years.[5] It is important for

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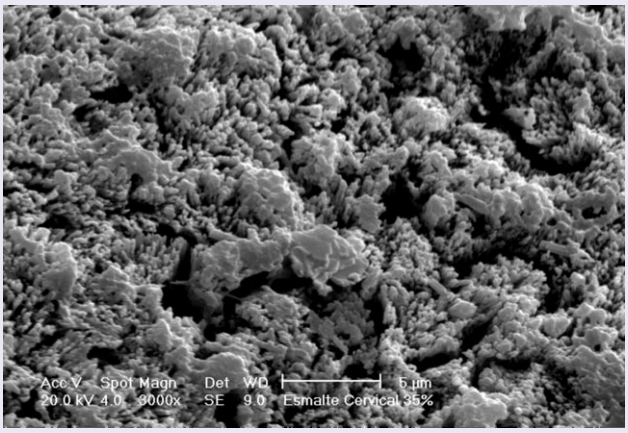

FIGURE 1. Scanning electron microscope (SEM) showing cervical enamel (without preparations) after acid-etched with 35% phosphoric acid for 15 seconds.

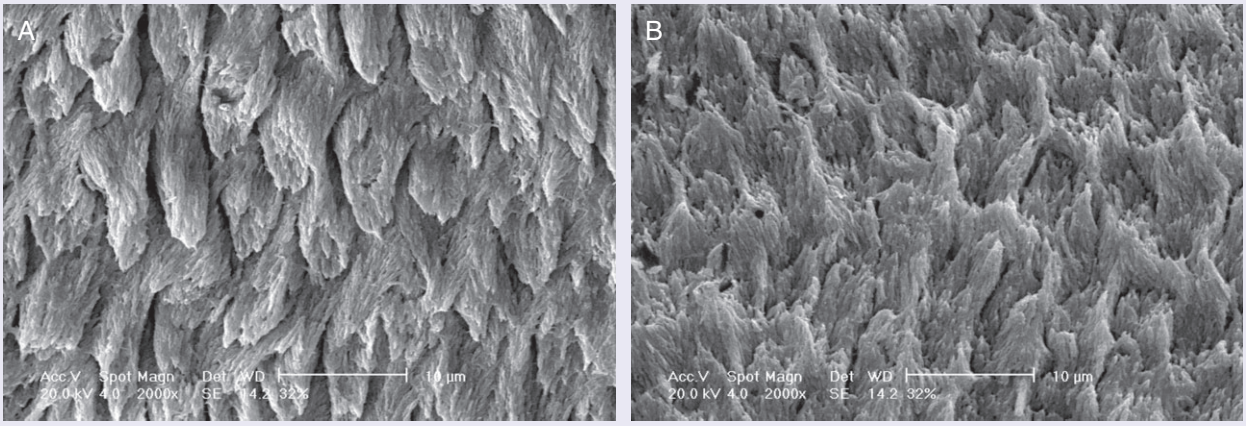

FIGURE 2. Scanning electron microscope (SEM) showing enamel acid-etched with 32% phosphoric acid for 15 seconds after roughening the enamel with a diamond bur. A, Preferential dissolution of prism boundaries was observed. B, Enamel prism cores were preferentially dissolved, with conservation of the marginal area.

clinicians to back our clinical evidence-based decisions with more than one article; with the similar results of the present revised article, we can conclude that using etch-and-rinse bonding systems bevel NCCL still not necessary considering bonding aspects (sealing and retention criteria).

ESTHETICS

The second important clinical aspect is esthetics because direct resin composite restorations are an aesthetic procedure. And, if the final color does not match the tooth remaining structure, patients might request the replacement of the restoration in anterior teeth or even in premolars. Current composite resin kits contain 35 to 40 shades and translucencies, making possible to mask marginal areas without bevel. However, this idea has not yet been supported by clinical trials with NCCL restorations. Costa and colleagues' study considered just the bonding aspects of the bevel.[6] Further clinical trials (in NCCL, Class III and Class IV restorations) should include the variable color match to study the importance of enamel bevel to mask the enamel margin. There are some indications that bevel is not

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important for color match of Class IV direct resin composite restorations.[10] One laboratory study concluded that enamel bevel did not influence esthetics results of resin composite restorations in fractured extracted incisors when dentists compared this restoration by means of photographs.[11] And one clinical trial compared 24 Class IV restorations (12 with enamel bevel and 12 without enamel preparations) and concluded that enamel beveling did not resulted in superior aesthetics after 1 week[12] and after 4 years.[13] However, this clinical trial had the bias that all Class IV restoration were placed by one operator.[12,13] So, it seems to be possible to insert aesthetic restorations in anterior fractured teeth without bevel but still be dependent to operator ability (natural manual skills and abilities exercised on cosmetic/esthetic dentistry courses) and experience.

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