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REVIEW ARTICLE

Clinical effectiveness of self-etching adhesives with or without selective enamel etching in noncarious cervical lesions: A systematic review

Wei Qin [a,b†], Lei Lei [c†], Qi-Ting Huang [a,b], Lily Wang [a,b], Zheng-Mei Lin [a,b*]

[a] *Department of Operative Dentistry and Endodontics, Guanghua School and Hospital of Stomatology, Sun Yat-sen University, Guangzhou, People's Republic of China*
[b] *Guangdong Provincial Key Laboratory of Stomatology, Sun Yat-sen University, Guangzhou, People's Republic of China*
[c] *State Key Laboratory of Oral Diseases, West China Hospital of Stomatology, Sichuan University, Chengdu, People's Republic of China*

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Abstract *Background/purpose:* Noncarious cervical lesions (NCCLs) are among the most frequent conditions requiring resin restorations. However, the major shortcoming of these restorations is limited longevity. The purpose of this study was to compare the clinical performance of self-etching (SE) adhesives with or without selective enamel etching in NCCLs.
Materials and methods: An initial literature search, with strict inclusion and exclusion criteria, was conducted in MEDLINE, Web of Science, the Wiley Online database, and the Cochrane Controlled Trials Center. Eight trials were included. Restoration retention, prevalence of marginal defects, and marginal discoloration were evaluated. Data were analyzed using the Mantel–Haenszel method with 95% confidence intervals.
Results: Results demonstrated that fewer marginal defects ($P = 0.0001$) and discoloration ($P = 0.008$) were observed with the selective enamel etching approach. The risk ratio (RR) values of the selective etching group and the nonselective etching group for marginal defects and discoloration were 0.58 (0.44, 0.77) and 0.48 (0.28, 0.83), respectively. For restoration retention, the differences between the two groups were not significant ($P = 0.44$). The RR values of the selective etching group and the nonselective etching group for

* Corresponding author. Department of Operative Dentistry and Endodontics, Guanghua School and Hospital of Stomatology, Sun Yat-sen University, Guangzhou 510055, People's Republic of China.
E-mail address: linzhengmei@hotmail.com (Z.-M. Lin).
† These authors contributed equally to this work.

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restoration retention were 1.01 (0.98, 1.04) and 1.02 (0.96, 1.08), according to a fixed-effects model at 2- and 5-year observation time, respectively.
Conclusion: Previous enamel etching resulted in fewer marginal defects and marginal discoloration, compared with using the SE approach alone. For restoration retention, the differences between the two groups were not significant. Additional longer follow ups and large-scale investigations are expected to assess possible advantages of selective enamel etching in NCCL restorations.

Introduction

Noncarious cervical lesions (NCCLs), which may be caused by erosion, abrasion, or occlusal stress,[1] are among the most frequent situations requiring adhesive techniques in modern operative dentistry.[2] It is necessary to restore NCCL to relieve hypersensitivity, to prevent further tooth structure damage, and to improve the esthetics. However, loss of retention and marginal discoloration are the main shortcomings of NCCL in adhesive technology.[3] In NCCL, restorations are placed on nonretentive cavities,[4] and the dentin exhibits a high degree of sclerosis with large amounts of minerals, rendering the establishment of a hybrid layer more difficult.[3] In addition, NCCLs have poor long-term prognoses because of the large proportion of dentin margins and the high stress concentrated on the cervical area.[5] Because the prevalence of NCCL likely increases with older age,[2] improvement in clinical longevity of resin restorations is an urgent necessity that would benefit public oral health.

In NCCL, the major part of the bonded tooth surface consists of dentin, and requires at least 50% surface bonding to dentin when restored. Mostly, the adhesive restorative material is bonded to enamel, as well as to the dentin margins on the incisal side.[6] Because no delicate rinsing step is required, self-etching (SE) adhesives present various advantages over total-adhesive procedures: they are less technique sensitive[7] and less time consuming, and they are expected to induce less postoperative sensitivity.[8] However, unlike bonding to dentin, the strength and longevity of adhesion to enamel using SE adhesives have been controversial issues. The etching pattern of enamel using SE adhesives appears to be less retentive than that produced by phosphoric acid.[9–11] As a result, selective etching of enamel with phosphoric acid prior to the application of dentin adhesives has been proposed to improve the durability of the enamel bond.[12] Miyazaki and colleagues[13] suggested that previous etching of enamel with phosphoric acid could provide greater bonding strength to enamel and better marginal sealing ability of restorations. Indeed, clinical effectiveness can be defined as "the extent to which a treatment achieves its intended effect in the usual clinical setting".[14] According to the modified United States Public Health Services (USPHS)/Ryge criteria for restoration evaluation,[15] clinical effectiveness is recorded in terms of retention, marginal integrity (absence of major or minor marginal defects), marginal discoloration, caries recurrence, preservation of tooth vitality, and postoperative sensitivity. In a review article by Heintze et al,[16] the first three (retention, marginal integrity, and marginal discoloration) were considered the "key" parameters of clinical effectiveness in determining the "overall clinical success rate". The American Dental Association (ADA) previously defined an adhesive system as having "full acceptance" if the retention rate was greater than 90% after an observation period of 18 months and if the loss of retention rate was less than 20% after 3-year follow up.

The aim of this review was to compare the clinical effectiveness of SE adhesives, with or without previous enamel beveling and selective phosphoric acid etching, in restorations of NCCL. Data were assessed by meta-analysis, which is a robust statistical methodology for synthesizing the results of several independent studies. Thus, an evidence-based review would provide more practical and reliable information to quantify this question for clinicians.

Materials and methods

Information sources and search strategy

A literature search was conducted in MEDLINE through PubMed databases, the Cochrane Center Library, the Web of Science, and the Wiley Online database. The following search terms were used in combination: "self-etching" or "self-adhesive"; "Class V" or "non carious cervical lesion" or "NCCL" or "cervical lesion"; "enamel etching or beveling or selective etching". Articles published up to August 20, 2013, were reviewed and the language was restricted to English.

Inclusion and exclusion criteria

The full texts of the retrieved articles were identified and reviewed independently by two reviewers (W.Q. and L.L), based on the inclusion and exclusion criteria (Table 1). These searches resulted in 135 primary citations matching the search terms after removing duplicates; 127 articles from the analysis were excluded for reasons such as *in vitro* study, primary teeth involved, or improper duration periods. Finally, eight studies were included for review (Fig. 1).