

Mini Review

Applications to reduce the amount of excess cement for cement-retained implant supported prostheses: Mini review

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Introduction

Cement-retained implant-supported restorations has been preferred by many clinicians due to its ease of production, low cost and similarity to dental supported restorations [1]. In the literature, many complications caused by residual cement, ranging from acute severe bone resorption to implant loss, have been published as a case report/ series [2-7]. In another study [8], residual cement was seen in 81% of implant cases that are clinically identified as peri- implantitis. Hence it has been indicated that a strong relationship has been determined between residual cement and development of chronic peri-implant infection [9].

Discussion

Abutment and crowns modifications

Some researchers have prepared various modifications to the abutment or crowns to limit the amount of excess cement [10,11]. One of the techniques in the literature is cement escape hole preparation in the crown. It is called crown venting technique. Patel, et al. [10], investigated the effect of the diameter and location of the escape route holes formed on the crown copings, on the cement overflowing from the abutment-crown junction. According to the results of this study, the location of the escape hole affected the amount of excess cement; however, no statistically significant difference was found between the diameter of the hole and the excess cement. As a result; a well-positioned cement escape hole reduces the amount of excess cement overflowing the margin. In the literature, it is thought that the amount of filling the screw access gap on the abutment may also limit the excess cement [12,13]. The screw entry channel of the abutments was also used for this purpose. The most excess cement screw access hole was found on the abutments that were completely closed, while the least cement was found on the hollow and

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hole-shaped abutments. In addition, Rodrigo, et al. [14]. The fact that the screw access points of the abutments are open or closed, with the situations where the cement escape hole is opened or not opened on the cast crowns, has investigated the effect of the copy abutment method before the cementation on the amount of cement. Within the limitations of this *in vitro* study, the copy abutment protocol combined with open screw access is not recommended as it significantly reduces retention of cement-retained restorations. The possibility of causing marginal voids is the most important disadvantage of these and similar techniques that minimize the amount of excess cement [15].

Use of individual abutments

The effect of the use of individual abutments on cement is examined by the researchers. The purpose of the prospective randomized pilot trial by Kappel, et al. [16] is to evaluate the frequency and quantity of cement after cementing monolithic zirconia crowns to standard and individual ceramic abutments. A small amount of cement is detected in all individual and standard ceramic abutments, on the abutment and sulcus surfaces. In another study [17] which the frequency of cement is now evaluated after the cementation of CAD/CAM individual abutments, no clinically detectable residual cement was found in 44 of 60 restorations, although no cement is present in the peri-implant tissues around these abutments. Within the limitations of these studies, it can be concluded that the use of individual abutments no longer guarantees preventing cement in the subgingival.



The amount of cement applied

The large variability in cement quantities used indicates a lack of uniformity and precision in cement application techniques. The most popular method of cementation is to spread the cement to the restoration in a uniform thin layer. The optimum cement volume required is estimated at 3% of the total crown volume and fills about 40 μm .

Few studies have reported on quantity of cement that is required when cementing a crown restoration on implants.

Chee, et al. [23], compared 4 different methods and 2 different cements in terms of the amount of cement overflowing after cementation. In Group 1, cement is only in the inner marginal area of the crown; cervical trio of crown axial walls in group 2; In group 3, except for the occlusal surface, all crown inner axial walls; In group 4, the internal configuration of the restoration was duplicated with a silicone index and this index was applied before cementation. No significant difference was observed between two different cements (tempbond and fujicem) in terms of overflow cements. Within the limitations of this *in vitro* study, the least overflow was in Group 4. The most overflowing group was reported as Group 3. No statistically significant difference was found between groups 1, 2 and 3.

Wadhvani, et al. [18] investigated the amount of cement applied by dentists in the cementation of an implant-supported crown. In the study, the most popular forms of application are: brush application, full filling and application to crown margins. This study shows that there is no consensus about the amount of cement to be used and the method of application.

Copy abutment methods

Copy abutment technique; a copy of the substrate is produced from materials such as pattern resin, thermoplastic materials, silicone, bis acrylic composite and polymethylmethacrylate, and the cement loaded crown is placed on the substrate prior to mouth cementation, so the minimum amount of cement required for the restoration to adhere is obtained. It shows good results in reducing retention and the amount of overflowing cement [19]. The results of the 1.5-year prospective study [20] show that the use of copy-abutment technique with zinc oxide cement is effective in providing retention.

Desimentation rates did not increase compared to a conventional cementation technique. Despite the presence of subgingival crown margin, low rates in terms of peri-implant disease were found after 1.5 years. Long-term follow-up and future cements and future prospective evaluations are needed to review the findings of this study and compare this cementation technique with other approaches. In another study [21]. The resin copy abutment method provided adequate retention with zinc oxide cement; however, for the first 6 months of intraoral service, it increased the

desimentation rates of single crowns with implant support by 6%. Wadhvani, et al. [22]. In their study, the relationship between the area where the cement is applied in the crown, the placement speed of the crown and the modifications of the abutment and the overflowing cement are evaluated. When the results are examined, the area where the cement is applied and the placement speed have been shown to affect the amount of overflowing cement and the cement sealing in the step. According to the results of this study, the application place of the cement, the abutment modifications and the placement speed of the crown have important effects on the cement flow. Chee, et al. [23] compared 4 different methods and 2 different cements in terms of the amount of cement overflowing after cementation. No significant difference was found between two different cements (tempbond and fujicem) in terms of the amount of excess cement. Within the limitations of this *in vitro* study, the least overflowing group was found in the copy abutment method.

Conclusion

Various techniques have been tried to reduce excess cement. However, no technique used can prevent the cement completely. For this reason, cementation of cement-retained implant-supported restorations is a procedure that needs to be done meticulously.

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