Influence of Bonded Composite Resin Cingulum Rest Seats on Abutment Tooth Periodontal Tissues: A Longitudinal Prospective Study

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This study aimed to examine the longitudinal influence of bonded composite resin cingulum rest seats on abutment tooth periodontal tissues in removable partial dentures (RPDs). Twenty-eight patients with RPDs were enrolled in the study. Thirty-one cingulum rest seats were prepared for an anterior tooth using composite resin and a standardized method for each patient. Periodontal indices such as probing pocket depth (PD), bleeding on probing (BoP), and tooth mobility (TM) were measured at the time of denture insertion (baseline) and at least 3 months postinsertion (up to 8 years). Control data were obtained from the remaining nonprepared anterior teeth on the other side of the arch. None of the bonded resin rest seats failed, but slight abrasion was observed in 3 rest seats. No significant differences were found in terms of PD, BoP, and TM between baseline and postinsertion data for abutments with bonded resin rest seats and controls. It is suggested that bonded composite resin cingulum rest seats can be used longitudinally without damaging the periodontal tissues of abutment teeth. *Int J Prosthodont 2008;21:37–39.*

Rest seats for removable partial dentures (RPDs) are used to support and transmit functional forces to abutment teeth. For anterior teeth, either incisal or cingulum rest seats are used for this purpose. In terms of momentum from the rotational center of anterior teeth to rest seats, cingulum rest seats are superior to incisal rest seats.[1,2] Since anterior teeth lack sufficient enamel volume for preparation of a cingulum rest seat without dentin exposure,[3] it has been suggested to fabricate cingulum rest seats using a cast,[4–6] orthodontic brackets,[7] or composite resin.[8,9] Due to their handiness, esthetics, and cost effectiveness, bonded composite resin rest seats have been frequently used for removable prostheses.[10–12]

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Toth et al[8,9] reported that the bonded method provided sufficient bonding strength for clinical use. Janus et al[6] reported the longitudinal clinical success of the resin-bonded metal rest seat method over a period of 3 years. However, as reported by Kern and Wagner[13] and Zlataric et al,[14] there are still concerns regarding the longitudinal influence on abutment periodontal tissues triggered by altering tooth contours.

The present study aimed to examine the longitudinal efficacy and influence of resin-bonded cingulum rest seats on abutment tooth periodontal tissues in RPDs.

Materials and Methods

Twenty-eight patients (10 men and 18 women; age range: 44 to 83 years; mean age: 67 years) wearing RPDs were enrolled in this study. Patient selection was carried out on the basis of convenience. Informed consent was obtained from all patients. The observation period ranged from 3 months to 8 years (mean: 35 ± 27 months). Posttreatment checkups were regularly scheduled every 3 to 6 months after denture insertion.

Following initial preparation with scaling and root planing and prior to final impression taking, 31 bonded resin cingulum rest seats were prepared on an anterior tooth using composite resin (Clearfil, Kurary) and a standardized method, as described by Toth et al.[8,9]

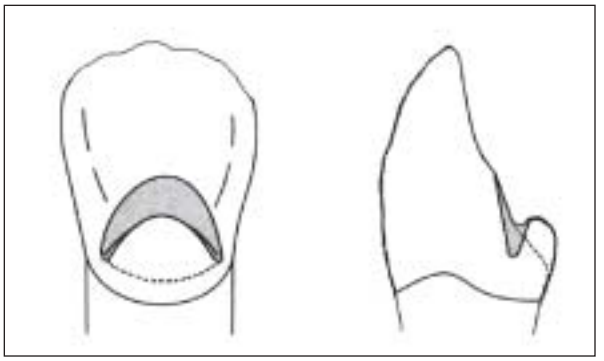

Fig 1 Schematic drawing of the design for bonded composite resin rest seats. The *dotted line* indicates the margin of the bonded composite resin.

Since the majority of RPDs were for mandibular bilateral distal-extension cases (Kennedy Class I: 20 RPDs, Kennedy Class II: 6 RPDs, Kennedy Class III: 2 RPDs), rest seats were prepared mainly on the lingual side of mandibular canines or lateral incisors for additional indirect retention, along with the direct retention from premolars. For the 2 maxillary Kennedy Class I RPDs, rest seats were prepared on maxillary canines. To orient the force exerted on the rest seat along the longitudinal axis of the tooth, a slightly rounded notch was prepared in the rest seat, as suggested by Pamir et al[15] (Fig 1). Rest seats were prepared at least 3 mm from the cervical gingiva. The RPDs were designed by a single operator, with the metal rest extended from the distal aspect to the rest seat as part of the chromium/cobalt metal framework to avoid the minor connector crossing the gingiva. The RPDs were opposed by complete dentures (10 patients), RPDs (13 patients), or natural dentition (5 patients).

Periodontal indices such as probing pocket depth (PD) with the CP11 probe, bleeding on probing (BoP), and tooth mobility (TM) according to Lindhe's classification[16] (scores from 0 to 3) were measured at the time of denture insertion (baseline) and at least 3 months postinsertion (up to 8 years). Control data were obtained from nonprepared remaining anterior teeth. The same operator measured periodontal indices throughout the study. Bonding failure and abrasion of the bonded resin rest seat were also checked at each visit with the tip of a periodontal probe.

Instructions were provided for patients regarding oral hygiene and RPDs, and a toothbrush, interdental brush, dental floss, and denture-cleaning brush were repeatedly provided during the study. Additional professional mechanical tooth cleaning was provided if required at the recall visit.

Statistical analysis was performed using the Wilcoxon signed rank test, a chi-square test, and a 1-way analysis of variance with the post hoc test or Welch method ($P < .05$).

Table 1 Mean Values for Periodontal Pocket Depth (PD), Tooth Mobility (TM), and Bleeding on Probing (BoP) at Baseline and Postinsertion for Teeth with Bonded Composite Resin Rest Seats (BCRRS) and Controls*

	Baseline	Postinsertion
PD (mm)		
BCRRS	3.10 ± 1.25	2.84 ± 0.78
Control	3.22 ± 1.18	3.06 ± 0.77
BoP (%)		
BCRRS	32.2	19.4
Control	25.8	16.1
TM		
BCRRS	0.39 ± 0.56	0.29 ± 0.59
Control	0.41 ± 0.56	0.39 ± 0.67

*No statistically significant difference between BCRRS and control data.

Results

Bonding Failure

There were no incidents of bonding failure among the 31 rest seats, with minimal discoloration around the margin area of the bonded resin. Discoloration was observed along the marginal area of 2 rest seats, while abrasion was observed in 3 rest seats. No cracking or chipping was observed.

Probing Depth

Changes in PD at experimental and control sites are shown in Table 1. Wilcoxon signed rank test indicated that there was no significant change between baseline and postinsertion PD at either the rest seat side ($P = .185$) or control side ($P = .444$). There were no significant differences in PD changes between experimental and control sites according to the Welch method ($P = .722$).

Bleeding on Probing

BoP was observed at 10 abutments at baseline and at 8 abutments postinsertion. However, BoP was also observed at 8 abutments at baseline and at 6 abutments postinsertion at the control site in those subjects (Table 1). There were no significant differences in BoP between experimental and control sites using the chi-square test ($P = .448$).

Tooth Mobility

Changes in TM at the experimental and control sites were analyzed with the Wilcoxon signed rank test. No significant changes between baseline and postinsertion values were found at either the rest seat side ($P = .405$) or the control side ($P = .793$) (Table 1). In addition, there were no significant differences in TM

changes between the experimental and control sides according to the Welch method ($P = 1.0$).

Discussion

As reported by Likeman and Juszczyk,[2] rest seat preparations significantly increase the supporting capability of RPDs and direct the functional force to the longitudinal axis of the abutment tooth. For anterior teeth, either cingulum or incisal rests can be used; however, cingulum rests offer several advantages compared to incisal rests. They show better esthetics, provide favorable force transmission by directing forces to the rotational center of a tooth, and increase the supporting capability of the denture base.

There are only a couple disadvantages to cingulum rest seats. One disadvantage is the exposure of dentin during rest seat preparation as a result of the thin dentin layer around the cingulum area of anterior teeth.[3] The other disadvantage is the alteration of tooth contour, which may lead to periodontal problems by hindering self-cleaning capability and creating cleaning difficulties for the patient.[17]

Among the other methods or materials used for creating cingulum rest seats, bonded composite resin has been used for prosthodontic treatments such as alteration of abutment tooth contour, increase in occlusal contacts, and reestablishment of vertical dimension of occlusion.[10–12] The advantages of this method are cost effectiveness, esthetics, and minimal invasiveness without the risk of dentin exposure, which may lead to secondary caries. As previously reported,[3] the primary concern during rest seat preparation with bonded composite resins is dentin exposure through the enamel; however, there has been no incident of pain reported by patients without local anesthesia.

With regard to changes in periodontal indices, this study clearly indicated that teeth with bonded composite resin rest seats showed no risk of reduced periodontal health compared to control teeth. Since increases in PD and TM are caused by poor oral hygiene and signs of periodontal disease were observed in both experimental and control teeth, careful and repeated oral hygiene instructions remain indispensable.

This study had some limitations. A limited number of maxillary cases were used, and there were insufficient matches in terms of gender, age, and remaining tooth position, although a single operator performed all measurements with the split-mouth design. Phoenix et al[18] and Tietge et al[19] indicated that composite resins are susceptible to wear and may lose effectiveness. However, the wear of rest seats was observed in only 3 abutments in the present study. A more detailed investigation of wear should be carried out in the future.

Conclusion

Despite the limited numbers of patients and abutment teeth, it is suggested that bonded composite resin cingulum rest seats can be used longitudinally without damaging the periodontal tissues of abutment teeth.

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