# **Overeruption of Teeth Opposing Removable Partial Dentures: A Preliminary Study**

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One of the purposes of prosthodontic treatment is to prevent overeruption of opposing teeth, but there is currently minimal literature describing the efficacy of removable partial dentures (RPDs) in performing this function. This study investigated overeruption following RPD treatment. The study participants were 33 patients treated with RPDs, and overeruption was evaluated by comparing the surface computer-aided design data of dental casts made at two different time points—before and after RPD treatment. Overeruption was observed in 38.1% of teeth opposed by the RPD, which was much less than the proportion of teeth that overerupted when not opposed by the RPD. *Int J Prosthodont 2014;27:475–476. doi: 10.11607/ijp.4006* 

Replacement of missing teeth after extractions (eg, with a fixed partial denture, implant, or denture) is a fairly standard protocol.<sup>1</sup> If missing teeth are not replaced, opposing teeth can overerupt if they remain out of occlusion.<sup>2–5</sup> Kiliaridis et al<sup>3</sup> reported that overeruption occurred in 82% of unopposed teeth, and Craddock and Youngson<sup>4</sup> estimated that 83% of unopposed posterior teeth showed signs of overeruption. Therefore, prosthetic treatment should preclude such overeruption. However, overeruption can still occur even in patients treated with removable partial dentures (RPDs), and there is little evidence for or against the efficacy of RPDs in preventing this phenomenon. This study investigated tooth overeruption after prosthetic treatment with RPDs.

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## **Materials and Methods**

Study participants were recruited from the outpatient roster of the Department of Removable Prosthodontics at the Osaka University Dental Clinic. Thirty-three patients (11 men, 22 women; mean age: 69.0 years [SD: 11.1 years]) were included. The inclusion criteria were as follows: (1) healthy adult patients receiving a new set of RPDs, and (2) no additional prosthetic treatment required during the observation period.

Two impressions were made: one before the final impression for fabricating the RPD, and a second at the recall visit following provision of the RPD. Impressions were made using standard impression stock trays and irreversible hydrocolloid impression material (Aroma Fine Plus, GC). Impressions were reproduced in type III die stone (New Plastone, GC) and trimmed.

Evaluation of overeruption was performed in two stages. First, the casts were placed in front of a threedimensional (3D) digitizer (VIVID 910, Konica Minolta Sensing) and scanned to produce surface data. The surface data of the baseline and follow-up casts were superimposed on reference teeth using computeraided design (CAD) software (Polygon Editing Tool v2.0, Konica Minolta Sensing; Fig 1). Reference teeth were the RPD abutment teeth that contact the RPD metal framework. Vertical tooth displacement was calculated with CAD software (3D-Rugle5, Medic Engineering). *Overeruption* was defined as vertical displacement greater than 200 µm, by considering the margin of various errors.

The proportion of overerupted unopposed teeth was compared with that of opposed teeth using the chisquare test. Data were analyzed using SPSS v19.0 (IBM).

The study protocol was approved by the Institutional Review Board of the Osaka University Graduate School of Dentistry (no. H24-E6).

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Fig 1 Procedure for evaluating overeruption.



Fig 2 Overerupted teeth: proportion of total sample.



Fig 3 Proportions of overerupted and nonovererupted teeth when opposed by natural teeth, RPD teeth, and when unopposed.

#### Results

In total, the eruption status of 382 teeth was measured. The mean observation period was  $1.9 \pm 1.0$ years (mean  $\pm$  SD). Overeruption was observed in 48 teeth (12.6%; Fig 2). Of these 48 teeth, 4.1% were opposed by natural teeth, 38.1% were opposed by RPDs, and 57.1% were unopposed (Fig 3). Overeruption was significantly less frequent in teeth opposed by RPDs than in unopposed teeth but more frequent than for teeth opposed by natural teeth (P < .001; Fig 3).

#### Discussion

These findings should be considered in the context of the limitations and strengths of this study. The patient sample was too small to make conclusions for all patients, and the observation period was short (mean: 1.9 years), because we should correct for those patients whose prosthetic or restoration status was unchanged over the observation period. Nevertheless, this study is the first to investigate tooth overeruption after RPD treatment by comparing the two casts made at different time points.

Although it is common to explain to patients the effects of prosthetics in preventing overeruption of opposing teeth, there has been until now a lack of definitive evidence to support this. This study has shown that the degree of overeruption is significantly but, importantly, not entirely decreased by RPD treatment. This component of overeruption that occurs despite the RPD may be due to displacement of the denture by residual ridge resorption or to attrition of the artificial teeth. For RPDs to continue providing effective resistance to overeruption, regular relining and/or reconstruction of the artificial teeth is advisable.

### Conclusions

It appears that prosthodontic treatment with RPDs is only partially effective in preventing overeruption of opposing teeth and that scrupulous RPD maintenance is required to fulfill its intended role.

#### **Acknowledgments**

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

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