Extraoral Cementation Technique to Minimize Cement-Associated Peri-implant Marginal Bone Loss: Can a Thin Layer of Zinc Oxide Cement Provide Sufficient Retention?

Eberhard Frisch, Dr Med Dent, MSc[1,2]/Petra Ratka-Krüger, Prof Dr Med Dent[3]/
Paul Weigl, Prof Dr Med Dent[4]/Johan Woelber, Dr Med Dent[2]

This report describes the use of laboratory-fabricated crown intaglio replicas for extraorally prepared cementation of fixed restorations to implants. This technique minimizes excess cement and may therefore reduce the risk of cement-related marginal peri-implant bone loss. It is unclear whether the remaining thin layer of luting agent provides sufficient retention if low-adhesive zinc oxide (ZnO) cement is used. In 85 consecutive patients, 113 single crowns were cemented to implants using extraoral cementation technique (ECT) and ZnO cement. All patients were followed for 6 months and investigated for decementation. Seven events of decementation (incidence: 6.19%) were found in 7 patients (8.24%). ECT may represent a viable cementation technique for implant-supported single crowns, even using low-adhesion cements. *Int J Prosthodont 2016;29:360–362. doi: 10.11607/ijp.4599*

Clinicians face two major challenges in the cementation of fixed restorations to implants: minimizing excess cement (cementation technique) and balancing retentive forces (choice of cement type). Different cement types have been used to lute fixed restorations on implant abutments, providing grades of retentive force in a range between 177 N (eugenol-free zinc oxide [ZnO] cement) and 813 N (polycarboxylate cement).[1]

Cements with high retention values minimize the risk of accidental decementation but are difficult to remove. Cements with low retention values (eg, ZnO cements) address this drawback but carry an elevated risk of accidental decementation.

In cases of subgingival crown margins, excess cement may be compressed during cementation between the implant-abutment surface and peri-implant soft tissue. This may lead to peri-implant disease[2] and even implant loss. Korsch et al[3] found subgingival cement residues at ~60% of implants after cementation with methacrylate cement. To overcome this problem, the use of abutment analogs for extraoral preparation of cementation has been proposed.[4]

This study investigated whether a newly developed extraoral cementation technique (ECT) together with low-adhesive ZnO cement provides sufficient retention for the first intraoral time period.

Materials and Methods

This retrospective study was performed in a private practice (Northern Hessia Implant Center, Hofgeismar, Germany). It evaluated the clinical outcomes of single crowns (SC) fixed on implants using ZnO cement and a new ECT technique. The study was reviewed and authorized by the Ethics Commission of the Albert-Ludwigs-University, Freiburg, Germany (application no. 46/10-120329).

All implant abutments had a minimum height of 4 mm. All SCs were manufactured using the metal-ceramic technique. Before cementation of the restorations, eugenol-free ZnO cement was prepared (TempBond, Kerr) and a replica of the internal side of the crown (pattern resin with a model pin) (Fig 1a) was fabricated by the dental laboratory. The cement was mixed and used to fill in the internal side of the crown using a small brush (Fig 1b). The replica was then inserted, and the excess cement was pressed out (Fig 1c) and removed using synthetic pellets (Pluradent) (Fig 1d). After withdrawal of the replica, the crown was ready for intraoral cementation and could be attached

[1]*Assistant Professor, Northern Hessia Implant Center, Hofgeismar, Germany.*
[2]*Assistant Professor, Department of Operative Dentistry and Periodontology, University of Freiburg, Freiburg, Germany.*
[3]*Professor, Department of Operative Dentistry and Periodontology, University of Freiburg, Freiburg, Germany.*
[4]*Assistant Professor, Department of Postgraduate Education, Faculty of Oral and Dental Medicine at J.W. Goethe-University, Frankfurt, Germany.*

Correspondence to: *Dr Eberhard Frisch, Markt 3, 34369 Hofgeismar, Germany. Fax: +49 5671 925027. Email: dres.frisch@t-online.de*

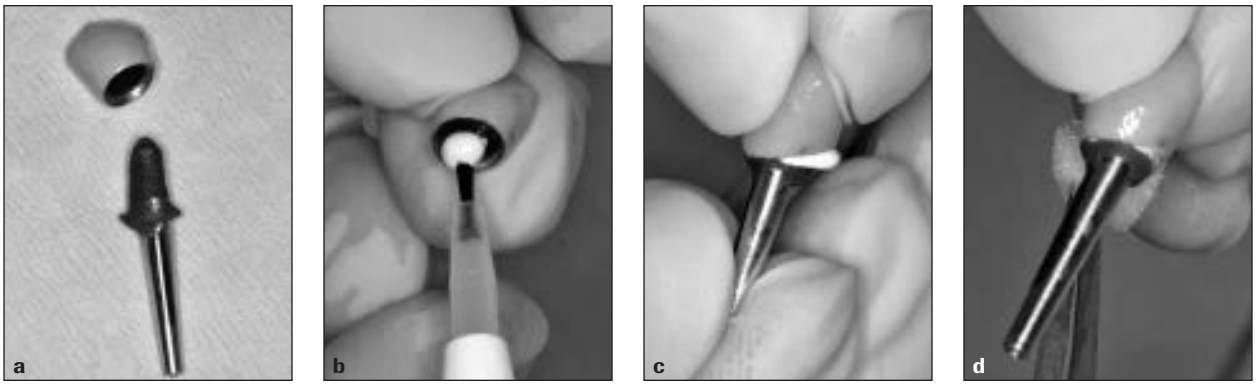

Fig 1 **(a)** Crown and intaglio replica with pin. **(b)** ZnO cement filled in with brush. **(c)** Pressing out excess cement. **(d)** Removal of excess cement.

Table 1 Characteristics of Patients (n = 85) and Implants (n = 113)

Age (y) (mean ± SD [range])	55.26 ± 14.83 (18.29–76.47)
Gender (n[%])	
Female	47 (55)
Male	38 (45)
Opposing dentition (n[%])	
Fixed	113 (100)
Implant length (mm) (mean ± SD [range])	10.7 ± 1.03 (8–14)

Table 2 Anatomical Distribution of Implants According to the FDI Scheme (n = 113)

Number of implants: maxilla (n = 66)															
0	1	6	4	6	4	4	4	5	7	4	5	5	9	2	0
Tooth position (FDI)															
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
Number of implants: mandible (n = 47)															
0	4	9	3	2	0	0	0	1	0	0	1	7	15	5	0

to the implant abutment. Only a dental probe was used for cement control/removal; no additional methods (ie, scaler or dental floss) were employed. All patients were invited to attend the supportive postimplant therapy program (SIT) of the center with a trimonthly recall.

Results

Between 2011 and 2014, 90 consecutive patients were treated with implant-supported SCs using ZnO cement and ECT in the study center. Pertinent patient data and anatomical distribution of the implants are provided in Tables 1 and 2. SIT data for 6 months were available for 85 patients with 113 SCs (dropout rate: 5.56%). At the time of data acquisition, all the implants and SCs were in situ and functional. Decementation events involved seven SCs (6.19%) in seven patients (8.24%) and occurred after a mean of 31 days (range: 1–135). No cases of gingival reddening/swelling or suppuration could be detected after 6 months of intraoral service.

Discussion

The goal of this study was to present a clinical technique that addresses the major problems of conventional cementation of fixed restorations on implants by using ECT and ZnO cement. The relatively short observation period of 6 months precluded significant conclusions. In the literature, decementation rates are nonhomogenous (up to 15% for the first 3 to 5 years using semipermanent cements[5]). A recent review found estimated decementation rates (per 100 years) of 0 for ZnP cement and 0.72 for zinc oxide eugenol cement.[6] Using ECT/ZnO, the present authors found decementation rates of 6% for the first 6 months. This seems to be relatively elevated, which may be due to the very thin layer of a low-retentive luting agent. Clinicians have to weigh the advantage of avoiding excess cement residues using ECT against an elevated risk of decementation. In the center where this study was performed, ECT/ZnO was revealed to be clinically acceptable. Moreover, it allows a quick course of cementation. Therefore, it was introduced as a rule and the likelihood of more events of decementation was accepted. In such cases, ECT with zinc phosphate cement is used for recementation. Until now, the ideal type of cement for implants has not been identified[7] and guidelines for cementation have been lacking. In the authors' opinion, the option to reliably avoid excess cement residues via ECT is worth considering irrespective of the cement type used.

Conclusions

ECT minimizes the quantity of possible excess cement. The commonly used ZnO cement together with ECT yielded sufficient retention but elevated decementation rates (6%) of implant-supported SCs for the first 6 months of intraoral service. The authors can recommend ZnO cement with ECT for clinical use. Controlled clinical trials with larger sample sizes, fixed dental prostheses, different cement types, and longer observational periods should be conducted.

Acknowledgments

The authors reported no conflicts of interest related to this study.

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Literature Abstract

Effectiveness of Implant Therapy Analyzed in a Swedish Population: Prevalence of Peri-implantitis

Peri-implantitis is a pathologic condition affecting peri-implant tissues that results in loss of supporting soft and hard tissues and is an emergent problem in dentistry. The objective of this study was to report on the prevalence, extent, and severity of peri-implantitis in a large and randomly selected patient sample (n = 588) identified from the data register of the Swedish Social Insurance Agency. The patients had received implant-supported therapy 9 years earlier and were clinically and radiographically examined. Peri-implantitis was defined as bleeding on probing or suppuration and detectable bone loss (> 0.5 mm; exceeding the measurement error). Sites with more than 2 mm of bone loss were classified as moderate or severe peri-implantitis. Peri-implantitis was found to be prevalent in 45% of the patients, while 14.5% had severe peri-implantitis. Using a multilevel regression analysis, significantly higher odds ratios were presented in patients with periodontitis (OR = 4.1) or four or more implants (OR = 15.1), as well as implants of certain brands and prosthetic therapy delivered by general practitioners (OR = 4.3) in the case of severe periodontitis. Higher odds ratios were identified for implants installed in the mandible and with crown restoration margins positioned ≤ 1.5 mm from the crestal bone at baseline. The author concludes that peri-implantitis is a common condition, the severity of which is influenced by multiple patient and implant-related factors.

Derks J, Schaller D, Håkansson J, Wennström JL, Tomasi C, Berglundh T. *J Dent Res* 2016;95:43–49. **References:** 32. **Reprints:** J. Derks, Department of Periodontology, Institute of Odontology, The Sahlgrenska Academy at the University of Gothenburg, Box 450, SE 405 30, Gothenburg, Sweden. Email: jan.derks@odontologi.gu.se —*Sheralyn Quek, Singapore*