Prosthetic Treatment Time and Satisfaction of Edentulous Patients Treated with Conventional or Implant–Stabilized Complete Mandibular Dentures: A Case–Control Study (Part 2)

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Purpose: The aim of this study was to compare, prospectively, treatment with implant-retained mandibular overdentures versus conventional complete dentures. ***Materials and Methods:*** Part 2 of this paper reports on the outcome after 7 years of denture use, using additional questionnaires. ***Results:*** Patients with implant-stabilized overdentures continued to be more satisfied with their mandibular dentures and their diet than those using conventional complete dentures. About 50% of the implant group who completed the questionnaire had had their dentures remade. The other 50% remained satisfied with their original dentures and were still using them at the 7-year review. The average chairside time spent on them was 467 minutes. ***Conclusions:*** Mandibular overdentures with two endosseous implants permit better function than conventional complete dentures. *Int J Prosthodont 2009;22:13-19.*

Part 1 of this study reported on the study design and 1-year follow-up results (Int J Prosthodont 2008; 21:489-495). Part 2 discusses the results 7 years after the initial study began.

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For the 7-year follow-up, a more extensive questionnaire was used to more fully explore the patients' responses to their treatments. This questionnaire incorporated all of the questions used at the 1 year review so as to permit a direct comparison, and reflected on more recent publications that had appeared after the original study had been designed.

Materials and Methods

Patients were contacted annually when possible and their dentures were serviced or replaced as deemed clinically necessary. Out of the 60 patients originally involved in the study (30 treated with implants and 30 used as matched controls), only 31 patients could be contacted at the 7-year follow-up. Of the balance, 1 in each group had been excluded for failure to complete the original treatment, 1 implant patient's treatment failed, 5 in all had died, 5 were too ill to respond, and 6 could not be contacted by either letter or telephone. In addition, 7 patients in the control group and 3 in the implant group had received prosthetic care outside the hospital and thus accurate data on the chairside time involved in these cases was not available (Table 1).

Table 1 Subjects for Whom a Complete Data Set Was Not Available

	Implant group	Control group	Total
Deceased	2	3	5
Illness	4	1	5
Excluded	2	–	2
Treatment failure	1	–	1
Not found	3	3	6
Other (Patients who sought treatment elsewhere)	3	7	10

Table 2 The Denture Complaint Questionnaire

1. The upper denture gets loose during eating
2. The upper denture gets loose during speaking
3. The upper denture gets loose during yawning
4. The upper denture hurts eating hard food
5. The upper denture hurts eating granular food
6. The upper denture fits badly
7. The lower denture fits badly
8. The lower denture gets loose during eating
9. The lower denture gets loose during speaking
10. The lower denture gets loose during yawning
11. The lower denture hurts eating hard food
12. The lower denture hurts eating soft food
13. The lower denture hurts eating granular food
14. Your lips have fallen in
15. Your cheeks have fallen in
16. Your mouth has fallen in
17. Burning sensation under the upper denture
18. Burning sensation under the lower denture
19. Teeth are too big
20. Teeth are too small
21. Teeth are too far forward
22. Teeth cannot be seen enough
23. Teeth are too obvious
24. Teeth click while eating
25. Teeth click while speaking
26. Tongue biting
27. Lip biting
28. Cheek biting
29. Food gets under the lower denture
30. Food gets under the upper denture
31. Teeth are not straight enough
32. An agglutinant is needed for retention
33. Not enough room for the tongue
34. Swallowing problems
35. Denture rattles
36. Upper denture becomes dislodged during laughing
37. Full sensation due to the denture
38. Dry mouth
39. Denture sucking habit
40. Denture tightens

The system of logging every appointment was continued. This was used to determine the total chairside time taken by the prosthodontist for the treatment of each patient in the implant group.

Subjective Assessment

The questionnaire used in this study comprises three validated questionnaires that have been reported in the literature.[1–3] These were selected as being relevant to

Table 3 The OHIP-14 Questionnaire

1	Have you had trouble pronouncing any words because of problems with your mouth or dentures? 0　　1　　2　　3　　4
2	Have you felt that your sense of taste has worsened because of problems with your mouth or dentures? 0　　1　　2　　3　　4
3	Have you had painful aching in your mouth? 0　　1　　2　　3　　4
4	Have you found it uncomfortable to eat any foods because of problems with your mouth or dentures? 0　　1　　2　　3　　4
5	Have you been self-conscious because of your mouth or dentures? 0　　1　　2　　3　　4
6	Have you felt tense because of problems with your mouth or dentures? 0　　1　　2　　3　　4
7	Has your diet been unsatisfactory because of problems with your mouth or dentures? 0　　1　　2　　3　　4
8	Have you had to interrupt meals because of problems with your mouth or dentures? 0　　1　　2　　3　　4
9	Have you found it difficult to relax because of problems with your mouth or dentures? 0　　1　　2　　3　　4
10	Have you been a bit embarrassed because of problems with your mouth or dentures? 0　　1　　2　　3　　4
11	Have you been a bit irritable with other people because of problems with your mouth or dentures? 0　　1　　2　　3　　4
12	Have you had difficulty doing your usual jobs because of problems with your mouth or dentures? 0　　1　　2　　3　　4
13	Have you felt that life in general was less satisfying because of problems with your mouth or dentures? 0　　1　　2　　3　　4
14	Have you been totally unable to function because of problems with your mouth or dentures? 0　　1　　2　　3　　4

this investigation. The first section covered complaints on the function of upper and lower dentures separately (variable 1). The questionnaire used in part 1 of this study was a subset of this, as it was completed soon after denture insertion. The second section covered patient satisfaction with the denture (variable 2). The final section was used to assess the oral health impact profile (OHIP) for both the implant group and the conventional denture group, using the OHIP-14 questionnaire (variable 3).

Variable 1. The Denture Complaint questionnaire contains 40 variables relating to the denture[3] (Table 2). Each item was rated on a four-point scale by the subjects themselves (0 = not at all; 1 = a little; 2 = quite a lot; 3 = extremely).

Variable 2. The Denture Satisfaction questionnaire[3] contains questions as follows:

Table 4 Differences in Complaint Scores between Conventional Denture Patients and Implant Patients for Each Factor

Complaint	Mean difference	95% CI Lower	Upper	P*
Upper gets loose during eating	0.00	−0.66	0.66	1.000
Upper gets loose during speaking	−0.50	−1.60	0.60	.296
Upper gets loose during yawning	0.20	−1.16	1.56	.704
Upper hurts eating granular food	0.20	−1.64	2.04	.778
Upper fits badly	−0.60	−1.71	0.51	.208
Lower fits badly	0.40	−1.02	1.82	.477
Lower gets loose during eating	0.40	−1.68	2.48	.621
Lower gets loose during speaking	0.00	−1.76	1.76	1.000
Lower gets loose during yawning	0.40	−0.71	1.51	.374
Lower hurts eating hard food	0.20	−1.42	1.82	.749
Lower hurts eating granular food	0.40	−1.68	2.48	.621
Lower hurts eating soft food	0.40	−1.68	2.48	.621
Lips fall in	−0.60	−2.02	0.82	.305
Cheeks fall in	0.00	−1.76	1.76	1.000
Mouth falls in	−0.60	−2.02	0.82	.305
Burning sensation under upper	0.40	−0.71	1.51	.374
Burning sensation under lower	0.20	−0.36	0.76	.374
Teeth are too big	−0.20	−0.76	0.36	.374
Teeth are too small	−0.20	−0.76	0.36	.374
Teeth too far forward	−0.20	−0.76	0.36	.374
Teeth cannot be seen	0.20	−0.36	0.76	.374
Teeth are too obvious	−0.20	−0.76	0.36	.374
Teeth click while eating	0.00	−1.24	1.24	1.000
Teeth click while speaking	0.00	−1.24	1.24	1.000
Tongue biting	0.20	−0.84	1.24	.621
Cheek biting	0.20	−0.36	0.76	.374
Food gets under lower	−0.20	−1.56	1.16	.704
Food gets under upper	0.40	−1.48	2.28	.587
Teeth are not straight enough	−0.20	−0.76	0.36	.374
Using agglutinant	0.00	−1.76	1.76	1.000
Not enough room for tongue	−0.20	−0.76	0.36	.374
Swallowing problems	0.20	−0.36	0.76	.374
Denture rattles	−0.20	−0.76	0.36	.374
Upper dislodged during laughing	−0.20	−1.24	0.84	.621
Full sensation due to denture	−0.20	−0.76	0.36	.374
Dry mouth	0.20	−1.16	1.56	.704
Denture sucking habit	0.20	−0.36	0.76	.374
Denture tightens	-0.20	−0.76	0.36	.374

*Paired-sample t test.

1. In general, how satisfied are you with your dentures?
2. How satisfied are you with your upper denture?
3. How satisfied are you with your lower denture?
4. How satisfied are you with the appearance of your dentures?
5. How satisfied are you with the retention of your dentures?
6. How satisfied are you with the functional comfort of your dentures?

The variables were rated on a five-point scale by the patients themselves (0 = very satisfied; 1 = satisfied; 2 = neither satisfied nor dissatisfied; 3 = dissatisfied; 4 = very dissatisfied).

Variable 3. The OHIP-14 questionnaire contains 14 variables and responses that are recorded on a Likert scale. The oral health impact profile (OHIP) is an instrument used to measure a patient's perception of the social impact of oral disorders on their well being.[4] The original form, based on a described concept for oral health,[5] was a questionnaire consisting of 49 statements (OHIP-49),[6] but it has commonly been used in the shortened version (OHIP-14). The OHIP questionnaire was completed by the patients themselves, who were asked to record their responses in one of five categories on a Likert scale, with a score of 0 representing the most favorable and 4 the least favorable response.[4] The questions related to the OHIP are shown in Table 3.

Denture Quality Assessment

Assessment of denture quality is an important aspect of prosthetic research and has been made using many different evaluation systems.[7–10]

Table 5 Differences in Satisfaction Scores between Conventional Denture Patients and Implant Patients

| Satisfaction question | Mean difference | 95% CI | | P* |
		Lower	Upper	
1–Both dentures	0.400	-0.325	1.125	.266
2–Upper denture	0.320	-0.329	0.969	.319
3–Lower denture	0.760	-0.042	1.562	.062
4–Appearance	0.280	-0.219	0.779	.258
5–Retention	0.520	-0.272	1.312	.188
6–Comfort	0.400	-0.184	0.984	.170

*Paired-sample *t* test.

Table 6 Differences in the OHIP between Conventional Denture Patients and Implant Patients

| Complaint | Mean difference | 95% CI | | P* |
		Lower	Upper	
1–Trouble pronouncing words	0.1600	-0.5000	0.8200	.621
2–Worsened taste	0.1600	-0.1911	0.5111	.356
3–Painful aching of mouth	0.0400	-0.7087	0.7887	.913
4–Uncomfortable to eat	0.1200	-0.5882	0.8282	.730
5–Self-conscious	-0.2400	-1.1016	0.6216	.571
6–Feeling tense	-0.0800	-0.7426	0.5826	.805
7–Unsatisfactory diet	0.6800	0.1508	1.2092	.014
8–Interrupt meal	-0.0400	-0.6296	0.5496	.890
9–Difficult to relax	0.2800	-0.2328	0.7928	.271
10–Embarrassed	0.0400	-0.6070	0.6870	.900
11–Irritable with people	0.2800	-0.1741	0.7341	.215

*Paired-sample *t* test.

Table 7 Differences in the Denture Quality Assessment between Conventional Denture Patients and Implant Patients

| Assessment | Mean difference | 95% CI | | P* |
		Lower	Upper	
1-Upper dislodged by opening	0.0400	-0.1050	0.1850	.574
2-Lower dislodged by opening	0.2400	0.0242	0.4558	.031
3-Midline upper moves	0.1200	-0.0971	0.3371	.265
4-Midline lower moves	0.1600	0.0056	0.3144	.043
5-Contact made	0.2400	-0.0586	0.5386	.110
6-Freeway space > 5 mm	0.0000	-0.2064	0.2064	1.000
7-ICP interference	-0.0400	-0.2277	0.1477	.664
8-3-point contact	0.2400	-0.0586	0.5386	.110
9-Retruded occlusal interference	-0.0400	-0.1226	0.0426	.327

*Paired-sample *t* test.

The patients were examined by the two senior specialist staff members in the Prosthetics Department of the Eastman Dental Hospital who originally treated them. These were the only two specialists with extensive experience in removable prosthodontics who were available on a daily basis for the duration of the study and were trained and calibrated in this technique. The following variables used are from a validated questionnaire[1]:

1. The maxillary denture is dislodged by moderate opening of the mouth; lips and tongue relaxed.
2. The mandibular denture is dislodged by moderate opening of the mouth; lips and tongue relaxed.
3. The midline of the maxillary denture moves more than 3 mm when rotating it while pressing it lightly against the supporting tissues.
4. The midline of the mandibular denture moves more than 3 mm when rotating it while pressing it lightly against the supporting tissues.

Table 8 Comparison between 1- and 7-year Questionnaires Regarding Differences in Complaint Scores between Conventional Denture Subjects and Implant Subjects

	Mean difference	
Complaint	1-year	7-year
1–Loose upper	0.10	-0.60
2–Loose lower	0.38	0.40
3–Soreness upper	0.28	0.40
4–Soreness lower	0.24	0.20
5–Food under upper	0.14	0.40
6–Food under lower	0.14	-0.20
7–Moving upper	0.10	0.00
8–Moving lower	0.10	0.40
9–Difficulty chewing	0.28	0.12
10–Speech interference	0.24	0.16
11–Denture mouthful	0.07	-0.20
12–Face aches	0.31	0.40
13–Appearance	0.17	0.28
14–Chewing	0.55	0.68

5. Contact is made on the contralateral side when a cotton wool roll is introduced between the premolars on one side.
6. The freeway space is more than 5 mm or less than 1 mm.
7. There is an occlusal interference between intercuspal position and centric occlusion.
8. There is at least a 3-point contact between maxillary and mandibular dentures in centric occlusion.
9. There is an occlusal interference present when moving from retruded contact position to intercuspal position.

Variables 1 through 6 and 8 were rated by the investigators on a two-point scale (no = 0; yes = 1); variables 7 and 9 were rated on a three-point scale (no = 0; light to moderate = 1; severe = 2). The sum of all of the ratings was considered the total score.

Results

Data were entered into SPSS analysis software (version 11.0, SPSS) for subsequent analysis, and the results are presented in Tables 4 to 7.

The time taken by the prosthodontist and the duration of the appointments were recorded for all the scheduled and nonscheduled appointments. As indicated above, accurate data for the control group were not available. However, the average chairside time spent on the implant group was 467 minutes up to the 7-year review.

The Denture Complaint questionnaire results are shown in Table 4. The table shows that there were no significant differences between the implant group and the conventional dentures group when answered in this way. The results for the Denture Satisfaction questionnaire are shown in Table 5 (Fig 1a).

The OHIP-14 questionnaire results are shown in Table 6 (Fig 1b). It can be noted that there was a significant difference between the implant group and the conventional dentures group regarding dietary restrictions imposed by problems with the mouth or the dentures. There were no significant differences for the other factors studied.

The Denture Quality questionnaire results are shown in Table 7 (Fig 1c). The table shows that there was a significant difference between the implant group and the conventional dentures group regarding the mandibular denture. In the conventional dentures group, the prosthesis was dislodged by opening the mouth. The prosthesis also moved more than 3 mm in the midline when rotating it by pressing slightly downward against the supporting tissues.
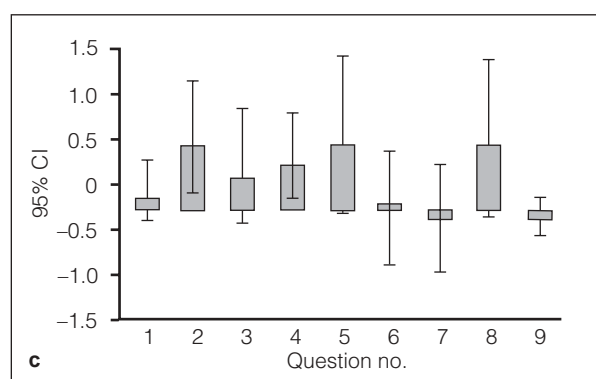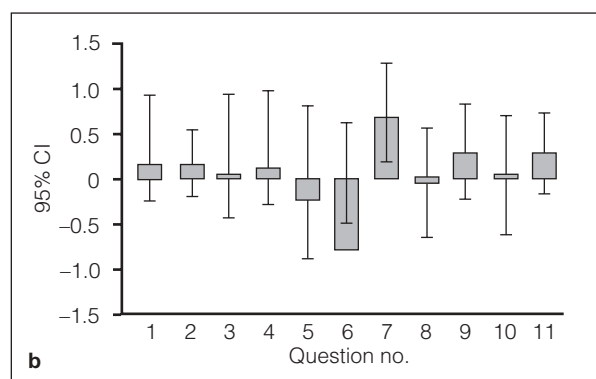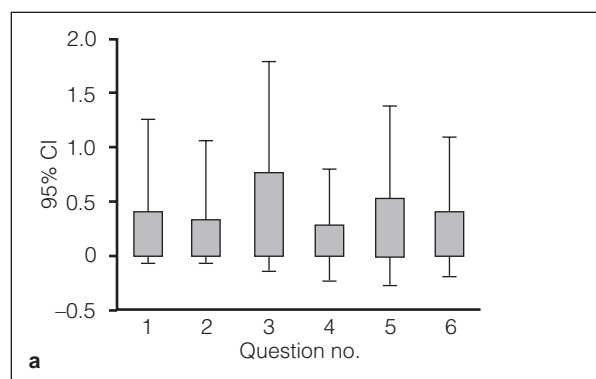
Comparing the 1- and 7-Year Questionnaires

Fourteen of the questions used in the assessment of patients' views of their dentures were the same for the 1-year and 7-year surveys. These are linked in Table 8 and the corresponding scores are shown in Fig 2.

Discussion

When considering these data, it is necessary to recognize that almost half of the patients had been lost by this stage of the study and it cannot be assumed that those who remained were a total representation of the original groups. While it would have been preferable to have used a larger sample, there were practical constraints on doing so, a problem not unique to this study and one which can be approached using a multicenter design, although this creates its own problems of standardization.

The retainers used in the implant dentures were of a basic design that proved prone to wear. However, this varied from patient to patient. Eight of the 16 implant patients remained satisfied with their dentures, 6 had had the dentures remade, and 2 had been put on a waiting list for new dentures. Decisions concerning replacement of dentures were made on clinical grounds uninfluenced by resource limitations. The larger number of implant dentures requiring replacement may reflect the tendency of the attachments to wear, a clinical observation that denture tooth abrasion was more evident in implant dentures, and the resultant decision to remake the entire prosthesis rather than only the attachments, as the procedure used a denture-copying technique which was significantly less resource-intensive than the original fabrication method. Other authors have commented on the significance of

Fig 2 Mean difference between scores for implant and conventional dentures for those questions which were used in the questionnaires administered after 1 (open bars) and 7 years (shaded bars).

Figs 1a to 1c Mean differences and confidence intervals for mean differences in **(a)** satisfaction, **(b)** the OHIP, and **(c)** the Denture Quality Assessment between conventional and implant dentures. The numbers on the x-axes refer to the individual questions. The minus sign indicates that the value for the implant patients is greater than that for the conventional denture.

attachment servicing as a factor in the resource implications of implant denture performance.[11]

It was not possible to compare the amount of time spent by the clinician on each patient, as most of the conventional denture patients (> 40%) did not follow-up with their treatment or were having new dentures made outside the hospital. Those in the latter group usually cited convenience, health, or cost-related travel issues as the reason for their choices. However, the mean time taken by the clinician for the implant denture patients who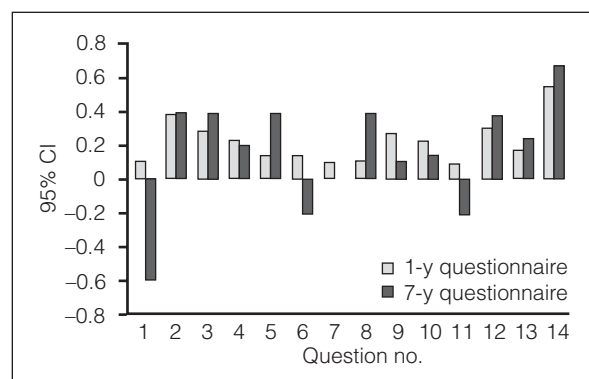 were using the same dentures up to the 7-year review was 467 minutes (an average of 140 minutes for all reviews after the first year).

Although the questionnaire response rate in this study was only 52%, such long-term response results are not uncommon.[12] There was no significant difference between the implant group and the conventional dentures group in their denture complaints. This is surprising, since while the level of complaints was rather similar, there was a significant difference between the groups regarding satisfaction with mandibular dentures, an observation in agreement with the findings of Jokstad.[13] This suggests a level of concern that was too low to generate a complaint, but nevertheless a significant difference in perceived performance.

There was also a significant difference between the implant group and the conventional dentures group regarding the dietary impact of problems with the mouth or dentures. This finding agrees with that of Melas et al,[14] who noted that patients with implant-stabilized overdentures were less likely than wearers of conventional complete dentures to report an impact related to difficulty in eating. Given that dietary restrictions can have a negative effect both on the psychological benefits of a varied diet and, more importantly, general health,[15] this is a matter of some concern.

While there were no significant differences between the groups when considering variable 1, these were noted for variables 2 and 3, although for different parameters. However, the questionnaires do have different approaches, which might explain the apparent disparity. This effect has also been observed by Locker and Gibson.[16]

The study showed a significant difference between the implant group and the conventional dentures group regarding the mandibular denture quality. This supports the findings of the subjective assessments of these dentures. Nevertheless, a previous study has shown that there was no relationship between the

clinicians' assessments of the quality of denture-supporting tissues and patient satisfaction with mandibular implant or conventional prostheses.[17] This did, however, relate to the tissues rather than the dentures themselves.

No attempt was made to assess the patients' subjective assessments of the value of their treatment since many were accustomed to state-funded health care and would have had difficulty placing a monetary value on their treatment.

Comparing the 1-and 7-Year Questionnaires

With regard to the comparison between the 1- and 7-year findings, it is noteworthy that there was a significant change in perception of the looseness of the maxillary denture, the accumulation of food under the mandibular prosthesis, the movement of the mandibular denture, and the denture "feeling a mouthful."

These probably represent changes in the denture-bearing tissues, wear of the retention system (which utilized a "snap fit" polymeric sleeve), and possibly reduced oral motor skills. Nevertheless, the patients overall remained more satisfied with the outcome of the implant treatment compared with the conventional. It is probable that the perceived degradation of the performance parameter could be managed by routine maintenance procedures.

Conclusions

Seven years after implant treatment it was found that:

1. Eight patients in the implant group and 2 in the conventional dentures group had had their dentures remade (out of the 15 conventional and the 16 implant patients).
2. Implant-supported mandibular overdenture treatment continued to provide better subjective function than conventional complete dentures.
3. Patients' satisfaction with implant-stabilized mandibular dentures was greater than that with conventional dentures.
4. No implants failed in the 6 years following the 1-year review, reported in part 1.
5. The findings of this study support the proposal that an implant mandibular overdenture retained by two implants[18,19] has quantitative benefits in this group of patients.

References

1. Vervoorn JM, Duinkerke AS, Luteijn F, Bouman TK, van de Poel AC. Reproducibility of an assessment scale of denture quality. Community Dent Oral Epidemiol 1987;15:209–210.
2. Forgie AH, Scott BJ, Davis DM. A study to compare the oral health impact profile and satisfaction before and after having replacement complete dentures in England and Scotland. Gerodontology 2005;22:137–142.
3. Vervoorn JM, Duinkerke AS, Luteijn F, van de Poel AC. Assessment of denture satisfaction. Community Dent Oral Epidemiol 1988;16:364–367.
4. Slade GD. Derivation and validation of a short-form oral health impact profile. Community Dent Oral Epidemiol 1997;25:284–290.
5. Locker D. Measuring oral health: A conceptual framework. Gerodontology 1988;5:3–18.
6. Slade GD, Spencer AJ. Development and evaluation of the oral health impact profile. Community Dent Health 1994;11:3–11.
7. Bergman B, Carlsson GE, Hedegard B. A longitudinal two-year study of a number of full denture cases. Acta Odontol Scand 1964;22:3–26.
8. Carlsson GE, Otterland A, Wennström A, Odont D. Patient factors in appreciation of complete dentures. J Prosthet Dent 1967;17:322–328.
9. Rise J. An approach to epidemiologic assessment of complete dentures. Acta Odontol Scand 1979;37:57–63.
10. Ramstad T, Norheim PW, Eckersberg T. The reliability of clinical evaluation of some characteristics in complete prosthetics. J Oral Rehabil 1980;7:11–19.
11. MacEntee MI, Walton JN, Glick N. A clinical trial of patient satisfaction and prosthodontic needs with ball and bar attachments for implant-retained complete overdentures: three-year results. J Prosthet Dent. 2005;93:28–37.
12. Brennan DS, Singh KA, Spencer AJ, Roberts-Thomson KF. Positive and negative affect and oral health-related quality of life. Health Qual Life Outcomes. 2006;4:83.
13. Jokstad A. Implant retained or conventional dentures, which give more patients satisfaction? Evid Based Dent 2006;7:96–97.
14. Melas F, Marcenes W, Wright PS. Oral health impact on daily performance in patients with implant-stabilized overdentures and patients with conventional dentures. J Oral Maxilllofac Implants 2001;16:700–712.
15. Morais JA, Heydecke G, Pawliuk J, Lund JP, Feine JS. The effects of mandibular two-implant overdentures on nutrition in elderly edentulous individuals. J Dent Res 2003;82:53–58.
16. Locker D, Gibson B. Discrepancies between self-ratings of and satisfaction with oral health in two older adult populations. Community Dent Oral Epidemiol. 2005;33:280–288
17. Heydecke G, Klemetti E, Awad MA, Lund JP, Feine JS. Relationship between prosthodontic evaluation and patient ratings of mandibular conventional and implant prostheses. Int J Prosthodont 2003;16:307–312.
18. Timmerman R, Stoker GT, Wismeijer D, Oosterveld P, Vermeeren JI, van Waas MA. An eight-year follow-up to a randomized clinical trial of participant satisfaction with three types of mandibular implant-retained overdentures. J Dent Res 2004;83:630–633.
19. Strassburger C, Kerschbaum T, Heydecke G. Influence of implant and conventional prostheses on satisfaction and quality of life: A literature review. Part 2: Qualitative analysis and evaluation of the studies. Int J Prosthodont 2006;19:339–348.