From:
The Department of
Prosthetic Dentistry,
Royal Dental College,
Aarhus, Denmark

A CLINICAL SURVEY OF REMOVABLE PARTIAL DENTURES AFTER 2 YEARS USAGE

by
ALLAN DERRY
ULRIK BERTRAM

INTRODUCTION

There seems to be agreement among members of the dental profession that the removable partial denture is something to be avoided. Damage to the oral structures as a result of removable partial denture use is well known. Surprisingly, however, there has been little study into why the removable partial denture is so damaging. Although varying in details, the studies that have been done show good correlation between results. These authors continually emphasize that a removable partial denture should be constructed only when absolutely necessary. The damage attributed to the partial denture include caries, gingival inflammation and increased tooth mobility.

In all of these studies caries was found to be a large problem, especially on the cemental surfaces. Surprisingly, occlusal rest seats were relatively free of caries. *Anderson* and *Lammie* (1952) found only 1 case of caries under an occlusal rest seat in a group of 274 patients. *Tomlin* and *Osborne* (1961) found caries quite frequently under lingual plates. After a four-year period *Carlsson et al.* (1965) found that three-quarters of all abutment teeth without crowns were carious. In a group of patients with maxillary complete dentures and mandibular double free-end saddles the number of carious abutments increased to 93 per cent.

Received for publication, January 2, 1970.

Inflammation of the marginal gingiva was evident in all of the studies. It was especially severe where minor connectors crossed the gingival margin, under lingual plates, and around abutment teeth. Oral hygiene, of course, played an important role as to the degree of inflammation but even where the oral hygiene was considered adequate there was often inflammation associated with the denture. *Seeman* (1963) demonstrated the relationship between oral hygiene and gingival inflammation in patients wearing partial dentures.

Koivumaa et al. (1960) found increased mobility of abutment teeth after 12—15 months denture use. This increased for every year the denture was worn. *Anderson* and *Lammie* (1952) found no increase in mobility of abutment teeth. Mobility was determined subjectively in all of the clinical studies but without the use of an objective type of mobility test (*Mühlemann*, 1951) only large variations in tooth movement could be determined accurately.

Although active retention of the dentures was found to decrease with use, *Tomlin* and *Osborne* (1961) found that the patients were usually unaware of any change. Apparently muscular control also plays an important part in the retention of a removable partial denture. *Anderson* and *Bates* (1959) also noted the lack of retention and stressed the importance of lateral support.

Koivumaa et al. (1960) observed that after only 12—15 months a relatively large number of the patients studied were not wearing their dentures. This is in agreement with *Anderson* and *Bates* (1959), *Anderson* and *Lammie* (1952), and *Tomlin* and *Osborne* (1961) who all found a high percentage of non-usage, with the Kennedy class I type (especially mandibular) being dominant. *Tomlin* and *Osborne* (1961) found that an intolerance of the lingual bar was the most common complaint. The patient's outlook regarding the necessity for the use of a denture was pointed out by *Anderson* and *Bates* (1959) and *Anderson* and *Lammie* (1961).

In view of the above, the following guidelines have been established for the construction of biologically-acceptable removable partial dentures:

1. Minor connectors should avoid contact with the free gingiva. (*Anderson & Bates*, 1959; *Anderson & Lammie*, 1952; *Carlsson et al.*, 1961, 1962, 1965; *Karlsen*, 1964; *Loos*, 1950; *Nevin*, 1955; *Waerhaug*, 1968).
2. Interproximally, minor connectors should contact the edentulous ridge approximately 3 mm from the tooth surface. (*Anderson & Bates*, 1959; *Anderson & Lammie*, 1952; *Carlsson et al.*, 1961, 1962, 1965; *Karlsen*, 1964; *Loos*, 1950; *Nevin*, 1955; *Waerhaug*, 1968).
3. Major connectors should be rigid. (*Applegate & Nissle*, 1951; *Henderson & Seward*, 1967; *Johnston & Bates*, 1964; *Kaires*, 1956; *Karlsen*, 1964; *Potter et al.*, 1967; *Tryde & Brantenberg*, 1965).

4. Occlusal rest seats should be well-defined and placed on the surface of an abutment tooth opposite a free-end saddle. (*Anderson & Lammie*, 1952; *Kabcenell*, 1962; *Koivumaa*, 1963; *Kratochvil*, 1963; *Osborne et al.*, 1957; *Potter et al.*, 1967).
5. Emphasis should be placed on firm lateral support and well-designed saddles rather than increased active retention. (*Anderson & Lammie*, 1959; *Carlsson*, 1961, 1962, 1965; *Kratochvil*, 1963).

METHOD AND MATERIAL

A series of removable partial dentures were constructed using the guidelines mentioned above. The rationale for the use of the design features incorporated follows:

Minor connectors. Where a minor connector crosses the free gingival margin one often finds inflammation. Whether this inflammation is due to pressure from the connector or from the plaque is not clear. With resorption of the alveolar process and the resultant sinking of a free-end saddle the pressure upon the epithelium from a minor connector would tend to increase. However, inflammation is also seen in Kennedy class III cases where sinking of the denture should be minimal.

To avoid this inflammation minor connectors were placed interproximally wherever possible. In addition, they were designed so as to contact the alveolar ridge approximally 3 mm from the tooth. Two diagrams illustrate the forementioned principle (Figs. 1 and 2.)

Major connector. Wherever possible a sublingual bar as described by *Tryde* and *Brantenberg* (1965) was used as the major connector for mandibular partial dentures. The rationale for the use of the sublingual bar is to obtain maximum rigidity and a more advantageous placement of the lingual major connector. Seen in cross section the bar has the form of a teardrop. (Fig. 3). It is thin incisally and in passive contact with the attached gingiva for an area of 1 mm from the incisal edge. An obtuse angle is formed where the bar contacts the gingiva. From the incisal margin the bar continues downward forming the base of the teardrop. The placement of the sublingual bar is unusual in that it lies at the border between the attached gingiva and the floor of the mouth. From this position it extends in a horizontal direction under the tongue. This placement prevents irritation of the tip of the tongue, a common problem with the lingual bar.

Finally, because of its form and placement it is well suited for patients with large marginal bone loss. In such patients it is often impossible to

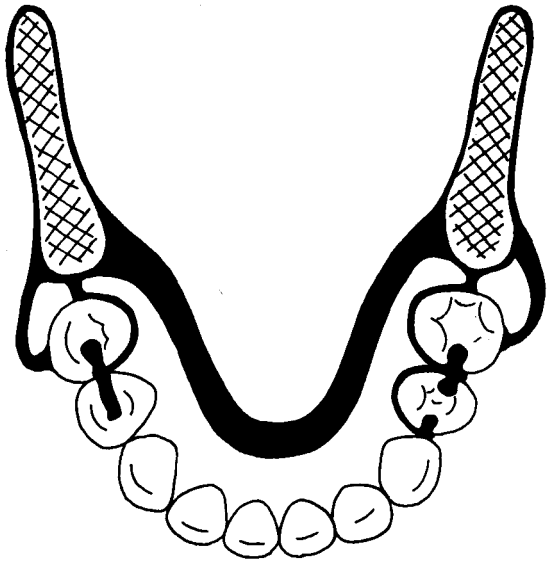

Fig. 1. Minor connectors placed interproximally.

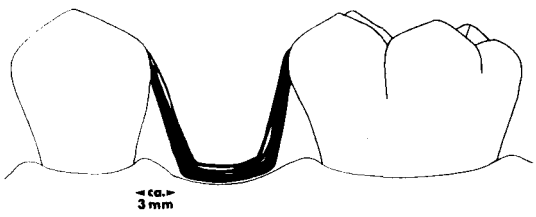

Fig. 2. Minor connectors placed to avoid the gingival area.

construct a lingual bar of adequate proportions and it is usually necessary to use a dental bar or some form of lingual plate. The chances of the dental bar being accepted by the patient decreases as the size of the bar increases to attain the necessary rigidity. The lingual plate is not conducive to good gingival health. It can be said that the sublingual bar has an individualized form similar to the borders of a full denture made from a dynamic impression. Maximum strength and rigidity are achieved in each individual case and the patients adaptation to the denture is made as easy as possible.

Rest Areas. Generally, rest seats were made as definite as possible. On posterior teeth they were made with rounded corners rather than spoon-shaped, as is usual, and as deep as possible. Being deep there is always the

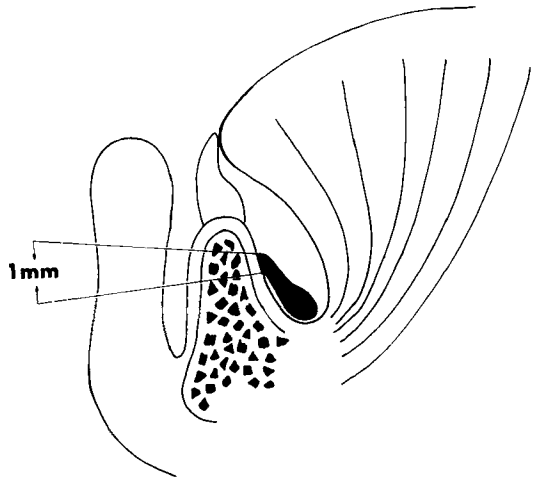

Fig. 3. Form and placement of the sublingual bar.

liability that the rest preparation may penetrate the enamel. This occurred only occasionally during the preparation of cingulum rest seats.

In free-end saddle cases (Kennedy class I and II), the rest areas were prepared on the mesial surface of the abutment tooth which was adjacent to the edentulous area. This placement is said to move the fulcrum anteriorly thereby reducing torque action and allowing stresses to be directed more perpendicular to the alveolar ridge.

To aid in the prevention of caries, a 2 % solution of sodium fluoride was applied to rest areas on three separate occasions.

Retention. Direct retention of the dentures was purposely made minimal (approx. 0.2 mm) in order to protect the abutment teeth. Emphasis was placed on achieving good stabilization and lateral support rather than increased retention by the means of clasps.

The patient material consisted of 60 patients (74 dentures) from the Department of Prosthetics, The Royal Dental College, Århus, Denmark. The patients received dento-gingivally supported partial dentures incorporating the features previously mentioned. All of the patients had some natural teeth in the opposing arch, i.e., there were no full dentures. The clinical procedures were standard and included a preliminary impression taken with irreversible hydrocolloid in a stock tray, the final impression taken with alginate in an individual acrylic tray, the framework cast in chrome-cobalt and the models mounted on a Dentatus articulator.

After 24 months fifty-four (90 %) of the patients returned for re-examination (65 dentures). As some patients had both maxillary and mandibular dentures the number of dentures is higher than the number of patients. The reasons for not seeing the remaining 6 patients (9 dentures) were as follows:

2 patients (3 dentures): moved from the area and would not return.
1 patient (1 denture): unable to return due to job.
1 patient (2 dentures): unable to return due to poor health.
2 patients (3 dentures): unable to contact.

The age and sex distribution of the returning patients is shown in Table I.

Table I.

The age and sex distribution of the re-examined patients

Age group	Male		Female		Total	
	n	%	n	%	n	%
29	2	9	1	3	3	6
30—39	1	4	13	42	14	26
40—49	8	35	9	29	17	31
50—59	8	35	4	13	12	22
60—	4	17	4	13	8	15
$\bar{x}$ 47 years	23 (31 dentures)		31 (34 dentures)		54 (65 dentures)	

The total number of teeth in both the maxilla and mandible along with the total number of teeth in contact with the denture is recorded below. In addition, the average number of teeth per patient and the average number of teeth in contact with the denture is also given.

Total number of teeth in maxillae:	260
Total number of teeth in mandibula:	274
Total number of teeth:	534

Average: 8.0 teeth per restored arch

Total number of teeth in contact with maxillary dentures:	166
Total number of teeth in contact with mandibular dentures:	158
Total number of teeth in contact with dentures:	324

Average: 5.0 teeth per patient in contact with dentures

Classification according to Kennedy's system for partially edentulous arches is seen in Table II.

Table II.

Classification of the surveyed dentures

Kennedy Classification	Maxilla	Mandible	Total
Class I (Bilateral free-end)	3	8	
Class I, mod. 1.	2	9	
Class I, mod. 2.	2	—	
	7	17	24
Class II, mod. 1. (unilateral free-end)	6	5	
Class II, mod. 2.	2	—	
Class II, mod. 3.	—	1	
	8	6	14
Class III (no free-end)	2	—	
Class III, mod. 1.	7	7	
Class III, mod. 2.	8	1	
Class III, mod. 3.	1	1	
	18	9	27
Total			65

Methods of investigation. One of the authors (UB) had seen all of the patients at least three times during construction of their partial dentures, but no recordings were made at that time. The patient's journal was used to help gain an overall picture of their status regarding mobility, and gingival and plaque status. These examinations, however, were not done by the authors.

The examination consisted of the following details:

1. usage (always, day only, never)
2. breakage or deformation
3. gingival and plaque status
4. condition of mucous membranes
5. dental caries, originating from
   a. enamel b. cementum
6. mobility

7. treatment within denture period
8. examiner's assessment of denture
    a. stability b. retention
9. patient's opinion
    a. comfort b. function

Usage. The terms *always, day only*, and *never* reflect the amount of time the denture is in the mouth of the patient. *Always* means that the patient sleeps with the denture, whereas *day only* indicates that the denture is removed during the night. *Never* is self-explanatory. One patient had previously used his denture but due to a fracture of an important element he was no longer able to use it. He was placed in the *never* group as the fracture occurred 6 months prior to the examination.

Gingival and plaque status. The Gingival and Plaque Indices (GI and PL. I) of *Löe* and *Silness* (1967) were used to evaluate the gingival status and oral hygiene of the patients. The »before» status was taken from the records of the Periodontal Department.

Mucous membranes. In determining the state of the mucous membranes only the palate was considered. The inflammation was scored according to *Löe* and *Silness'* Gingival Index (1967).

Dental caries. Caries was recorded on teeth that were in contact with the denture. No differentiation was made between active elements, passive elements, minor connectors, etc.

Mobility. Tooth mobility was estimated by clinical observation. The following grading was used:

Grade 0: not clinically mobile.
Grade 1: horizontally mobile, but less than 1 mm.
Grade 2: horizontally mobile, more than 1 mm.
Grade 3: horizontally and vertically mobile.

Examiner's assessment.

Stability: *good* was assigned to dentures when pressure applied vertically to the saddle on one side produced no movement on the opposite side. *fair* was assigned when vertical pressure produced slight movement. *poor*indicated that the movement was so large as to warrant rebasing or construction of a new denture.

Patient's opinion. The patients were questioned regarding both the comfort and function of their dentures. The following question was put to the patients: »If you were to have a new denture constructed, what would you change?»

RESULTS

The denture wearing habits of the patients are divided into three groups: *always, day only* and *never.* There terms have been explained earlier and the distribution is shown in Table III.

Table III.

Usage of removable partial dentures

Dentures worn	Always		Day only		Never	
	n	%	n	%	n	%
Maxillary	24	76	6	18	3	9
Mandibular	20	63	9	28	3	9
Total	44	68	15	23	6	9

Table IV.

Patient's comments related to type of denture

Type of denture	Maxillary/%	Mandibular/%
Class I	50	82
Class II	62	100
Class III	76	77

In Table IV a comparison is recorded between the type of denture and the patient's comment. Although no surprises are encountered in the maxillary section, the mandibular section presents an uncommon distribution in that the free-end denture has been well accepted.

The values given in Table IV indicate percentage of »excellent» comments for each class, e.g., 82 % of the total number of mandibular class I dentures were considered excellent. The comments of the patients who did not use their dentures are listed below along with the denture type. This is a relatively small group with a wide distribution both of comments and denture type. There were 3 maxillary and 3 mandibular dentures that were not worn or 9 % of the total.

Dental caries. Caries originating from the cementum was differentiated from caries starting from the enamel. The distribution is shown in Table VI.

Gingival and Plaque Indices. It was the intention of the authors to record the Gingival and Plaque Indices and compare them with those taken in the Periodontal Department prior to construction of the partial dentures. Aware of the shortcomings of the method (most notably the variation in examiners), the recordings were nevertheless made to see if any general trend could be seen. No correlation could be found between changes in the GI—Pl. I, and the other factors mentioned previously, i.e. type of denture, age and sex of the patient, usage, etc. In general the gingival condition around the abutment teeth was the same as that of the remaining teeth when the dentures were constructed correctly. Where tooth contour didn't allow

Table V.

Patients who did not use their dentures and their reasons for not doing so

Denture type:	Arch:	Reason:
Class III, mod. 1.	Maxillary	Fractured circumferential clasp resulting in loss of retention.
Class I, mod. 2.	Maxillary	Full denture after tooth fracture.
Class III, mod. 2.	Maxillary	Saddle margin knife-sharp causing laceration of alveolar mucosa.
Class III, mod. 1.	Mandibular	Same patient and reason as above.
Class I	Mandibular	1. Food under saddles 2. Denture causes gagging 3. Unstable
Class III, mod. 1.	Mandibular	1. Denture unstable 2. Felt denture was not necessary

Table VI.

Distribution of dental caries according to origination on enamel or cementum

	Maxillary		Mandibular		Total	
	cases n / %	teeth n / %	cases n / %	teeth n / %	cases n / %	teeth n / %
Enamel	3 9	3 2	4 13	6 4	7 11	9 3
Cementum	10 30	18 11	5 15	7 4	15 23	25 8
Total	13 39	21 13	9 28	13 8	22 34	34 11

the proper construction to be made or poor laboratory procedures resulted in an incorrect framework, there was often increased inflammation.

Mobility. Tooth mobility was recorded at the time of examination using the criteria mentioned previously. There were 12 cases in which teeth were mobile to grade 1 (18 %). The *number* of mobile teeth was 21 or 6 %. In 9 of these 12 cases mobility had been noted by the students prior to construction of the dentures. There remained 3 unexplained cases (5 %) or 9 unexplained mobile teeth (2 %).

Retention and stability. There were 28 cases (43 %) where both stability and retention were considered good. Of these, all of the patient's comments were »excellent» with the exception of 3 cases who complained of food impaction under the palatal major connector. There were 15 cases (23 %) in which stability was considered to be poor. Of this number, 2 complained of food impaction under the palatal elements, 5 complained of unstability (2 of these didn't use their dentures), while the remaining 8 cases considered their dentures to be excellent.

Retention did not play a large role in the patient's comments; stability seemed to be the important factor in patient acceptance. There were patients whose dentures were completely lacking active retention but who considered their dentures to be satisfactory.

Table VII.

Inflammation under palatal elements of denture related to usage and stability

Gingival Index:	Usage:	Stability:
GI I: 2 cases	always	poor
GI II: 7 cases	always	poor

Table VIII.

Distribution of framework fractures

		Number of fractures		
Total number of,		Maxilla	Mandible	%
cingulum rests:	118	4	1	4
bar clasp arms:	43	1	—	2
occlusal rests:	212	1	—	5
circumferential clasp arms:	242	2	4	2

Palatal inflammation. Inflammation of the palate was found in 9 cases (27 %) of maxillary dentures. The severity of inflammation under the palatal major connector was evaluated using the Gingival Index of *Löe* and *Silness* (1967). The usage and stability of the dentures compared to the severity of the inflammation is shown in Table VII.

Framework fractures. There were a total of 13 (2 %) fractures out of a possible 615 (the latter being the total number of rests and clasps). The distribution is shown in Table VIII.

Construction errors. A 0.5 mm standard beading was used in cases where the denture did not extend to the posterior palatal seal area. This was found insufficient in 7 patients (21 % of all maxillary dentures) as they complained of food trapping. These 7 patients were successfully treated by the addition of a new posterior seal.

Amalgam fractures. The authors were especially interested in finding out if the rather deep occlusal rest seats caused an increase in amalgam fractures. There were 5 amalgam restorations that fractured during the 24 month period. Four (4) of these were of the MOD-type in premolars and one (1) was of the MO-type in a molar.

DISCUSSION

A study of the type done by *Koivumaa et al.* (1960) and *Carlsson et al.* (1961, 1962, 1965) is undoubtedly the most accurate as the patients were examined before the treatment was begun, during the study and at the conclusion.

As pointed out by *Koivumaa et al.* (1960) it is important that attendance at the recall examination be sufficient so that selection bias is avoided. In the present study two patients could not be contacted but this small number is not considered to have any influence upon the results.

Probably the most important finding is the observation that of the entire group only 5 patients (9 % of dentures) were not wearing their dentures. Admittedly, the total number of patients is small but the high recall percent enables one to draw reasonably accurate conclusions regarding the effect of a partial denture on the remaining oral structures. As one reviews the reasons why these 5 patients did not use their dentures one is struck by the lack of subjective symptoms.

It is emphasized that there was not one instance where the denture had contributed to the destruction of the surrounding structures resulting in the inability of the patient to use the denture.

The following comments might explain the present, apparently succesful results. One might question the role of the number of remaining teeth in the denture-fitted jaw. *Anderson* and *Lammie* (1952) stated that, »it is apparent that if some natural masticatory efficiency remains, the patient is less tolerant of a denture.» *Koivumaa* (1956) found that the average number of teeth was higher in the group of patients not wearing their dentures. In the present study the average number of remaining teeth was a relatively high 8.0.

The great emphasis placed on oral hygiene instruction could help to account for the lack of destruction.

Tomlin and *Osborne* (1961) found that intolerance of the lingual bar was a common factor in patient acceptance and use of their dentures. There was not one patient who complained over the sublingual bar type of major connector used in the present investigation. Most of them, in fact, were quite surprised that something so voluminous could be worn so comfortably. It should also be remembered that as the minor connectors arise interproximally there is nothing to irritate the tongue.

The Kennedy class I denture (bilateral free-end) is usually the least worn of all types. This was not true, however, in the present investigation. One explanation might be that this class constituted only 26 % of the total whereas in *Koivumaa*'s study 61 % of the total group were of the class I type (1960). *Anderson* and *Bates* (1959) and *Anderson* and *Lammie* (1952) found that more than half of the class I type dentures were not being worn.

Dental caries. Carious lesions were only recorded for teeth in contact with the denture. In Table VI the caries distribution is shown, both according to case and teeth. A total of 11 % of all of the teeth in contact with the denture became carious. There were no cases of severe destruction of tooth structure.

It is interesting to note that the cementum was a common site for carious attack. This is logical as a number of patients had gingival recession leading to exposure of the cemental surface and some of the patients had undergone gingival surgery. One might suggest treating the adult patient with fluoride solution applications to combat cemental caries. The present study confirmed the results of previous investigations regarding caries under rests — not one was discovered.

Plaque and Gingival Indices. Löe and *Silness'* Indices (1967) were chosen as they were considered the most sensitive for small clinical studies. Unfortunately, only 20 patients (34 dentures, 55 %) had previously had their Indices recorded limiting the value of the present findings. The periodontal

condition of the remaining 45 patients was such that it was not considered necessary to refer them to the Department of Periodontology. Also, as mentioned previously the recordings were not done by the writers; therefore, no conclusions are drawn.

Mobility. The findings indicate no significant changes in abutment mobility. Undoubtedly, the use of a measuring device such as that suggested by *Mühlemann* (1951) would have been more accurate, but the method used was considered sufficient for the present purposes as gross changes in tooth movement can readily be detected. *Carlsson et al.* (1965) found that after 2 years several abutment teeth displayed both axial as well as horizontal mobility. This degree of increased mobility can, of course, be detected subjectively.

The use of a rigid major connector could account for the lack of increase in tooth mobility. It has been shown to be effective in transmitting horizontal loads thereby reducing the stress placed on individual abutment teeth. *Kaires* (1956) has demonstrated that as the flexability of the major connector increases so does the horizontal load placed upon the supporting areas under the saddles. An increase in load to the alveolar ridge could result in increased resorption. The resulting lack of saddle support would place an unfavorable load upon the abutment teeth.

Another factor of possible significance is the placement of occlusal rest areas on the surface of the abutment tooth opposite the edentulous area. Apart from altering the direction of the rotary movement on the abutment tooth it also prohibits the use of a clasp which is considered especially damaging.

As seen in Fig. 4., the circumferential clasp arm arising from the surface adjacent to the edentulous area has an orthodontic effect upon the abutment

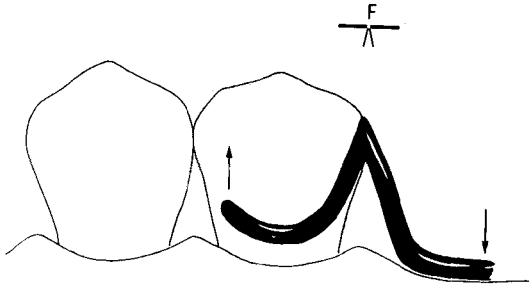

Fig. 4. Placement of the occlusal rest seat adjacent to the edentulous area places an unfavorable stress upon the abutment tooth as the denture moves in function (distal extension partial denture).

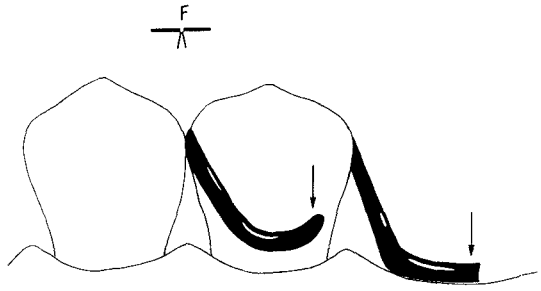

Fig. 5. Placement of the occlusal rest seat opposite the edentulous area reduces the stress upon the abutment tooth. (distal extension partial denture).

tooth when there has been resorption of the alveolar process not followed by a rebasing of the saddle or where the mucous membrane under the saddle is very compressible.

When the occlusal rest is placed opposite the edentulous area the clasp arm arises mesially and extends distally (see Fig. 5) or is of the bar type (infrabulge). This placement reduces the load upon the tooth with tissueward movement of the saddle. The active clasp arms were placed only 0.2 mm. into undercuts further limiting any adverse effects upon the abutment teeth.

Whatever the explanation, there were only 9 teeth (2 %) with unaccounted for mobility and all had movement of less than 1 mm (Grade 1).

Retention and Stability. The results confirm those of other authors regarding retention and stability in that the latter seems to be the more important of the two.

Perhaps active retention is helpful in the early phase of denture use as the patient learns to adjust to his prosthesis, but factors as stability, saddle extention, and muscle function become increasingly important. Aware of this fact, one can de-emphasize the active retaining elements (thereby protecting the abutment teeth) and concentrate on obtaining the best possible support for the denture.

Palatal Inflammation. Nothing unusual was found concerning inflammation under the palatal major connectors. Poor stability was associated with every case of inflammation. No attempt was made to determine if there was a coinciding candida infection.

Framework Fractures. In the attempt to avoid crossing the gingival margin with minor connectors, the indirect retainers were often quite long. The number of fractures, however, compares favorably with previous investigations.

SUMMARY

The intention of the investigation was to determine if a biologically-acceptable removable partial denture could be designed and, most important, worn. Removable partial dentures were made for 60 patients. Two years after the completion of the dentures 90 % of the patients returned for re-examination. The most important finding was that 91 % of the patients were using their dentures, and in not one instance had the denture contributed to the destruction of the supporting structures to the extent that the denture could not be worn.

RÉSUMÉ

CONTRÔLE CLINIQUE DE CAS DE PROTHÈSES PARTIELLES AMOVIBLES APRÈS 2 ANNÉES D'UTILISATION.

Le but de cette étude était de déterminer si une prothèse partielle amovible acceptable du point de vue biologique était susceptible d'être construite et surtout d'être portée. Des prothèses partielles amovibles ont été exécutées pour 60 patients. Deux ans après l'exécution des prothèses, 90 % des patients se sont présentés à un examen de contrôle. La constatation la plus importante faite à cette occasion était que 91 % des patients utilisaient leur prothèse, et que dans aucun des cas la prothèse n'avait contribué à un degré de destruction des tissus de soutien rendant impossible le port de la prothèse.

ZUSAMMENFASSUNG

KLINISCHE UNTERSUCHUNG VON ABNEHMBAREN PARTIELLEN PROTHESEN NACH ZWEI JAHREN GEBRAUCH

In der vorliegenden Arbeit wollten die Autoren feststellen, ob eine biologisch geplannte und konstruierte, abnehmbare, partielle Prothese von Patienten benützt werden. Partielle Prothesen wurden für 60 Patienten konstruiert. Nach zwei Jahren wurden 90 % von Patienten kontrolliert. Die Autoren konnten feststellen, dass 91 % von diesen Patienten die Prothesen getragen haben, und in keins von Fällen verursachten die Prothesen Schädigungen des Stützgewebe, so dass die Prothesen nicht getragen werden konnten.

REFERENCES

Anderson, J. & J. Bates., 1959: The cobalt-chromium partial denture. A clinical survey. Brit. dent. J., *107:* 57—62.

Anderson, J. & G. Lammie., 1952: A clinical survey of partial dentures. Brit. dent. J. *92:* 59—67.

Applegate, O. & R. Nissle, 1951: Keeping the partial denture in harmony with biologic limitations. J. Amer. dent. Ass. *43:* 409—419.

Carlsson, G., B. Hedegård, & K. Koivumaa., 1961: An investigation of mandibular partial dentures with double extension saddles. Study II. Acta odont. scand. *19:* 215—237.

Carlsson, G. et al., 1962: A longitudinal study of mandibular partial dentures with double extension saddles. Study III. Acta odont. scand. *20:* 96—119.

—»— 1965: Final results of a 4-year longitudinal investigation of dentogingivally supported partial dentures. Study IV. Acta odont. scand. *23:* 443—472.

Henderson, D. & T. Seward, 1967: Design and force distribution with removable partial dentures: a progress report. J. prosth. dent. *17:* 350—364.

Hildebrand, G., 1937: Studies in dental prosthetics. Svensk tandläk.-tskr. *30:* suppl.

Hohnston, J. & J. Bates, 1964: Partial denture design and problems. Internat. dent.J. *14:* 303—316.

Kabcenell, J., 1962: Effective clasping of removable partial dentures. J. prosth. Dent. *12:* 104—110.

Kaires, A., 1956: Effect of partial denture design on unilateral force distribution. J. prosth. Dent. *6:* 526—533.

—»— 1956: Partial denture design and its relation to force distribution and masticatory performance. J. Prosth. Dent. *6:* 672—683.

Karlsen, K., 1964: Partial Dentures. Norske Tannlaegeforen. Tid. *74:* 47—52.

Koivumaa, K., 1956: Changes in periodontal tissues and supporting structures connected with partial dentures. Suom. hammaslääk. toim. *52:* 7—181.

—»— 1963: Incomplete dentition and removable dentures. Internat. dent. J. *13:* 267—283.

Koivumaa, K., B. Hedegård, & G. Carlsson, 1960: An investigation of dentogingivally supported partial dentures. Study I. Suom. hammaslääk. toim. *56:* 248—306.

Koivumaa, K., Anderson, & B. Hedegård, 1959: Some aspects of partial dentures. Internat. dent. J. *9:* 30—40.

Kratochvil, F., 1963: Influence of occlusal rest position and clasp design on movement of abutment teeth. J. prosth. Dent. *13:* 114—124.

Krogh-Poulsen, W., 1954: Partial denture design in relation to occlusal trauma and periodontal breakdown. Internat. dent. J. *4:* 847—867.

Loos, A., 1961: Bio-physiological principles in construction of partial dentures. Brit. dent. J. *88:* 61—68.

Löe, H. & J. Silness., 1963: Periodontal disease in pregnancy. I. Prevalance and severity. Acta odont. scand. *21:* 533—551.

Löe, H., 1967: The gingival index, the plaque index, and the retention index systems. J. periodont. *38:* 610—616.

Mühlemann, H., 1951: Periodontometry: method for measuring tooth mibility. Oral Surg. *4:* 1220.

Nevin, R., 1955: Periodontal aspects of partial denture prosthesis. J. prosth. Dent. *5:* 215—219.

Osborne, J., N. Brill, & G. Lammie, 1957: Partial dentures. Internat. dent. J. *7:* 26—53.

Potter, R., R. Appleby, & C. Adams, 1967: Removable partial denture design: a review and a challange. *17:* 63—68.

Seemann, S., 1963: Study of the relationship between periodontal disease and the wearing of partial dentures. Aust. dent. J. 206—208.

Tempel, F., 1963: Treatment of incomplete dentition with removable prostheses. Internat. dent. J. *13:* 294—302.

Tomlin, H. & J. Osborne., 1961: Cobalt-chromium partial dentures: a clinical survey. Brit. dent. J. *110:* 307—310.

Tryde, G. & F. Brantenberg., 1965: The sublingual bar. Tandlaegebladet. *69:* 873—885.

Waerhaug, J., 1968: Periodontology and partial prosthesis. Internat. dent. J. *18:*101—107.

Address:
The Department of Prosthetic Dentistry,
Royal Dental College,
Aarhus, Denmark