



ORIGINAL ARTICLE

Investigation of the implant-supported overdentures in completely edentulous mandibles



Yu-Hwa Pan ^a, Kuan-Wei Chen ^b, Tai-Min Lin ^a,
Yang-Ming Chang ^{c*}

^a Department of General Dentistry, Chang Gung Memorial Hospital, Chang Gung University, Taipei, Taiwan, ROC

^b Department of Dentistry, Show Chwan Memorial Hospital, Changhua, Taiwan, ROC

^c Department of Oral Surgery, Chang Gung Memorial Hospital, Taipei, Taiwan, ROC

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KEYWORDS

implant-supported overdenture;
ERA attachment;
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survival rate;
retrospective study

Abstract *Background/purpose:* This study investigated the cumulative survival rate of the mandibular implant-supported overdentures in patients treated from 2005 to 2014 at the Chang Gung Memorial Hospital Implant Center.

Materials and methods: Mandibular implant-supported overdentures were placed in 61 patients (32 males and 29 females) during the period from 2005 to 2014. These patients were categorized into two groups according to the type of attachment system used, namely, Group A and Group B. Group A included 31 patients (17 males and 14 females who received a total of 124 implants) whose denture was retained by a Hader bar and cast ERA attachments, whereas Group B included 30 patients (15 males and 15 females who received a total of 120 implants) whose denture was retained by a Hader bar and bilateral, extension cantilevers with clips.

Results: At the end of the follow-up period, 238 implants remained. Among the failed implants, two implants were in Group A (failure rate $2/124 = 1.6\%$), whereas four implants were in Group B (failure rate $4/120 = 3.3\%$). Fifty percent (3/6) of the failed implants were placed in the distal anterior mandible and 50% (3/6) were placed in the middle anterior mandible. The condition of the opposing arch was also analyzed in relation to the survival rate. The failure rate among patients with maxillary complete dentures was only 1.6%, whereas those wearing maxillary removable partial dentures had the highest implant failure rate ($3/61 = 4.9\%$).

* Corresponding author. Department of Oral Surgery, Chang Gung Memorial Hospital, Number 199, Tung-Hwa North Road, Taipei, Taiwan, ROC.

E-mail address: alan8302018@gmail.com (Y.-M. Chang).

Conclusion: Our results indicate that implant-supported overdentures provide a reliable and effective alternative to conventional complete mandibular dentures. Overdentures with Hader bars and bilateral, cast ERA attachments resulted in fewer prosthetic complications. Copyright © 2015, Association for Dental Sciences of the Republic of China. Published by Elsevier Taiwan LLC. All rights reserved.

Introduction

Although many edentulous patients are satisfied with their conventional mandibular complete dentures (CDs), some problems, such as insufficient retention and stability of the prosthesis, decreased chewing efficiency, and discomfort during mastication, continue to remain. Previous clinical studies have demonstrated, however, that these issues can be addressed effectively by using a dental prosthesis in combination with dental implants.^{1–3}

An implant overdenture can be categorized as either an implant-retained overdenture or an implant-supported overdenture according to the number of implants utilized with the prosthesis.⁴ By increasing the number of implants, the implant-supported overdenture results in improved retention and stability. At the same time, the loading placed on individual implants can be decreased correspondingly. Another advantage of an implant-supported overdenture over the other category is a decreased need for denture relining resulting from ridge resorption. These advantages have been cited in several similar studies previously.^{5–7} Some studies, however, have reported contradictory results.^{4,8–10} Furthermore, although both types of prostheses have been found to be associated with high implant survival rates,^{11–16} there is still no consensus regarding which treatment is preferable, and thus, additional studies are still required to clarify the aforementioned inconsistencies in the findings of previous studies.

Only few studies have evaluated the effects of using implant-supported mandibular overdentures for up to 10 years, especially with respect to attachment design, such as a bar connecting distal extension cantilevers.

The use of implant-supported overdentures as a treatment alternative for patients with an edentulous mandible has been adopted by dentists working in the Dental Department of Chang Gung Memorial Hospital since 2005. In this retrospective study, the implant survival and maintenance requirements of implant-supported mandibular overdentures were examined in relation to attachment design and the condition of the opposing maxillary dentition during an average follow-up period of 7 years (range 1.9–10 years).

Materials and Methods

From 2005 to 2014, a total of 61 patients (29 women and 32 men) at the Dental Department of Chang Gung Memorial Hospital in Taipei, Taiwan, were selected for treatment (Table 1) according to Misch's patient selection criteria.¹⁷ The age of these patients ranged from 37 years to 86 years (mean age 69 years). Experienced dentists who had worked at a hospital for at least 5 years evaluated these

patients using clinical examinations and panoramic evaluations and measured their bone height and bone width between the mental foramen. For each patient, four 3i implants (diameter and length are presented in Table 1; Palm Beach Garden, FL, USA) were placed in the anterior mandible between the mental foramen according to the manufacturer's instructions. The patients were then asked not to wear their previous dentures for at least 2 weeks following the first-stage surgery. A tissue conditioner (GC Soft-liner, GC Corporation, Tokyo, Japan) was used to reline the patient's existing dentures. After 4 months, the

Table 1 Description and distribution of implants and patients.

Variable	Total patients	Total implants
Total	61	244
Male	32	128
Female	29	116
Age, y		
<30	2	8
>30–40	3	12
>40–50	7	28
>50–60	19	76
>60–70	21	84
>70–80	9	36
Attachment type		
A	31	124
B	30	120
Number of implants		
4	61	244
Implant width		
3.25 mm		10
4.0 mm		234
Implant length		
10.0 mm		104
11.5 mm		124
13.0 mm		12
15.0 mm		4
Diagnosis of maxilla		
CD	28	112
NT	21	84
RPD	12	48
Follow-up period, y		
<2	2	8
>2–4	3	12
>4–6	12	48
>6–8	24	96
>8–10	20	80

CD = complete denture; NT = natural maxillary teeth; RPD = removable partial denture.

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