

EFFECT OF REMOVABLE PARTIAL DENTURE ON PERIODONTAL HEALTH

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ABSTRACT

Objective: To assess the effect of cobalt chromium removable partial dentures on the periodontium of the abutment teeth in comparison with that of the remaining dentition, and to investigate the effect of regular checkups on periodontal health for patients using this type of prosthesis.

Methods: Thirty-six patients wearing cobalt chromium removable partial dentures for at least three years were included in the study. Teeth used as direct or indirect retainers for the removable partial denture were considered as the study group, while the remaining dentition in the same jaw was considered as the control group. The following periodontal parameters were registered for each tooth, plaque and gingival indices, clinical attachment level and tooth mobility. Patients were divided into two groups as regular and irregular attendants.

Results: Among the 36 patients, 15 were regular attendants. A significant difference in clinical attachment level and plaque accumulation was detected between study and control group of teeth. In addition there was a statistically significant difference in all periodontal parameters between regular and irregular attendants.

Conclusion: Teeth used as direct abutments for cobalt chromium removable partial dentures are more periodontally affected than the remaining teeth. Patients with removable partial dentures should be included in regular periodontal and oral hygiene recall appointments.

Key words: Cobalt chromium, Removable partial denture, Periodontal health, Regular checkup.

JRMS Dec 2004; 11(2): 17-19

Introduction

Epidemiological studies in both animals and humans have shown that plaque is an essential factor in the etiology of periodontitis. It has also been shown that gingivitis and periodontitis can be satisfactorily treated if plaque control is established⁽¹⁾.

Placement of a removable partial denture (RPD) in the oral cavity seems to influence the existing ecological situation by causing increased plaque formation on the remaining teeth⁽²⁾.

Many investigators have also studied the effect of RPDs on gingival health. Orr *et al*⁽³⁾ reported an increase in gingival index after 21 days of constructing acrylic resin base plate, this increase occurred rapidly and irrespective of the degree of the gingival relief, and this was in agreement with Hobkirk and Strahan⁽⁴⁾ who concluded that partial dentures should provide minimal coverage. The pocket depth was also affected by the placement of RPD since many studies reported an increase in the probing pocket depth following the use of

these prosthesis^(5,6).

Mobility of the abutment teeth is influenced by many factors, such as the location of the rests, the contour and rigidity of the connectors, and the extension of the partial denture⁽⁷⁾. Fenner *et al*⁽⁷⁾ and Browning *et al*⁽⁸⁾ reported an increase in the mobility of abutment teeth and concluded that it has an undesirable effect on the distal extension of a RPD. Many studies have investigated the effect of regular checkups on periodontal health, and most of these studies insisted on periodic recall^(5,9,10). Bergman *et al*⁽⁶⁾ designed a study and compared it with a previous one performed by Bergman *et al*⁽⁹⁾, where they compared two groups of patients with partial dentures that differ from each other on the basis of periodic recall. For all periodontal parameters the results were somewhat better for these patients who had regular checkups than those who did not. This study describes the partial dentures in general and Co-Cr- type in specific.

This study was conducted to assess the effect of cobalt chromium RPD on the periodontium of the

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Manuscript received April 14, 2002. Accepted August 7, 2002.

abutment teeth with that on the remaining teeth and to investigate the effect of regular checkup on periodontal health of patients using this type of prosthesis.

Methods

All patients attended the dental department at King Hussein Medical Center (KHMC) between February and April 2001, and wearing cobalt chromium RPD for at least three years were included in this study. Patients with systemic diseases or taking regular medications were excluded. A minimum of 10 teeth excluding third molars had to be present in the mouth.

Teeth used as direct or indirect retainer for the partial denture were used as a study group, while the remaining teeth in the same jaw were used as a control group.

Each of the eligible patients was examined once by the same periodontist and the following periodontal parameters were recorded for each tooth present:

- Clinical attachment level (CAL) was measured using a Williams Probe and read to the nearest millimeters (mm) at four areas (mesiobuccal, distobuccal, mesiolingual and distolingual) for each tooth.
- The gingival condition using the gingival index (GI) of Löe and Silness⁽¹¹⁾.
- The accumulation of supra-gingival plaque using Silness and Löe plaque index (PII)⁽¹²⁾.
- Tooth mobility was recorded as follows:
0 = no mobility.
I = mobility < 1mm in the horizontal direction.
II = mobility > 1mm in the horizontal direction.
III = mobility in the vertical direction.

A history of attendance to the dental clinic for routine checkup at least once a year was recorded to assess the patient care during the period of using the RPD. Accordingly, the patients were divided into two groups as regular and irregular attendants. Verbal consent was obtained from each of the participants. Statistical analysis was performed using paired t-test. The level of statistical significance was established at $p < 0.05$.

Results

Thirty-six patients were examined at one clinical visit by one examiner in order to exclude inter-examiner variation. The age of the patients ranged between 30-74 years (mean 52.9 ± 11.4). Fifteen patients were regular attendants to the dental clinic while 21 patients were irregular attendants.

Table I represents a comparison for all periodontal parameters between abutment teeth and the remaining dentition. The results for CAL and PII revealed a statistically significant difference between teeth used as direct abutments (study group) and the remaining teeth (control group) in which the p value was < 0.001 and < 0.02 respectively. While for the GI and mobility, there was no statistically significant difference between the study and control groups of teeth.

Additionally, Table II represents comparison for all periodontal parameters between regular and irregular attendants to the dental clinic during the period of using the RPD. There is a statistically significant difference in all periodontal parameters between regular and irregular attendants. This difference is in favor of regular attendants. However, irregular attendants had a relatively good periodontal health.

Discussion

It seems that insertion of RPF creates the potential for quantitative and qualitative changes of plaque formation on the remaining teeth that is representative by proliferation of spiral organisms⁽¹³⁻¹⁵⁾. Thereby there is an increased risk for development of gingivitis and periodontitis, and this was reflected in our results.

In this study, clinical attachment level was used because it is a more representative measurement of periodontal ligament destruction than clinical pocket depth. Comparing our results with others showed that our mean CAL, GI, PII, and Mobility (mob) were higher than that reported by Bergman and Ericson⁽⁵⁾. This difference can be partly explained by the fact that the prevalence of gingival disease in our study population was high. Education, awareness, and motivation during the stage of RPD construction were not assessed in our study. Due to this fact, it is important to stress the point of increase awareness, level of education and motivation in a similar condition. Also it may be thought that patients who were included in this study had from the beginning somewhat worse values for the periodontal parameters examined. Therefore comparing our results with that of Bergmen and Ericson⁽⁵⁾ or Bergmen *et al*⁽⁶⁾ must be made with great caution.

Regarding the reaction of the periodontium to RPDs, several studies^(4-6,14) reported a variation between extensive to moderate periodontal changes after construction of RPDs. But most of the longitudinal studies have shown that wearing RPDs is a threat to periodontal tissues and lead to increased mobility of abutment teeth^(16,17). If the prosthesis is regularly checked and indicated procedure is performed, the forces transmitted to teeth do not seem to induce periodontal breakdown. Although it may be thought that patients who did not follow the recommendation to visit a dentist at least once a year already had from the beginning somewhat worse values for the periodontal parameters examined.

Therefore patients who are going to receive RPDs should be carefully motivated and instructed in order to prevent periodontal diseases. A tidy and simple design of RPD will minimize the accumulation of food debris and plaque on teeth and gingival margins. With carefully planned prosthetic treatment and adequate maintenance of the oral and denture hygiene, little or no damage will be caused to the remaining teeth and their periodontal support.

Prior to the construction of RPDs, periodontal status

was not studied. It is too difficult in a hospital-based study with frequent transfers of dentists to follow the same patients over a long period of time. Therefore we

recommend a prospective longitudinal investigation to study the effect of RPDs on the periodontium.

Table I. Comparison of periodontal parameters between study and control group teeth

Periodontal Parameter	Study group teeth	Control group teeth	P value
	Mean, SD	Mean, SD	
CAL*	4.8± 1.6	4.0± 1.2	0.00
GI**	1.4± 0.6	1.3± 0.7	0.14
PII***	1.4± 0.8	1.3± 0.7	0.02
Mob [^]	0.4± 0.4	0.3± 0.4	0.20

Table II. Comparison of periodontal parameters between regular and irregular attendants to dental clinic

Periodontal Parameter	Regular attendants	Irregular attendants	P value
	Mean, SD	Mean, SD	
CAL*	3.5± 1.2	5.6± 1.3	0.00
GI**	1.1± 0.6	1.5± 0.5	0.01
PII***	1.0± 0.6	1.8 ± 0.7	0.00
Mob [^]	1.9± 0.3	0.5 ± 0.4	0.01

* CAL: Clinical attachment level

** GI: Gingival index

***PII: Plaque index

[^] Mob: Mobility

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