Professional hygiene care, adjustments and complications of mandibular implant-retained overdentures: A three-year retrospective study

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Purpose. This report presents a retrospective evaluation of postinsertion care required by 104 edentulous patients with advanced mandibular bone loss.
Material and methods. The patients were treated with new maxillary dentures and mandibular overdentures retained by two implants with a single bar-clip attachment. Distinction was made between professional hygiene care, adjustments, and treatment of complications. The follow-up period after insertion of dentures was 3 years for all patients.
Results. Approximately a third of the patients needed professional hygiene care. The need for adjustments declined during the years of function. Complications were encountered in approximately a third of the patients. The majority of these were not related to the implants, but to the superstructure and both the maxillary and mandibular dentures.
Conclusions. Many edentulous patients with advanced mandibular bone loss who were treated with mandibular implant-retained overdentures need professional hygiene care, adjustments, and treatment of complications. (J Prosthet Dent 1997;78:387-90.)

CLINICAL IMPLICATIONS

This retrospective study confirms the need for routine follow-up services of hygiene care, adjustments, and treatment of complications for patients restored with implant-retained overdentures.

Treatment with mandibular implant-retained overdentures can solve long-term problems in edentulous patients.[1-7] Some authors have investigated the maintenance requirements and complications of implant-retained overdentures. Tolman and Laney[8] reported problems relating to magnets, O-rings, or bar-attachments. Johns et al.[9] described fractures of dentures, bars, and clips and a frequent need to reactivate clips. In a clinical trial, Geertman et al.[3] noted several complications within 1 year after insertion, including gingival hyperplasia, occlusal discrepancies, clip loosening, coping screw loosening, broken abutments, nonfitting superstructures, fracture of superstructures, and deep peri-implant sulci. Walton and MacEntee[10] observed a high incidence of adjustments and repairs. Hemmings et al.[11] found that adjustments in the first year were common for overdentures.

The purpose of this study was to evaluate retrospectively the postinsertion care required by edentulous patients with advanced mandibular bone loss who were treated with implant-retained mandibular overdentures. For this purpose, a distinction was made between professional hygiene care, adjustments, and treatment of complications.

MATERIAL AND METHODS

During the period 1988 to 1992, a group of edentulous patients with advanced mandibular bone loss who were unsuccessfully wearing conventional dentures had been referred by general practitioners to the Clinic of Maxillofacial Prosthodontics and Special Dental Care at the Dental School of the University of Nijmegen. None of the patients had implants inserted before or medical risks interfering with the treatment or with (expected) implant success. All patients received new conventional maxillary dentures and mandibular overdentures retained by two implants and a single bar-clip attachment. This treatment followed a standardized method for denture fabrication, including functional impressions with an individual tray, intraoral gothic arch registration, and lingualized occlusion.[12,13] A prosthodontist and an oral surgeon proposed this treatment because no beneficial result could be expected by retreatment with conventional dentures because of advanced mandibular bone loss (class V and class VI, according to Cawood and Howell).[14]

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Table I. Distribution of patients with regard to adjustments during the 3 subsequent years of follow-up

Adjustments	Number of patients (patients with recurring adjustments in parentheses) 1st year $n = 104$	2nd year $n = 103$	3rd year $n = 103$
Loose screws/abutments	33	12 (10)	7
Decubital ulceration treatments	22	11 (3)	8 (2)
Minor occlusal adjustments	6	5	6
Activation of retentive clips	8	9	4 (3)
Replacement resilient components	6	9 (1)	1
Abutment replacements	6	10	18
Corrections denture borders	10	10 (1)	2 (1)
Replacement of fractured artificial teeth	3	6	3

Table II. Distribution of patients with regard to complications during the 3 subsequent years of follow-up

Complications	Number of patients (patients with recurring complications in parenthese) 1st year $n = 104$	2nd year $n = 103$	3rd year $n = 103$
Implant loss	1	0	0
Abutment fractures	1	2	3
Ill-fitting superstructures	2	3	1
Ill-fitting retentive clips	2	6	2 (1)
Relining maxillary dentures	15	5	4 (2)
Relining mandibular dentures	5	2	3
Peri-implant problems needing surgery	2	3	1
Major adjustments	5	4	5
New maxillary dentures	1	0	0
New mandibular dentures	1	0	0
Esthetic problems	2	0	0
TMJ disorders	2	0 (1)	0
Psychologic problems	4	0 (4)	0 (4)

Of the 104 patients treated, 74 were women (mean age 52.7 years, standard deviation 9.3) and 30 were men (mean age 54.6 years, standard deviation 8.6). A total of 102 patients were treated with two IMZ implants (Friedrichsfeld, Mannheim, Germany), and two patients with two Brånemark implants (Nobelpharma, AB, Göteborg, Sweden).

Data were obtained from patients' records. All treatments were noted. A distinction was made between professional hygiene care, adjustments, and treatment of complications. Professional hygiene care is defined as need for oral hygiene instruction and treatment by a dental hygienist. All patients had received specific instructions about oral hygiene and maintenance before and during the treatment. During the 3 months after insertion of the (over)dentures, a prosthodontist examined whether additional professional hygiene care was needed or not. Adjustments included tightening of loose screws and abutments, treatment of decubital ulcerations, minor occlusal adjustments, activation of retentive clips, replacement of worn out stress-absorbing resilient components, replacement of abutments, correction of denture borders, and replacement of fractured artificial teeth. Complications included implant loss, abutment fractures, ill-fitting superstructures or retentive clips (resulting in replacement of the total superstructure, replacement of retentive clips, or sectioning and resoldering bars), acrylic resin fractures, relinings, gingival hyperplasia, peri-implant bone resorption, major occlusal discrepancies, esthetic problems, psychologic problems, and temporomandibular joint (TMJ) disorders. Instability and inadequate retention of the dentures were criteria used to indicate a relining. The follow-up period after insertion of the overdentures was 3 years for all patients.

RESULTS

In the first year after insertion of the overdentures, 43 patients required additional professional hygiene care. The number of patients needing additional professional hygiene care declined to 32 and 31 patients in the second and the third year, respectively.

Table I presents the frequencies of adjustments during the 3 subsequent years of function. The incidence of tightening screws and abutments declined from 33 times in the first year to 7 times in the third year, whereas the incidence of abutment replacement increased from 6 patients in the first year to 18 patients in the third year. Treatment of decubital ulcerations was frequently needed (46 times). Finally, minor occlusal adjustments were needed in 17 patients, activation of retentive clips had to be carried out in 21 patients, replacement of resilient components was needed in 16 patients, correction of denture borders had to be carried out 24 times, and fractures of artificial teeth occurred in 12 patients. The need for adjustments declined during the years of function.

Complications occurred in 36 patients during the first year, in 29 patients during the second year, and in 26 patients during the third year of follow-up. Of these patients, 8 had complications in more than 1 follow-up year. The frequencies of these complications and treatments are shown in Table II. In one patient (1.0%), an implant was lost. This failure occurred 6 months after overdenture insertion. The failing implant was replaced. During the healing period of this new implant, the patient was not able to function with an implant-retained overdenture. Therefore the patient was left out of the results from the second and third year of follow-up. In six patients, abutment fracture occurred. In all these cases, abutments with resilient components were involved.

Mechanical problems related to the superstructure were present in 6 patients. Acrylic resin fractures were

not present. Relinings of maxillary dentures were performed in 24 patients, and mandibular denture relining was needed in 10 patients. Soft tissue surgery because of peri-implant problems had to be carried out in 6 patients. Membranes for guided tissue regeneration were used around three implants. Mucosal grafts from the palate were used around three other implants. In 15 patients, major adjustments of dentures or new dentures were needed. Finally, 2 patients had esthetic problems, 4 patients had psychologic problems, and 2 patients had TMJ disorders, which required additional attendance.

Most of the complications occurred in different patients, but in some cases multiple complications or adjustments were present in one patient. In three such patients, abutment fractures occurred. After abutment replacement, sectioning and resoldering of the bars had to be carried out because of misfit, and retentive clips had to be replaced. In three other patients, a relining was needed for both the maxillary denture and the mandibular implant-retained overdenture. For one of these patients, a new maxillary denture and a new mandibular implant-retained overdenture were fabricated because of persistent problems.

Almost no differences were noticed between men and women regarding frequencies of adjustments and complications. The percentages of patients with complications were equal for men and women during the first and the second year, but not during the third year. In the third year, 29.7% of the women had complications, which is more than twice as much as for men (13.3%). Esthetic problems (two women), TMJ disorders (two women), and psychological problems (three women) were more often present in women.

DISCUSSION

In contrast to previous studies,[8-11] this clinical report made a distinction between professional hygiene care, adjustments, and treatment of complications, giving a more detailed reflection of the postinsertion care needed. The failure rate for implants can be considered in agreement with other studies,[15,16] as implant loss mostly occurs in early stages of loading.[16-18] Hemmings et al.[11] noted a relatively high incidence of maintenance treatment for implant-supported overdentures in the first year, decreasing in the following years, which is similar to our findings.

In the patient population, implant-retained overdentures were preferred to implant-retained fixed prostheses because of advanced mandibular bone loss. Moreover, since 1989, oral rehabilitation with dental implants is included in the Dutch National Dental Insurance scheme for patients with advanced bone loss, but it is restricted to implant-retained overdentures.[19] Therefore treatment results of implant-retained overdentures and implant-retained fixed prostheses cannot be compared.

Loose screws and abutments were the most common mechanical problems in this study. However, the frequency of loose screws and abutments decreased during the 3 follow-up years, whereas an increasing frequency of abutment replacement was noted. An explanation for this phenomenon is that, in our clinic, abutments with a resilient stress-absorbing component were frequently used some years ago. It is known that the clinical durability of this resilient component, known as the intramobile element (IME), is approximately 1 year,[20] and fatigue and fracture is no exception.[21] During the follow-up years, frequent loosening and sometimes fractures of intramobile elements occurred. Because of these problems, IMEs were replaced by rigid titanium abutments. The frequency of loosened or fractured abutments decreased when a titanium abutment was used. The replacement of IMEs by rigid abutments may also account for replacement or resoldering of superstructures. Because of its resilience, the IME can obscure misfits and conceal the stress being created. Replacement or resoldering of bars was needed in three patients after replacement of intramobile elements by titanium abutments. If rigid titanium abutments had been used at baseline, less complications would probably have been present.

Unlike other studies, which reported several acrylic resin fractures for overdentures supported by oral implants[22] as well as natural tooth abutments,[23] no acrylic resin fractures occurred in this study's patient sample. An explanation for this phenomenon could be that during the overdenture treatment, attention was given to sole support by the bar-clip attachment, or in other words, absence of direct contact between denture base and implants. In this way, the implants cannot act as fulcrum points, resulting in fatigue resin fractures.

Treatment of decubital ulcerations and relinings of maxillary dentures were frequently needed, especially in the first year of function, which corresponds closely to the report of Walton and MacEntee.[22] It is likely that complete maxillary dentures opposed by implant-supported overdentures are subjected to higher occlusal forces and are more easily dislodged, so that adequate retention is more difficult to achieve. Moreover, the patient sample in this study included patients with unfavorable maxillary ridges.

Finally, a small number of patients with psychologic problems and patients with insufficient oral hygiene that resulted in peri-implant problems required additional attendance, even in the third year of function. However, these patients benefit from implant-retained overdentures, although time spent and costs are higher.

A randomized clinical trial on patients receiving either implant-retained mandibular overdentures or implant-retained fixed prostheses would be desirable in the future to make a detailed comparison between both groups regarding surgical results, prosthodontic treat-

ments, laboratory procedures and postinsertion care, and treatment of complications.

CONCLUSIONS

In 1.0% of the patient population with advanced mandibular bone loss who were treated with implant-retained mandibular overdentures, implant failure occurred. Approximately a third of the patients needed professional hygiene care. The need for adjustments declined during the follow-up period. Tightening of loose screws and abutments, treatment of decubital ulcerations, and correction of denture borders were the most common adjustments. Complications occurred in approximately a third of the patients. The majority of these were not related to the implants, but to the superstructure and to both the maxillary and the mandibular denture. The results of this clinical retrospective study suggest that many edentulous patients with advanced mandibular bone loss treated with mandibular implant-retained overdentures need professional hygiene care, adjustments, and treatment of complications.

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