

Original Research

Periodontal Status of Teeth in Contact with Denture in Removable Partial Denture Wearers in Hazaribag City, Jharkhand

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Abstract

The aims of the study were to determine the periodontal status of the teeth in contact with removable partial dentures (RPDs) and to compare them with other teeth in the opposing arch not related to any prosthesis. The periodontal status was also assessed in relation to the age of the dentures. Four hundred and twenty-seven patients treated with RPDs from 2019-2021 were recalled for examination. Prior to prosthetic treatment they were given periodontal treatment and fillings when required. Initially all were given oral hygiene instructions and motivation. They were reviewed regularly only on a short-term basis. Eighteen patients were suitable for the present study comprising of eight males and 10 females whose mean age was 41 years. The RPDs were in use from 1-ñ to 8 years (mean 4-6 years). The following parameters were assessed: Plaque index (PII), Gingival index (GI), loss of attachment (LA) and tooth mobility. The wearing of RPDs resulted in higher PII, GI and LA compared to the controls and these differences were statistically significant. There was an increased frequency of higher PII, GI and LA with the increase in denture age. Minor changes in tooth mobility were observed. It was concluded that the wearing of RPDs was detrimental to periodontal health in patients whose oral hygiene was less than adequate.

INTRODUCTION

Various studies have been carried out to determine the effect of RPDs on the oral structures particularly the periodontium and the remaining

teeth. The results of these studies are not unanimous. Earlier studies reported an increased occurrence of caries and periodontal disease which were extensive.^{1,2,3} Others found moderate

periodontal injuries^{4,5,6} or practically no progression of caries and periodontal disease after insertion of RPDs.⁷ RPDs promote plaque formation on abutment teeth and teeth in contact with them.^{8,9} Plaque is the main aetiological agent in the initiation and progression of chronic inflammatory periodontal disease¹⁰ (Loe, 1983). Some cross-sectional studies found that RPD wearers had significantly more periodontal pockets and a larger number of deeper pockets compared to the control subjects.^{11,12} On the other hand it was shown that maintenance of good oral hygiene by the patients together with periodic professional examinations and maintenance therapy resulted in little damage¹³ or no damage to the periodontal structures.¹⁴ The purpose of the study was to determine the periodontal status of teeth in contact with RPDs and to compare them with other teeth not related to any prosthesis in the same patient group. The periodontal status of the former was also assessed according to the age of the denture (length of time of denture usage).

MATERIAL AND METHODS

The material for this study comprised patients who received prosthetic treatment for RPDs at the Department of Prosthodontics, crown & bridge, Hazaribag College of Dental Sciences & Hospital, Hazaribag.

The treatment was carried out by undergraduate dental students under the supervision of experienced clinical instructors. Each step in the treatment procedure was checked by the instructors. Prior to prosthetic treatment, all the other necessary dental treatments such as periodontal and restorative (conservative) treatments were carried out. These patients were not put on a long-term recall programme but were advised to see their regular dentists instead. On a short-term basis, the patients were reviewed by the students concerned until the latter graduated. All patients who had RPDs made in the stated time period, a total of 427, were recalled for the examination. Of the patients who responded, only those who were wearing RPDs in one arch were included in this study. The remaining natural teeth in the opposing arch acted as controls. In the arch with prosthesis, only the teeth in direct contact with

the prosthesis were utilized for the study. Those not in direct contact with any part of the denture were excluded.

The following parameters were assessed by one examiner sequentially; plaque index (PII),¹⁵ gingival index (GI),¹⁰ probing pocket depth, gingival recession and tooth mobility.¹⁴ The readings for PII, GI, probing pocket depth and gingival recession were taken only on the palatal or lingual of each test and control tooth. Three readings were taken for each tooth, i.e. mesio-lingual, mid-lingual and disto-lingual (or palatal for the maxillary tooth), and the mean was taken as the score for this tooth. The probing pocket depth was measured to the nearest millimetre with a periodontal probe (William's No. 14) from the gingival margin to the base of the pocket and placed parallel to the long axis of the tooth. This procedure was repeated for measurement of gingival recession, except that the measurements were taken from the gingival margin to the cemento-enamel junction. The mean values obtained for pocket depth and gingival recession of a corresponding tooth were summed to obtain the mean value for loss of periodontal attachment (LA) of that tooth. Chi-square test was utilized for the statistical analysis of the collected data. This was done on a computer using a statistical program (Amstat, S.C. Coleman, 1988, Leicestershire, U.K.). The level of significance was taken to be $P < 0.05$.

RESULTS

Of a total of 427 call cards sent by mail, only 83 patients responded and returned for examination. This comprised 19.4% of the original group which received removable partial dentures. From this group of 83 patients who responded, only 18 were found to be suitable for this study, i.e. those having a removable partial denture in one arch with an opposing natural dentition in the other arch. This group comprised of eight males and 10 females between the ages of 21 and 65 years. The mean age was 41 years. At the time they were recalled for examination, the age of dentures ranged from 1-5 to 8 years with a mean of 4-6 years. All the RPDs were constructed to replace missing teeth in the maxilla using acrylic resin.

To determine the effect of dentures age on the periodontium, the patients were divided into three groups; <3 years, 3-6 years and >6 years denture usage. There were six patients in each group respectively.

Table 1 shows the frequency distribution of PII groupings according to the teeth in contact with denture, control teeth and abutment teeth. The PU score of 0-1 had the highest frequency distribution for all the three groups of teeth i.e. 65%, 58% and 49% for the control teeth, abutment teeth and teeth in contact with denture respectively. There was a general trend of a decrease in the frequency distribution for all the three groups of teeth with increasing PII score. Statistically significant difference in the PII score was found only between the teeth in contact with denture and the control teeth groups ($F < 0.05$). The frequency distribution of the GI groupings according to the three groups of teeth is shown in Table 2. There was a similar trend in the frequency distribution between the teeth in contact with denture and the abutment teeth. For both these groups, the GI score of M- 2 had the highest frequency of occurrence (50% and 49% respectively). For the control teeth, the GI score of 0-1 had the highest frequency of occurrence (48%). Comparison between groups showed statistically significant differences in GI scores between teeth in contact with denture and control teeth ($P < 0.001$) and between control teeth and abutment teeth ($P < 0.05$).

Table 3 shows the frequency distribution of the GI groupings according to the dentures' age. No specific trend in common for the three groups was observed. For the dentures' age groups of <3 years and 3-6 years, the highest frequency distribution was for GI score of 1-1-2 which were 64% and 52% respectively. For the dentures' age group of >6 years, the highest frequency (45%) was for GI score 2-1-3. There were no statistically significant differences in the GI frequency distributions between the dentures' age groups except for the between 6 years (P6 years). None of the teeth had a mobility score of 3.

DISCUSSION

Only about 20% of the patients issued with RPDs returned for the examination. It was noted that

prosthetic patients did not easily return for recall examinations. Schwalm et al. (1977)⁴ in trying to recall 161 patients issued with RPDs for re-examination had a less than 10% response. Thus it was suggested that remuneration should be given to them to participate in the study.¹³ We experienced the same problem in the present study. Patients who did not respond to the first call cards mailed were either contacted by telephone (for those with contact telephone numbers in their files) or sent another call card. Some of those contacted through the telephone refused to come for re-examination since they had no complaints concerning their dentures or oral status even though they were informed that they would be given whatever treatment that was necessary, without having to pay any fee.

The results of the present study indicate that the wearing of RPDs had an influence on the status of the periodontal health. The frequencies of higher index values for PII, GI and LA were greater for the teeth in contact with denture than the controls and the differences were all statistically significant. The frequency distributions for PII, GI and LA values were comparable for both the teeth in contact with denture and the abutment teeth and statistically there were no significant differences between the two. As for the tooth mobility, very few teeth were mobile for all the three groups and it was in the abutment tooth group that mobility grade 3 observed. The increased retention of plaque by RPDs observed in this study is in agreement with several previously reported studies.^{8,16,9} Mobility changes in the present study were minimal even though some of the RPDs had been in the mouth for quite some time. In a study in elderly patients, it was observed that the tooth mobility increased in RPD wearers.¹¹ This was also observed in other studies³ while some reported no increase in mobility.^{4,14} The wearing of RPDs caused more gingival inflammation and loss of periodontal attachment when compared to the controls. Cross-sectional studies involving a large number of patients found that the wearing of RPDs were associated with deep periodontal pockets compared to the teeth not associated with RPDs.¹² All these could be attributed to the harmful effects of plaque

on the periodontium. It could be argued that in the present study, the patients' oral hygiene was not optimal since they were not seen at regular intervals by the same examiners and no reinforcement of oral hygiene instruction was done as advocated by Bergman et al.¹⁴ But in the present study, the same patients acted as their own controls and the harmful effects of plaque should be observed on the control teeth as well. The results of this study showed that the teeth in contact with dentures and abutment teeth were more affected than the controls. It can be inferred that the wearing of RPDs had an adverse effect on the periodontium in patients where optimal oral hygiene was not attainable. Complete supragingival plaque control is probably not an achievable goal for most patients.¹⁷ The presence of some degree of plaque is still compatible with health in some individuals. The presence of RPDs not only increase plaque retention (quantity) but the oral environment might also be changed as to encourage plaque growth, i.e. change in flora.¹⁸ This ecological change might cause the overgrowth of flora which is associated with the 'diseased' periodontium, i.e. the spirochetes and motile organisms. It should be emphasized here that not all patients could afford to attend regular dental examinations/check-ups or maintenance visits at a private dental practice. Most would not do so unless there was a specific complaint concerning their oral condition since they would have to pay for the treatment rendered. This is especially so in third world countries where the standard of living is low, there are no health insurance schemes and most cannot afford to pay for dental treatment. The services provided by the government dental clinics are limited. There are no dental hygienists to carry out dental prophylaxis which could lessen the workload of the dentist. It is not feasible to follow-up all the patients at regular intervals of 3—6 months for a long period of time as advocated by others in their longitudinal studies.⁹ These longitudinal studies involved small and selected groups of patients who were aware of their research role and they did not pay for the treatment rendered. So it was possible for them to achieve good plaque control and thus it was not surprising to find little or no progression of caries

and chronic inflammatory periodontal disease in these patients over the years. But on a large population basis and especially in the third world countries, this treatment regimen is not economically feasible though presently it is the only way to preserve periodontal health of RPD wearers. Chandler & Brudvik (1984)⁶ in their clinical evaluation of patients 8—9 years after placement of RPDs found that there was increased gingival inflammation in regions covered by the RPDs compared with the regions which were not covered. They attributed this to the poor oral hygiene of their patients, who like the ones in the present study, were not put on a long-term recall program. It could be due to this fact that a greater degree of gingival inflammation and loss of attachment were observed in relation to the teeth in contact with denture and the abutment teeth compared to the controls. It was shown that coverage of marginal gingivae by the denture base had an adverse effect on periodontal health.¹⁹ When the results were analysed according to the age of the denture, for the teeth in contact with the appliance, it was found that the frequency distribution of higher values of PII, GI and LA were significantly greater the longer the dentures were in the mouth. There were no significant differences between the dentures' age groups of <3 years and 3—6 years for all the above parameters. Very few teeth were mobile. Higher mobility score values were seen in the dentures' age group of >6 years and the five mobile teeth observed in this group were from one patient only (Table 4). No tooth mobility was observed in the dentures' age group of <3 years. Carlsson et al. (1965)³ in their 4-year longitudinal study found an increased incidence of gingival inflammation, deepened gingival sulcus/pockets, mobile abutment teeth, alveolar bone loss and carious lesions compared to the baseline. Oral hygiene techniques were not stressed in their patient group. Lower incidence of caries and periodontal disease compared to Carlsson et al. (1965)³ were observed by Derry & Bertram (1970)²⁰ in their 2-year longitudinal study where oral hygiene was emphasized to their patients. A series of longitudinal studies up to 10 years reported by Bergman et al.¹³ found no

significant deterioration of the periodontal status of the remaining teeth. Their patients were seen at least yearly or more frequently if necessary and they were remotivated and reinstructed in oral hygiene technique. They were also given scaling, fillings and prosthetic treatment as required. Thus it is obvious that the oral hygiene was the main factor in determining the periodontal health of RPD wearers. Inadequate oral hygiene results in the cumulative increase in the level of periodontal disease over the years as seen in the present investigation.

The results of this study demonstrated that the wearing of RPDs was detrimental to the periodontal health in patients whose oral hygiene was less than adequate. It was also found that the periodontal health was affected by the dentures' age. Though the maintenance of low plaque levels compatible with periodontal health is not attainable with all patients either personally or professionally,

it should be emphasized that at present, in order to maintain periodontal health in RPD wearers, they should be motivated, instructed in oral hygiene procedures repeatedly and followed-up regularly.

The patients issued with RPDs should be seen at least once a year if not more frequently. During these visits the required dental treatment should be carried out. This seems to be a burden to the dentists in the developing and underdeveloped countries but there is no other alternative at the moment. Further research in this area is needed to find ways in minimizing damage to the periodontium without being too professionally dependent. It was suggested that if patients' cooperation in terms of oral hygiene is questionable, the functional and aesthetic advantages gained by providing a partial denture must be weighed against the potentially adverse pathological changes which may be produced in the supporting tissues of the remaining teeth.¹⁶

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Table 1: The frequency distribution of PU groupings for teeth in contact with denture, control teeth and abutment teeth

TEETH						
Plaque Index	Denture		Control		Abutment	
	n	%	n	%	n	%
0-1	64	48.9	132	65.0	25	58.1
1.1-2	48	36.6	51	25.1	15	34.9
2.1-3	19	14.5	20	9.9	3	7
Total	131	100	203	100	43	100

* Teeth in contact with denture, n. Number of teeth. Numbers in parentheses represent percentage. Chi-square tests.

Table 2. The frequency distribution of GI groupings for teeth in contact with denture, control teeth and abutment teeth

TEETH						
Plaque Index	Denture		Control		Abutment	
	n	%	n	%	n	%
0-1	31	23.7	98	48.3	12	27.9
1.1-2	65	49.6	82	40.4	21	48.8
2.1-3	35	26.7	23	11.3	10	23.3
Total	131	100	203	100	43	100

Chi-square tests

Table3: The frequency distribution of GI groupings of teeth in contact with denture according to the age of dentures

AGE OF DENTURES (YEARS)						
Gingival Index	<3		3-6		>6	
	n	%	n	%	n	%
0-1	9	23.1	13	24.1	9	23.7
1.1-2	25	64.1	28	51.8	12	31.6
2.1-3	5	12.8	13	24.1	17	44.7
Total	39	100	54	100	38	100

Chi-square tests