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Bonding Crowns and Bridges with Resin Cement: An American Dental Association Clinical Evaluators Panel survey

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Abstract

Background

Bonding crowns and bridges with resin cement can improve retention and reinforcement of the restoration. However, there is variation in the steps taken by different practitioners to achieve this goal.

Methods

The authors developed a survey on bonding dental crowns and bridges with resin cement and distributed it electronically to the American Dental Association Clinical Evaluators (ACE) Panel on May 22, 2020. The survey remained open for 2 weeks. Descriptive data analysis was conducted using SAS Version 9.4.

Results

A total of 326 panelists responded to the survey, and 86% of respondents who place crowns or bridges use resin cements for bonding. When placing a lithium disilicate restoration, an almost equal proportion of respondents etch it with hydrofluoric acid in their office or asked the laboratory to do it for them, and more than two-thirds use a silane primer before bonding. For zirconia restorations, 70% reported their restorations are sandblasted in the laboratory, and 39% use a primer containing 10-methacryloyloxydecyl dihydrogen phosphate. One-half of respondents clean their lithium disilicate or zirconia restorations with a cleaning solution. Resin cements used with a primer in the etch-and-rinse mode are the most widely used. The technique used to cure and clean excess resin cement varies among respondents.

Conclusions

The types of resin cements used, tooth preparation, crown or bridge preparation, and bonding technique vary among this sample.

Practical Implications

Although many dentists bond crowns and bridges on the basis of best practices, improvement in the process may be achieved by dentists communicating with their laboratory to confirm the steps performed there, ensuring an effective cleaning technique is used after try-in and verifying that the correct primer is used with their chosen restorative material.

Key Words

Survey, dental materials, resin cements, crowns

Survey Results

Data reflect the responses of 326 American Dental Association Clinical Evaluators (ACE) Panel member dentists in the United States.

1. Prepare surface of crown or bridge

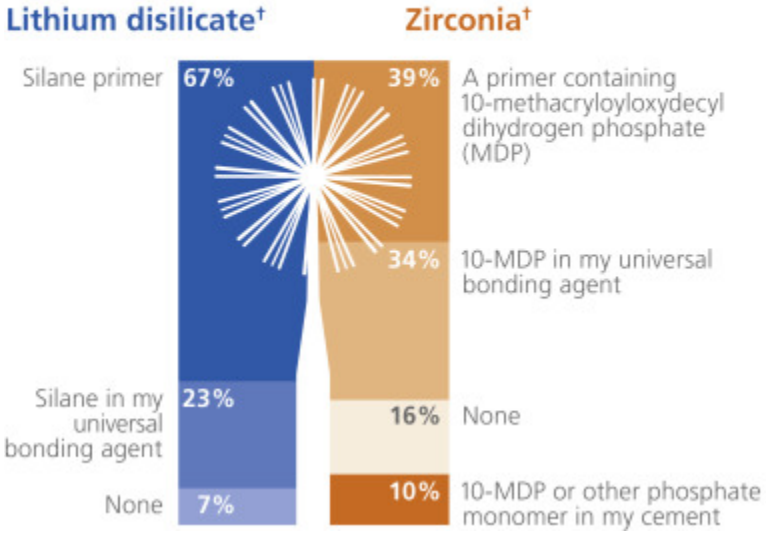
Etching **lithium disilicate** with hydrofluoric acid†

Zirconia sandblasted in the laboratory

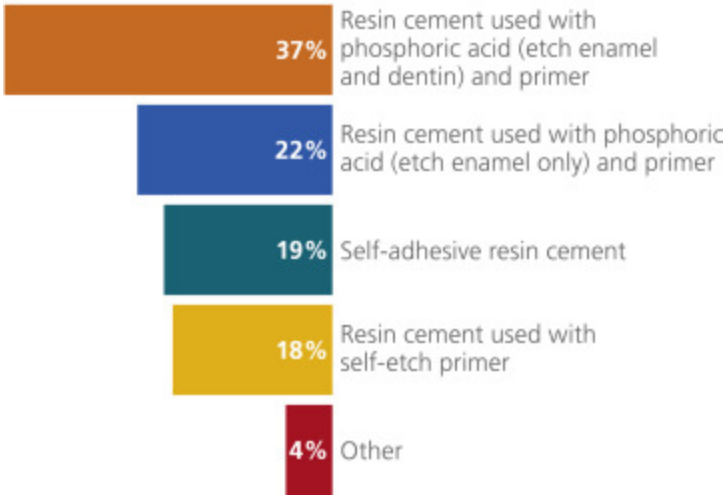
2. Clean surface of crown or bridge

50% **of respondents** clean their **lithium disilicate** or **zirconia** with a cleaning solution‡

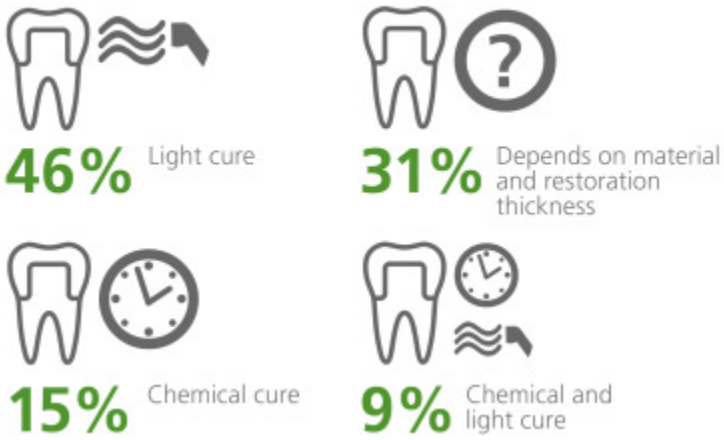
3. Prime surface of crown or bridge before bonding with resin cement



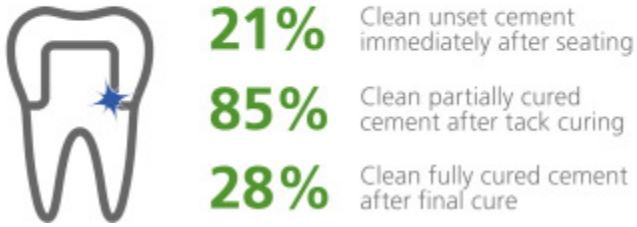
4. Resin cement choice



5. Resin cement curing



6. Clean excess resin cement (postcementation)§



Demographics (n = 326)

Age, y, Mean (Standard Deviation)	56 (13)
Female/Male, %*	22.1/77.6
Region, %†	
Northeast	21.4
Midwest	25.5

West	25.2
South	28.0
Race, %†	
White	76.6
Asian	10.2
Other	12.5
Practice Type, %	
General practice	90.1
Specialties	9.9
Occupation, %†	
Full-time practice (≥ 30 h/wk)	75.0
Part-time practice (< 30 h/wk)	6.1
Dental school faculty	8.6
Part-time faculty and practice	3.1
Other	7.1

∗ 1 respondent chose not to respond to this question.

† Percentages may not add up to 100% owing to rounding.

Clinical Insights

Resin cements may be used with an adhesive system (self etch, etch and rinse, universal) or without (self adhesive). Although self-adhesive resin cements are commonly perceived to be less retentive than those used with an adhesive system, evidence suggests there may not be a significant difference for crown cementation.[1,2] Several factors may contribute to postoperative sensitivity, such as thin dentin thickness; however, the use of either self-etch or etch-and-rinse adhesive strategies is likely not the reason for postoperative sensitivity.[3]

Cements may also be classified according to the polymerization method (light cured, chemical cured, dual cured [light and chemical]). Light-cured cements are often used to bond veneers owing to their increased working time and color stability. Although dual-cure cements polymerize with light, some dark-shade and opaque restorations may block light and require the clinician to wait for the chemical cure.[4]

Lithium disilicate is usually etched by the dental laboratory with hydrofluoric acid-etching (20-30 seconds); however, additional in-office etching can be performed after try-in without negatively affecting bond strength.[5] Zirconia is roughened by sandblasting with alumina (5-10 seconds).[6,7]

After try-in, lithium disilicate restorations can be cleaned with phosphoric acid or a cleaning solution containing either potassium or sodium hydroxide to remove saliva remnants. Alcohol and water rinsing are not sufficient for decontamination,[8,9] and sandblasting is not recommended because it will obliterate the etched surface and weaken the material.[10] Zirconia restorations can be cleaned with a cleaning solution containing either potassium or sodium hydroxide because phosphoric acid, alcohol, and water rinsing are ineffective.[11,12]

Silane primers provide a better bond to lithium disilicate than universal adhesives containing silane.[13] Primers, universal adhesives, and cements incorporating 10-methacryloyloxydecyl dihydrogen phosphate (10-MDP) are effective in bonding to zirconia.[6,7,13]

American Dental Association Clinical Evaluators Panel Methodology

History of the American Dental Association Clinical Evaluators Panel

The American Dental Association Clinical Evaluators (ACE) Panel[14] was first convened in 2006 as a volunteer group of American Dental Association (ADA) members who provided clinical feedback on professional product evaluations for a professional product evaluation newsletter known as the *ADA Professional Product Review.*

In 2013, the ADA Division of Science received software to conduct its own surveys, and the first professional product review survey was deployed in September 2013 to the ACE Panel and a separate random sample of 3,000 dentists. Since then, ADA Science Institute and ADA Science and Research Institute (SRI) staff members have worked with the ACE Panel Oversight Subcommittee of the Council on Scientific Affairs to generate ACE Panel survey results reports.

As of January 2020, the ACE Panel is used to take the pulse of ADA member perceptions and feedback regarding professional products, materials, and clinical technique. The ACE Panel comprises 900 ADA members who have the opportunity to participate in quarterly surveys.

Purpose of the American Dental Association Clinical Evaluators Panel

The ACE Panel is a network of practicing ADA members who want to learn from one another by sharing clinical insights and experiences that can help build science content focused on dental materials and clinical-based research. The ACE Panel is a valuable resource in that it enables ADA members to expand their clinical knowledge about dental products, materials, devices, and drugs. In addition, the ACE Panel provides a platform for dentists to expand their professional network of dental experts and clinical scientists. ACE Panel members also have the opportunity to identify knowledge gaps and areas of future research for the ADA SRI.

Panel Recruitment and Composition

The ADA SRI actively recruits new ACE Panel members through the ADA Meeting, targeted e-mail campaigns, ADA News stories, the ADA Morning Huddle, and science-related ADA continuing education courses for clinicians. Any ADA member can join the ACE Panel by visiting the ACE Panel home page.

Survey Development

A subcommittee of the ADA Council on Scientific Affairs selects topics for each survey on the basis of suggestions from the ACE Panel and ADA SRI priorities. After topic selection, the subcommittee and the ADA staff methodologist (O.U.) develop the survey content in the Qualtrics Research Core platform.[15] When a topic is outside the expertise of the subcommittee, ADA SRI staff members and subcommittee members consult subject matter experts. Before deployment to the ACE Panel, ADA SRI staff members and the subcommittee conduct an iterative process of pretesting the questions with another group of ADA SRI staff members and the subcommittee members to help ensure the comprehensiveness of answer choices, brevity (that is, surveys should take approximately 5 minutes to complete), clarity in

question wording, logic, and response options and response scales (for example, Likert scales and numerical rating scales), among other survey methodology best practices. ADA SRI staff members and the subcommittee deploy the surveys to the ACE Panel electronically via e-mail, including a link to access the questionnaire. All links are set to expire 2 weeks after deployment. One week after deployment, ADA SRI staff members and the subcommittee send e-mail reminders to nonrespondents.

Data Analysis and Reporting

After respondents take the survey, they immediately have access to an interim report containing aggregate data from all respondents to that particular point in time. Two weeks after deployment, ADA SRI staff members export the final data set from Qualtrics Research Core platform to a .csv file and import the file into SAS Version 9.4 for data cleaning, relabeling of variables, and conducting exploratory and descriptive analysis (for example, participant demographics [including sex, age, region, race, practice type, and occupation] and means for continuous variables and proportions for discrete variables). These analyses provide insights as to which data will be prioritized for reporting and in which format. Next, in consultation with a graphic designer, ADA SRI staff members develop infographics to illustrate the most relevant results and elaborate clinical insights to facilitate the use and contextualization of the information from the survey. The collection of final reports for ACE Panel surveys are published in *The Journal of the American Dental Association* and are available electronically in the ACE Panel report library.[16]

Footnotes

∗ Among those who use resin cement for bonding crowns or bridges, 97% bond lithium disilicate or zirconia.

† The remaining respondents selected other.

‡ Examples include Ivoclean, Zir-Clean, and Katana Cleaner.

§ This question allowed for multiple answers.

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