Does Case Severity Make a Difference to Clinical Improvement Following Complete Denture Treatment?

Yuko Kurushima, DDS[a]/Ken-ichi Matsuda, DDS, PhD[b]/Kaori Enoki, DDS, PhD[c]/
Kazunori Ikebe, DDS, PhD[d]/Yoshinobu Maeda, DDS, PhD[e]

Purpose: The aim of this study was to investigate the effect of case severity on clinical outcomes when fabricating new complete dentures. ***Materials and Methods:*** Participants were separated into severe and moderate groups using the index of case difficulty for edentulous patients developed by the Japan Prosthodontic Society. Before and after treatment, self-assessed masticatory ability and oral health–related quality of life (OHRQoL) were examined, and the authors compared them according to case severity using the Mann-Whitney *U* test. To compare findings before and after treatment, the authors used the Wilcoxon signed rank test. ***Results:*** In the severe group, both scores were significantly improved after treatment ($P < .01$). However, in the moderate group, there was no significant difference in self-assessed masticatory ability as measured by the food acceptance score before and after treatment ($P = .11$). Before treatment, OHRQoL as measured by the Oral Health Impact Profile score was significantly higher in the severe group than in the moderate group ($P < .01$). However, after treatment, there was no significant difference between the two groups ($P = .92$). ***Conclusions:*** The authors concluded that case severity makes a difference in the edentulous patient's OHRQoL and self-assessed masticatory ability during complete denture treatment. Evaluating case severity with the index before treatment is a useful tool for patients and clinicians to predict clinical outcomes. *Int J Prosthodont 2015;28:161–166. doi: 10.11607/ijp.4177*

Implant dentistry has advanced rapidly in recent years. Although implant prostheses have great advantages for edentulous patients, the most common treatment choice is still conventional complete dentures.[1] Advanced-technology implant treatment is not an option for most edentulous patients because of the cost[2]; because of the aging population, the need for complete dentures is not likely to lessen in the near future.[3] Most edentulous patients appear to benefit from complete dentures and report satisfactory oral and masticatory function with their use.[3]

Many studies have investigated how oral health–related quality of life (OHRQoL) or oral function can be improved for edentulous patients undergoing complete denture treatment.[4–8] However, some clinical cases are hard to improve because of their severity. Generally, edentulous patients with extreme alveolar bone resorption, distorted jaw relationships, or hyposalivation are considered to be severe cases when fabricating complete dentures.[9–11] For example, patients with extreme alveolar bone resorption are likely to have problems with the stability and retention of their dentures. This leads to poor appearance, impaired mastication, and lower OHRQoL.

The American College of Prosthodontists (ACP) and the Japan Prosthodontic Society (JPS) have developed classification systems for complete edentulism that can be used to guide overall treatment planning and management of patients with complete dentures.[12–14] However, there have been no studies investigating the effect of case severity on improvement in OHRQoL or oral function.

[a]*Graduate Student, Department of Prosthodontics, Gerodontology, and Oral Rehabilitation, Osaka University Graduate School of Dentistry, Osaka, Japan.*
[b]*Assistant Professor, Department of Prosthodontics, Gerodontology, and Oral Rehabilitation, Osaka University Graduate School of Dentistry, Osaka, Japan.*
[c]*Clinical Fellow, Department of Prosthodontics, Gerodontology, and Oral Rehabilitation, Osaka University Graduate School of Dentistry, Osaka, Japan.*
[d]*Associate Professor, Department of Prosthodontics, Gerodontology, and Oral Rehabilitation, Osaka University Graduate School of Dentistry, Osaka, Japan.*
[e]*Professor and Chairman, Department of Prosthodontics, Gerodontology, and Oral Rehabilitation, Osaka University Graduate School of Dentistry, Osaka, Japan.*

Correspondence to: *Dr Ken-ichi Matsuda, Department of Prosthodontics, Gerodontology, and Oral Rehabilitation, Osaka University Graduate School of Dentisty, 1-8 Yamadaoka Suita, Osaka 565-0871, Japan. Fax: +81-6-6879-2957. Email: digiflex@dent.osaka-u.ac.jp*

©2015 by Quintessence Publishing Co Inc.

The purpose of this study was to investigate the effect of case severity on edentulous patients' OHRQoL and self-assessed masticatory ability following complete denture treatment.

Materials and Methods

The study participants were edentulous patients sourced from the outpatient roster of the Department of Removable Prosthodontics, Osaka University Dental Clinic. Thirty-one people (17 men, 14 women), with a mean age of 74.9 ± 6.0 years, participated.

The inclusion criteria were as follows: *(1)* independently living without any serious chronic conditions, *(2)* requiring a new set of complete dentures, and *(3)* wearing complete dentures for at least 3 years previously. The authors excluded participants who had dysfunctional disorders of the masticatory system or debilitating systemic or oral mucosal diseases.

After giving informed consent, the patients received complete denture treatment by only one prosthodontist in the Department of Prosthodontics (clinical experience: 10 years).

Evaluations were carried out before and after treatment. As clinical evaluations, OHRQoL and self-assessed masticatory ability (food acceptance) were measured.

OHRQoL

To measure OHRQoL, the authors used the Oral Health Impact Profile-Edentulous (OHIP-EDENT) questionnaire, developed as a scaled-down version of OHIP-49 and providing better relevance to clinical studies of prosthodontic procedures for edentulous patients.[15–17] The OHIP-EDENT questionnaire includes between two and four items from each impact sub-domain. These domains are organized to reflect the hierarchy of increasingly complex and disruptive impacts or problems. The first three domains (functional limitations, physical pain, and psychologic discomfort) include items that are limited to the individual's experience, whereas items in the disability and handicap domains represent impacts or problems that may affect everyday activities and social function. Response options range from 4 (very often) to 0 (never). OHIP scores were obtained by summing the response codes for the 19 items to produce a total score for each respondent.

Self-Assessed Masticatory Ability (Food Acceptance)

Masticatory ability was evaluated as a food acceptance score from responses to a question regarding 10 foods: "Can you chew this food without difficulty?"[18] Common Japanese foods were used to rate masticatory ability: hard rolls, rice, bread, raw cabbage, apple, devil's tongue, roast beef, peanuts, rice crackers, and octopus. The food acceptance score was the total number of foods the subject reported being able to chew without difficulty.

Case Severity

Case severity was evaluated with the treatment difficulty indices for edentulous patients developed by the JPS.[14] This classification consisted of five categories: *(1)* shape of residual ridge, *(2)* properties of the mucous membrane, *(3)* interocclusal relationship of the alveolar ridges, *(4)* oral habits, and *(5)* other traits (torus, residual ridge undercut, amount and nature of saliva). In each category, there were four examination ratings (levels 1 to 4). The comprehensive severity level was defined as the highest level of the five categories. In this study, the patients were divided into two groups. The "severe" group consisted of the 17 patients with level 3 or level 4 ratings and the "moderate" group contained 14 patients with level 1 or level 2 ratings.

Statistical Analysis

Differences between the two groups were assessed using a Mann-Whitney *U* test. The improvement in each score following treatment was assessed using a Wilcoxon signed rank test. *P* values of less than .05 were considered significant.

The study protocol was approved by the Institutional Review Board of Osaka University Graduate School of Dentistry.

Results

All participants received complete denture treatment and were satisfied with their new dentures.

In the severe group, the scores after treatment were significantly higher than before treatment for both OHIP and food acceptance ($P < .01$). However, in the moderate group, there was no significant change in the food acceptance score ($P = .11$; Fig 1).

Before treatment, OHIP scores were significantly higher in the severe group than in the moderate group ($P < .01$). By contrast, after treatment there was no significant difference between the two groups ($P = .92$; Figs 2 and 3).

Improvement in the OHIP and food acceptance scores in the severe group was significantly higher than in the moderate group (Fig 4).

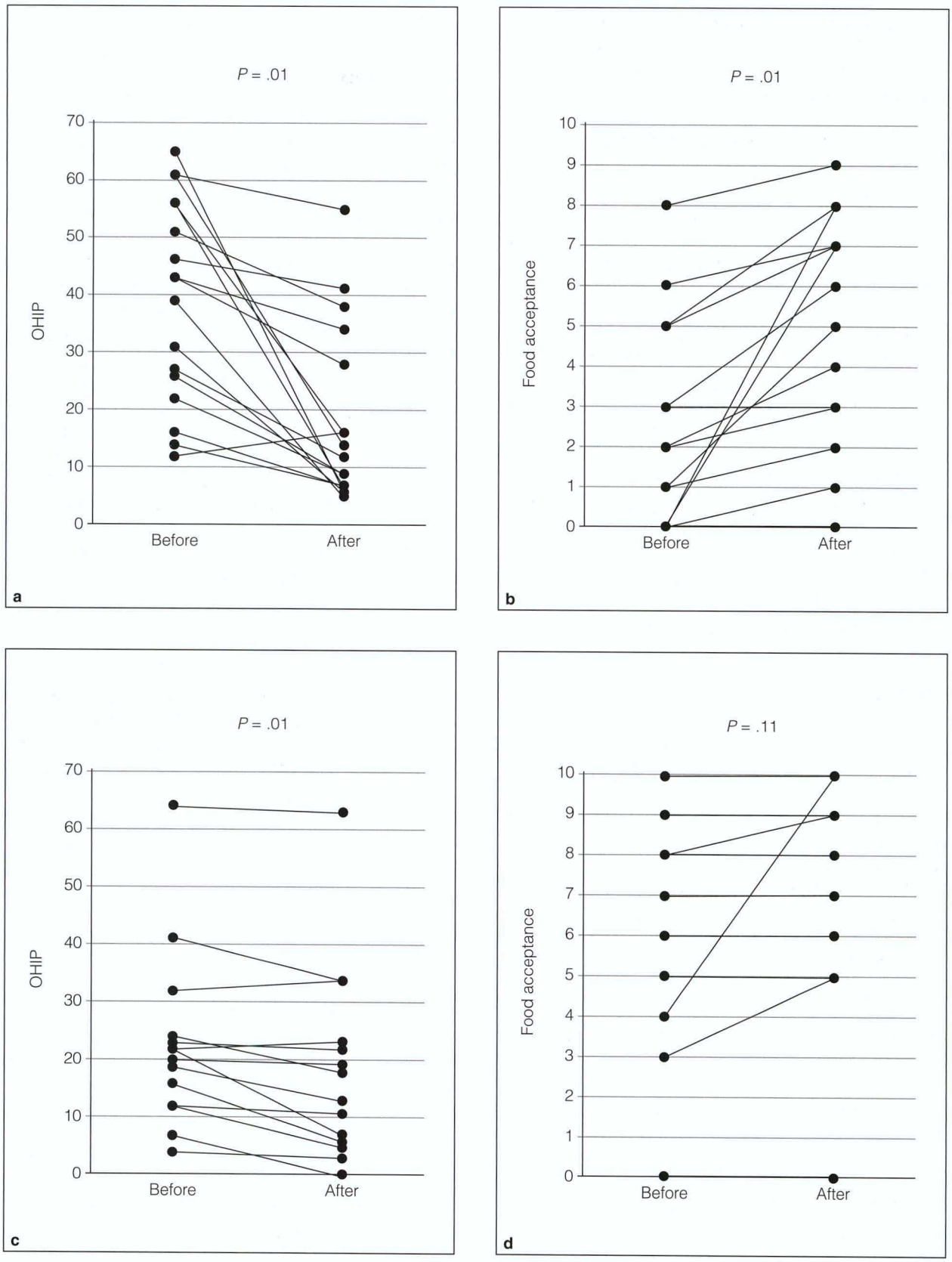

Fig 1 Changes in the Oral Health Impact Profile (OHIP) and food acceptance scores before and after treatment in the **(a, b)** severe and **(c, d)** moderate groups (Wilcoxon signed rank test).

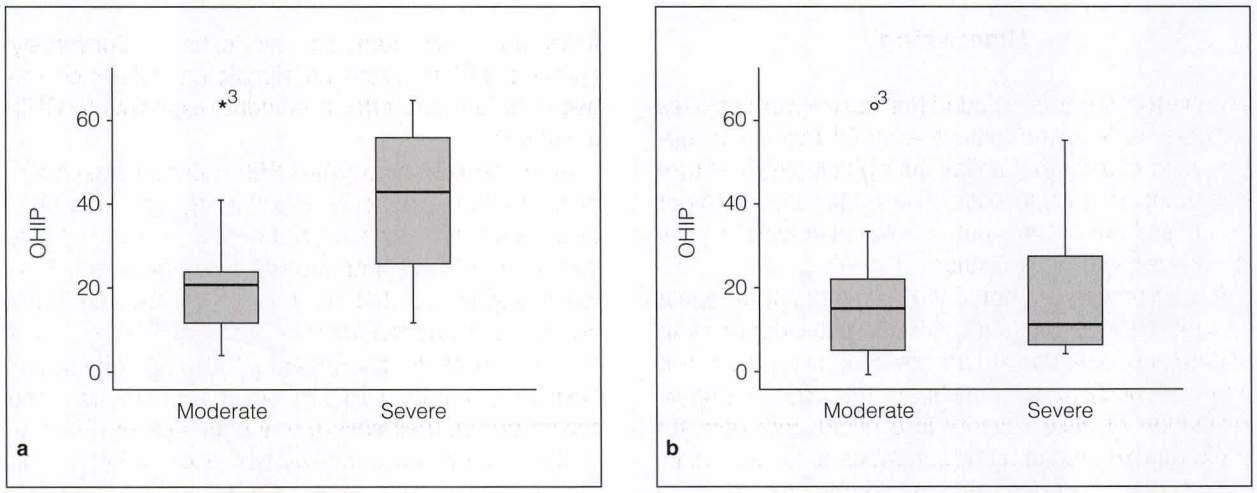

Fig 2 Differences in OHIP scores between the moderate and severe groups **(a)** before ($P = .01$) and **(b)** after ($P = .92$) treatment.

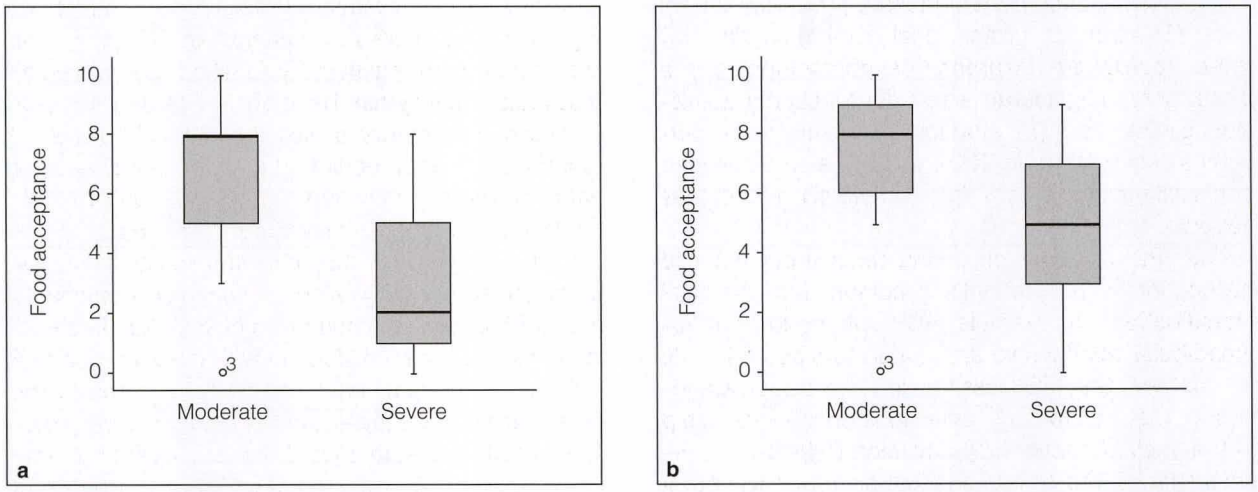

Fig 3 Differences in food acceptance scores between the moderate and severe groups **(a)** before ($P < .01$) and **(b)** after ($P = .013$) treatment.

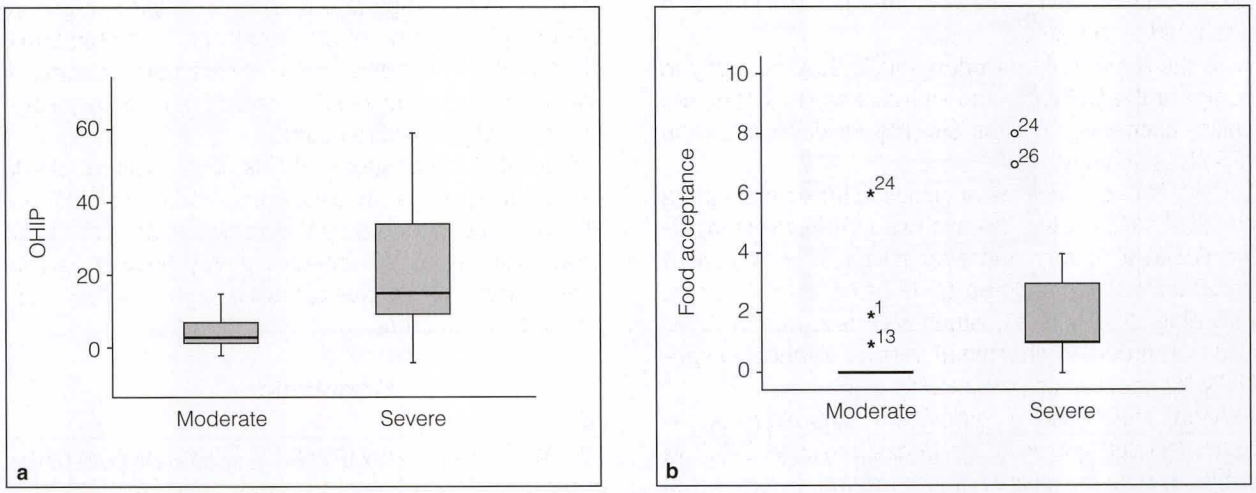

Fig 4 Differences in improvement in **(a)** OHIP ($P < .01$) and **(b)** food acceptance ($P < .01$) scores between the moderate and severe groups.

Discussion

The present study concluded that case severity makes a difference in edentulous patients' OHRQoL and self-assessed masticatory ability during complete denture treatment. Evaluating case severity before treatment was useful not only for patients but also for clinicians to predict the clinical results.

It is commonly accepted that it is difficult to regain satisfactory oral function with complete dentures in edentulous patients with severe bone resorption or a poor interocclusal relationship of the alveolar ridges. Evaluation of case severity is a useful tool dentists could use for predicting treatment difficulty and clinical outcomes before treatment commences.

In 1999, the ACP developed a classification system for completely edentulous patients based on diagnostic findings. They reported that potential benefits of the classification system include *(1)* better patient care, *(2)* improved professional communication, *(3)* more appropriate insurance reimbursement, *(4)* a better screening tool to assist dental school admission clinics, and *(5)* standardized criteria for outcomes assessment. In 2006, the JPS also developed a classification system for completely edentulous patients.[19]

The JPS classification allows for a more detailed description of the patient's condition than the ACP classification. For example, ACP options for maxillomandibular relationship are limited to classes I to III. By contrast, the JPS classification has three categories in that section: *(1)* anteroposterior relationship in the sagittal section, *(2)* deviation (left-to-right relationship) in the frontal section, and *(3)* asymmetry of the shape of the residual ridge and/or interalveolar ridge space in the frontal section. The authors considered this detailed information to be useful for precise classification. For this reason, the JPS classification was used in this study.

To the authors' knowledge, this is the first study to compare the OHRQoL and self-assessed masticatory ability according to case severity as defined by the JPS classification.

OHIP is one of the major scales used for measuring OHRQoL. Many studies have used OHIP for comparing OHRQoL before and after treatment or between prosthodontic procedures. OHIP has several versions, including OHIP-EDENT, which was used in this study, and is a modified shortened version intended especially for edentulous patients.[20]

Allen[4] reported a significant improvement in health-related quality of life (measured with OHIP) in subjects who requested and received conventional complete dentures. Ellis et al[7] also reported statistically significant improvement in some OHIP domains following new denture fabrication. Conversely, Forgie et al[21] reported no significant difference between before and after treatment responses to OHIP questions.

In the present study, the OHIP score improved significantly in all participants following complete denture treatment. However, in the moderate group, this improvement was not statistically significant. This result suggested that for patients in the moderate group, their edentulousness and their use of complete dentures did not impact greatly on OHRQoL as measured with the OHIP. However, for patients in the severe group, their severe oral condition or difficulty in using complete dentures had a great impact on their OHRQoL. This explains why the improvement in OHIP scores following new denture fabrication in the severe group was significantly higher than in the moderate group.

Self-assessed masticatory ability was one of the representative indices for patients' oral function and satisfaction with masticatory function. Self-assessed masticatory ability has been shown to be related to objective masticatory ability. Ikebe et al[22] reported that the number of foods that could be eaten without difficulty was the most important explanatory variable for dissatisfaction with masticatory function.

Locker suggested that chewing ability could be evaluated subjectively using questionnaires relating to the psychosocial consequences of limitation in chewing ability and self-satisfaction with chewing ability.[23]

Before treatment, food acceptance scores in the severe group were lower than in the moderate group. This result indicated that the case severity affects masticatory ability. Koshino et al[24] also reported that the basal area of the denture foundation greatly influenced masticatory efficiency.

The improvement in food acceptance scores in the severe group was greater than in the moderate group following fabrication of new dentures. This result implied that professional complete denture treatment could greatly improve self-assessed masticatory ability, especially in severe cases.

One of the limitations of this study was its small sample size; the study group was limited to patients who had been treated by the same prosthodontist in order to standardize treatment quality. Because of the sample size, the findings cannot be extrapolated to all edentulous patients.

Conclusions

This study covers new ground in investigating whether case severity affects improvement in OHRQoL and self-assessed masticatory ability following complete denture treatment.

Acknowledgments

The authors reported no conflicts of interest related to this study.

References

1. Anastassiadou V, Robin Heath M. The effect of denture quality attributes on satisfaction and eating difficulties. Gerodontology 2006;23:23–32.
2. Owen PC. Appropriatech: Prosthodontics for the many, not just for the few. Int J Prosthodont 2004;17:261–262.
3. Carlsson GE, Omar R. The future of complete dentures in oral rehabilitation. A critical review. J Oral Rehabil 2010;37:143–156.
4. Allen PF. Assessment of oral health related quality of life. Health Qual Life Out 2003;1:40.
5. Ana Paula Viola AST, Monteiro DR, Barbosa DB. Oral health-related quality of life and satisfaction before and after treatment with complete dentures in a dental school in Brazil. J Prosthodont Res 2013;57:36–41.
6. Shigli K, Hebbal M. Assessment of changes in oral health-related quality of life among patients with complete denture before and 1 month post-insertion using Geriatric Oral Health Assessment Index. Gerodontology 2010;27:167–173.
7. Ellis JS, Pelekis ND, Thomason JM. Conventional rehabilitation of edentulous patients: The impact on oral health-related quality of life and patient satisfaction. J Prosthodont 2007;16:37–42.
8. De Marchi RJ, Hugo FN, Padilha DM, et al. Edentulism, use of dentures and consumption of fruit and vegetables in south Brazilian community-dwelling elderly. J Oral Rehabil 2011;38:533–540.
9. Atwood DA. Some clinical factors related to rate of resorption of residual ridges. J Prosthet Dent 1962;12:441–450.
10. Ortman HR. Factors of bone resorption of the residual ridge. J Prosthoet Dent 1962;12:429–440.
11. Tallgren A. The continuing reduction of the residual alveolar ridges in complete denture wearers: A mixed-longitudinal study covering 25 years. J Prosthet Dent 1972;27:120–132.
12. Mazurat RD, Mazurat NM. Communicating complexity: Using a diagnostic classification system for edentulous patients. J Can Dent Assoc 2003;69:511–514.
13. McGarry TJ, Nimmo A, Skiba JF, Ahlstrom RH, Smith CR, Koumjian JH. Classification system for complete edentulism. The American College of Prosthodontics. J Prosthodont 1999;8: 27–39.
14. Kuboki T, Ichikawa T, Baba K, Hideshima M, Sato Y, Wake H, et al. A multi-centered epidemiological study evaluating the reliability of the treatment difficulty indices developed by the Japan Prosthodontic Society. J Prosthodont Res 2012;56:71–86.
15. Slade GD. Derivation and validation of a short-form oral health impact profile. Community Dent Oral Epidemiol 1997;25:284–290.
16. Locker D. Measuring oral health: A conceptual framework. Community Dent Health 1988;5:3–18.
17. Sato Y, Kaiba Y, Yamaga E, Minakuchi S. Reliability and validity of a Japanese version of the Oral Health Impact Profile for edentulous subjects. Gerodontology 2012;29:e1033–e1037.
18. Kapur K, Yurkstas A, Soman S. Test foods for measuring masticatory performance of denture wearers. J Prosthet Dent 1964; 14:483–491.
19. Ichikawa T, Sato H, Kuboki T, Sato Y, Hideshima M, Wake H. Classification system for the completely dentate, partial and complete edentulism [in Japanese]. J Jpn Assoc Dent Sci 2006; 25:63–75.
20. Allen F, Locker D. A modified short version of the oral health impact profile for assessing health-related quality of life in edentulous adults. Int J Prosthodont 2002;15:446–450.
21. 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.
22. Ikebe K, Morii K, Matsuda K, Nokubi T. Discrepancy between satisfaction with mastication, food acceptability, and masticatory performance in older adults. Int J Prosthodont 2007;20:161–167.
23. Locker D. Changes in chewing ability with ageing: A 7-year study of older adults. J Oral Rehabil 2002;29:1021–1029.
24. Koshino H, Hirai T, Ishijima T, Ohtomo K. Influence of mandibular residual ridge shape on masticatory efficiency in complete denture wearers. Int J Prosthodont 2002;15:295–298.

Literature Abstract

Effect of alveolar ridge preservation after tooth extraction: A systematic review and meta-analysis

Tooth extraction has been shown to be followed by alveolar ridge volume loss and this can complicate subsequent dental implant treatment. Alveolar ridge preservation (ARP) techniques aim to prevent or reduce alveolar bone dimension loss after tooth extraction by socket grafting. The aim of this systematic review is to compare socket grafting to tooth extraction without grafting, in nonmolar teeth in terms of changes in horizontal ridge width and vertical ridge height. Only randomized controlled trials (RCTs) in human adults with a minimal healing period of 12 weeks were chosen. Six RCTs were selected from a total of 256 articles for meta-analysis. Quantitative analyses showed that ARP is significantly more effective than tooth extraction alone in preserving buccolingual width, midbuccal height, midlingual height, and mesial height. It was further found via subgroup analyses that flap elevation, barrier membrane placement, and xenograft or allograft socket filling contributed to a beneficial effect on height preservation. ARP is a widely practiced and recognized technique for its benefits on nonimmediate implant placement after tooth extraction. This review substantiates its practice and provides evidence of its intended effect.

Avila-Ortiz G, Elangovan S, Kramer KWO, Blanchette D, Dawson DV. *J Dent Res* 2014;93:950–958. **References:** 61. **Reprints:** G. Avila-Ortiz, Department of Periodontics, The University of Iowa, Iowa City, IA, USA. Email: gustavo-avila@uiowa.edu—*Debbie P.M. Hong, Singapore*

Copyright of International Journal of Prosthodontics is the property of Quintessence Publishing Company Inc. and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.