Patient Satisfaction with Implant-Retained Mandibular Overdentures: A Retrospective Study

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ABSTRACT

Purpose: The aim of this study was evaluation of the effect of age, gender, and past prosthetic history (duration of edentulism, number of complete dentures before implant treatment, and number of adjustment appointments) on patients' ratings of satisfaction (comfort, hygiene, retention, appearance, speech, mastication, and overall satisfaction).

Materials and Methods: In this retrospective study, 55 patients who were treated with mandibular overdentures retained by splinted implants from 1998 to 2004 and met the inclusion criteria of the study were selected. Each patient was asked to fill out a questionnaire to evaluate his/her general satisfaction with the implant prostheses and other aspects of satisfaction such as comfort, aesthetic, function, and hygiene. Data were analyzed using a marginal model and the generalized estimating equations methodology to assess the relationship between the scores and the patients' demographic and past prosthetic histories. Significance was accepted at 5% and expressed as p values and odds ratio (OR).

Results: Gender had significant correlation with comfort ($p < .0001$). Years of being edentulous prior to implant/prosthetic treatment had direct effects on the general satisfaction and satisfaction of comfort ($p < .01$). One extra denture used before implant treatment resulted in less comfort ($p < .01$) and poorer function ($p < .001$). Elders were more satisfied with aesthetic (OR = 0.96) and comfort (OR = 2.96). Number of adjustment appointments had a positive correlation with comfort ($p < .001$) and a negative correlation with satisfaction of aesthetic ($p < .001$).

Conclusion: The results of this study demonstrated that satisfaction was correlated with age, gender, and past prosthetic history in the patients rehabilitated with the implant-supported overdentures.

KEY WORDS: denture, edentulism, gender, implant, overdenture, retrospective, satisfaction

The population aged over 65 years is increasing. There is some evidence of decreasing incidence of edentulism. Overall, the number of people who need complete dentures is predicted to remain constant or even increase.[1] Conventional complete dentures have clinical problems related to pain, lack of retention, lack of stability, and poor function. Complete dentures may also compromise patients' confidence and comfort, especially in edentulous mandibles.[2,3] Appearance, speech, comfort, stability, and ease of mastication are some aspects of denture satisfaction that have been analyzed in the literature.[4,5] Although these factors may have correlation, it is noteworthy to evaluate satisfaction with regard to patient's age, gender, and past prosthetic history. Pera and colleagues[6] showed that degree of satisfaction was not solely correlated with masticatory ability and oral function. They concluded that satisfaction was a highly complex phenomenon influenced by numerous factors, not strictly related to the stomatognatic system. These results confirmed that of the study of Boretti and colleagues[7] which concluded that a patient's

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satisfaction with complete dentures would primarily depend on the subject's sociopsychological background. Bergman and Carlsson[8] concluded that the psyche played a significant role in determining the ability of the patients to adapt to dentures and their ultimate satisfaction. They also believed that patients with emotional problems might reject dentures for reasons unrelated to the technical aspects of the treatment. Carlsson and colleagues[9] reported that 10 to 18% of patients remained unsatisfied after rehabilitation with the traditional dentures.

Many problems associated with the conventional approaches in management of the edentulous patients have been eliminated because implant therapy became a routine treatment modality.[10] Age can significantly influence prosthetic types of implant treatment. Although younger edentulous patients might prefer the fixed implant-supported dentures for its stability and ease of mastication,[11] a series of longitudinal studies have confirmed the effectiveness of implant-retained overdentures.[12–23] Moreover, evaluation of patients' satisfaction can further reconfirm the value of treatment with overdentures.[24,25]

This article presents a retrospective study that describes patient satisfaction including aesthetic, function, comfort, hygiene, and general satisfaction with regard to gender, age, and past dental history (number of adjustment appointments, duration of edentulism, and number of complete dentures before implant treatment).

MATERIALS AND METHODS

All patients treated with soldered bar-retained mandibular overdentures on two implants without extension (cantilever) at the Department of Implantology of Faculty of Dentistry at Tehran University of Medical Sciences, Tehran, Iran, between 1998 and 2004 were included in this study (Figure 1). A total of 65 patients fulfilled the inclusion criteria (Table 1) out of which 10 patients failed to participate. Two of the excluded participants passed away, six patients moved from the area, and two were excluded for being confined in bed. The included subjects underwent a comprehensive oral health examination.

Age, sex, and past dental history (number of adjustment appointments, duration of edentulism, and number of complete dentures before implant treatment) of the participants were evaluated using their archived files. The university's Clinical Research Ethics Board approved the research protocol, including recruitment procedures, exclusion/inclusion criteria, and the informed consent. Two observers examined all participants.

Figure 1 A screw-retained mandibular bar splinting two implants.

In this study, patients' satisfaction was quantified by means of questionnaires developed based on the aspects commonly used to evaluate overdentures: appearance, function, comfort, and hygiene.[10,26] The questionnaire was designed according to Guckes and colleagues,[26] and Narhi and colleagues[10] with extra questions to confirm the reliability of the responses. The responses were

TABLE 1 Inclusion and Exclusion Criteria

Patient inclusion criteria

1. Presence of two endosseous dental implants in anterior of mandible
2. Soldered splint bar
3. Appropriate overdentures
4. Edentulous maxilla
5. Healthy oral mucosa (no denture stomatitis, etc.)
6. No history of medication interfering with saliva secretion

Patient exclusion criteria

1. Cantilever bar
2. Severe clenching or bruxing
3. Drug or alcohol abuse
4. Nicotine abuse
5. Any psychiatric condition
6. Immunocompromised status
7. History of radiation therapy
8. Diabetes

coded as 2, 1, and 0 (completely satisfied, partially satisfied, and dissatisfied, respectively). The questionnaire consisted of five sections in which questions were related to aesthetic, function, comfort, hygiene, and general satisfaction. In each part, several questions were designed to assess patient's satisfaction with each parameter. For example, questions related to function were concerned of changing eating habits, denture stability, and speech. Ease of cleansing was one of the questions about hygiene.

The questionnaires were given to the patients after they had signed the consent forms. Patients were left alone to complete the questionnaires and were instructed to call the investigator when they were finished. They were instructed to leave a question blank if they did not understand it. Data were transcribed onto a spreadsheet and the statistical analysis was performed using statistical software (SAS/STAT, version 8.0, SAS Institute, Cary, NC, USA).[27] Multivariate regression models (marginal models) analysis was used to evaluate the correlations between the explanatory variables (including sex, age, number of adjustment appointments, dentures, and years of edentulous state) and the multivariate responses (such as aesthetic, function, comfort, hygiene, and also general satisfaction). In addition, to account for the correlation between multivariate responses, the generalized estimating equations (GEEs) methodology was utilized. Significance was accepted at 5% and expressed as p values and 95% confidence interval.

RESULTS

Patients' ages ranged from 49 to 75 years with a mean value of 65.3 years. The study group included 34 female and 21 male patients. The prostheses were in place for periods ranging from 6 months to 8 years, with a mean value of 3 years. The edentulous period before implant treatment ranged from 6 months to 38 years, with a mean value of 13.4 years. Table 2 shows the results of the GEE analysis. With this multivariate regression analysis, the obtained estimates could be interpreted in terms of the odds ratios (ORs). OR expresses the effect, when changing an independent variable while holding other variables in the model constant. ORs were given with their 95% confidence limits.

Aesthetic-based results revealed that as the patients become 1 year older, the chance of being in dissatisfied or partially satisfied group was multiplied by OR = 0.96. For instance, if patients of age 65 years old were one unit dissatisfied, then the dissatisfaction score for patients of 66 years old would be 0.96 when all other parameters remain unchanged. For the adjustment appointment variable, the OR estimated to be 1.29, which indicates an increased chance of being dissatisfied by each additional appointment session. Other factors were not statistically significant (see Table 2).

Functional-based results showed that satisfaction had only correlation with the number of dentures preceding the implant placement. The OR for being in the dissatisfied or partially satisfied groups was 1.22 as the patient had one more denture ($p < .0001$) (see Table 2). The analysis results showed that increasing age, adjustment appointment, and edentulous period affected the comfort factors and resulted in decreasing satisfaction. The OR of the number of dentures was 0.047 and that of the gender (males vs females) was 0.96 (see Table 2). Among the independent variables evaluated with hygiene factors, no significant correlation was found. As shown in Table 2, edentulism prior to implant treatment had significant impact on general satisfaction ($p < .01$).

DISCUSSION

Small sample size and unequal proportion of genders in our study did not quite allow comparison of the findings between males and females. The results indicated that male subjects had higher expectations regarding comfort, and also they were more satisfied with aesthetic compared to females. These results were not statistically significant ($p = .7$).

The statistical analyses conducted in this study showed that increasing age resulted in more satisfaction with aesthetic (OR = 0.96). As all participants in this study were healthy, there was not any negative health factor related to age that could adversely impact the satisfaction ratings. Although it has been explained that oral tactile function and performance deteriorate with age,[5] significant correlation between age and functional aspects could not be found in this study ($p > .05$). This observation could not confirm Hamlet and colleagues'[4] results, which indicated that the ability to speech and adaptation to a new prosthesis was mainly a consequence of the patient's age. This might be because of the fact that most participants were elderly people (mean age was 65.3 years). Feine and colleagues[21] reported more comfort with removable prosthesis compared to fixed implant-supported prosthesis in older patients (>50 years), which was somewhat consistent

TABLE 2 Statistical Results: *p* Value and Odds Ratios (ORs) from Generalized Estimating Equation Analysis

	Aesthetic *p* Value (OR)	Function *p* Value (OR)	Comfort *p* Value (OR)	Hygiene *p* Value (OR)	General *p* Value (OR)
Sex (M to F)†	.7176 (1.22)	.9775 (0.98)	<.001 (0.96)	.7671 (1.13)	.7477 (1.25)
Age	.0008* (0.96)	.9252 (1.001)	.0008 (2.96)	.3409 (0.95)	.2105 (0.96)
Adjustment appointments	.0004* (1.29)	.7737 (0.96)	.0001 (5.88)	.2541 (0.79)	.1513 (1.09)
Edentulous period	.1617 (0.96)	.8473 (0.99)	.0035 (1.86)	.2905 (0.94)	.0018* (0.94)
Number of dentures	.3828 (1.21)	<.0001 (1.22)*	.0023 (0.047)	.5344 (1.12)	.2787 (0.91)

*Significant.
†F (Female) is the reference category.

with results reported in this study (OR = 0.96). Both studies indicated that there was a tendency toward removable prostheses expressed by older subjects. Usually, those who chose the fixed alternatives rated stability, aesthetic, and ability to masticate as the most important parameters. Older patients who lost some of their dexterity or vision might find cleaning the abutments under a fixed complete denture a difficult task.[18] However, the results of this study showed that age was not significantly correlated with the hygiene aspect of satisfaction ($p > .05$).

The results of this study showed that more adjustments were related to lower scores of aesthetic satisfaction ($p < .001$). This might be because of more appointment requests from patients with aesthetic problems. Bouma and colleagues[22] showed that aesthetic did not change over time. In this study, the number of adjustment appointments had a positive effect on the satisfaction with comfort ($p < .001$). The recall appointments not only reduced patients' problems which might occur with the prostheses but also they provided the patients with some knowledge of potential future problems. This might reduce the emotional effects when the problems occurred.

Jacobs and colleagues[19] showed that neither the length of time of edentulism nor the number of dentures worn before implant rehabilitation had any significant effect on speech difficulties. Satisfactory speech also seemed to significantly contribute to general patient satisfaction with prosthetic rehabilitations.[20] Mericske-Stern and colleagues[14] reported 97% implant survival with two implants (splinted or unsplinted), irrespective of duration of edentulism. However, being edentulous for a long time might compromise alveolar ridges because of bone resorption. Atwood and Coy[28] showed an average annual alveolar ridge height reduction of approximately 0.4 mm in the edentulous anterior mandible resulting from physiological changes. The results of this study showed that as duration of edentulism increased, the general satisfaction with implants would also increase with implants. However, long-term edentulism would result in more resorption and consequently less stability of the dentures. Therefore, it could be concluded that in more atrophic jaws, rehabilitation with implant overdentures would be more beneficial to patients.

The results of this study demonstrated that as the number of dentures worn before implant rehabilitation

increased, the patients became more dissatisfied with function and comfort ($p < .001$ and $p < .01$, respectively). It could be a hypothesis that having numerous dentures before the implant treatment might imply maladaptability of the patient or emotional problems. Although this treatment modality might provide patients with more predictable results, they might still be unsatisfied. Therefore, additional research might be needed to evaluate such treatment modalities.

In a retrospective study, it could be difficult to know the actual number of patients that would fulfill the inclusion criteria. A limitation of this study was the questionnaire design which compared to visual analogue scale lacked specificity. Another limitation was that a few subjects found the questions confusing. Some of them had difficulties using the questionnaire because they could not relate easily to the questions as an expression of feelings.

CONCLUSIONS

Within the limitations of this study, it could be concluded that men had more expectations regarding comfort than women with a significant difference. Getting older significantly resulted in more satisfaction with esthetic and comfort. This study also showed that more adjustments could improve comfort. Being edentulous for a longer time affected the satisfaction scores. Although this factor significantly increased comfort and general satisfaction, patients who had been treated with more dentures preceding their implant rehabilitation reported less satisfaction with function and comfort.

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