Intraoral Repair of Chipping Due to Cohesive Failure—Results of a Nationwide Survey Among Dentists in Germany

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Purpose: To survey the materials favored by dentists for intraoral repair of cohesive chipping.

Materials and Methods: From August 2019 to February 2020, dentists were surveyed to determine the frequency of cohesive chipping experienced within the last 3 months and to identify their preferred approaches for intraoral repair. Results: Of the participants, 42.5% observed chipping (n = 506). Participants favored the application of roughening devices, silane, and composite resins. Self-etching glass-ceramic primers or hydrofluoric acid were used for ceramic etching. Conclusion: Dentists apply a variety of materials for intraoral repair of chipping, including materials that are not approved for intraoral use.

Chipping of ceramic veneers is a frequent complication in fixed dental prostheses (FDPs) with metal or zirconia frameworks. However, intraoral repair of chipping produces a favorable mid-term survival rate of 89%. A survey among dentists from a German federal state revealed that 85.8% repaired ceramic restorations at least occasionally and preferred the application of composite resin (97.8%), surface roughening (70.1%), silane (60.7%), and hydrofluoric acid (HF; 43.0%) for treatment. Currently, a variety of different approaches attempting to simplify intraoral repair are available on the dental market, including self-adhesive composite resins and universal adhesives.

The aim of this nationwide survey was to identify the approaches preferred by German dentists for intraoral repair of cohesive chipping. The working hypothesis
was that dentists apply similar materials for intraoral repair of chipping.

**MATERIALS AND METHODS**

A survey entitled “Versorgungskompass Festsitzender Zahnerersatz” was developed and available online (SurveyMonkey) for 6 months, from August 2019 to February 2020. In addition to questions about chipping, the survey gathered information on demographic characteristics, material preferences for the fabrication of FDPs, and cementation procedures, which will be described elsewhere. Participants were asked to report the frequency of observed cases of chipping within the last 3 months and to select the approaches they use for intraoral repair from the following: rubber dam; roughening device (bur, sandblasting); HF; buffered HF; self-etching glass-ceramic primer (containing ammonium polyfluoride instead of HF or silane); silane; self-adhesive resin cement; composite resin; or ceramic veneer. The participants were also allowed to give a free response answer (eg, other materials or the trade name of the repair kit).

The survey was solicited by the German Society for Prosthodontics and Dental Material Science (DGPro) and the German Dental Association (BZÄK). The local ethical committee approved the study (156-19-ek). For statistical analysis, the frequency and number of observations were determined, and group comparisons were conducted using chi-square test assuming a level of significance of \( P < .05 \) (SPSS version 24.0, IBM).

**RESULTS**

A total of 721 dentists took part in the present survey, and 33 were excluded from the data analysis because they either did not work in Germany or because they provided less than one FDP a month. The distributions of sex (41.6% female), age group (9.3% to 28.2% in each decade from 20 to ≥ 60 years), time since graduation (56.5% within the last 15 years), first digit of postal code (5.7% to 17.1% for each of the 10 areas of the postal system), and size of the village/city in which the participant worked (41.5% in a village/city with > 100,000 inhabitants) indicated that the questionnaire was completed by dentists from all over Germany and in both rural and urban areas.

A total of 57.5% of the participating dentists responded that they had not observed chipping within the last 3 months, while 38.7% had noticed it up to three times and 3.8% had noticed it more frequently (valid data: \( N = 506 \)). A total of 89 dentists reported using a comprehensive repair kit—22.5% of these dentists used Cimara (VOCO), 21.3% used CoJet (3M), and 12.4% incorrectly specified a particular system. Dentists using a repair kit were excluded from the statistical analysis of the repair regimes. The remaining 417 participants favored the application of roughening devices (83.5%), silane

![Figure 1](image-url)
(69.1%), and composite resin (79.1%; Fig 1). Etching of the ceramic was performed with HF or self-etching glass-ceramic primers by 25.2% to 29.5% of the dentists. Free answers were given as follows: universal adhesive; dental adhesive; phosphate monomer–containing primer; phosphoric acid; opaquer; and laser conditioning. The frequency of each response was less than 3.5%. No statistically significant differences were observed after Bonferroni correction regarding the time since graduation (≤ 15 years vs > 15 years) or the number of inhabitants of the village/city the dentists worked in (< 20,000 vs 20,000–100,000 vs > 100,000 inhabitants).

DISCUSSION/CONCLUSIONS

The results of the current survey revealed that dentists in Germany apply a variety of materials for intraoral repair of cohesive chipping. The most favored regimens include surface roughening, application of silane, and composite resins, which corroborates the results of the survey from the German federal state.³ One out of four participants used unbuffered HF. Moreover, self-adhesive resin cements and self-etching glass-ceramic primers were more frequently³ recommended in the current survey, even though the latter are not yet approved for intraoral application, as they have not earned a CE mark from the European Union. Nevertheless, a recent laboratory study investigating a prototype of a self-etching glass-ceramic primer for intraoral application reported promising results.⁵ As the survey was designed to be completed within a time of 7 minutes, the limitations of the current study include the fact that only a scenario with cohesive failure surveying the preferred materials, but no repair protocols including various materials and treatment steps and no question regarding the success of intraoral repair, were offered to the participants.

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