

12-30-2017

## Mandibular Two Mini Implants Overdenture Using Magnetic Attachments: A Case Report

Anna Miyayasu

*Gerodontology and Oral Rehabilitation, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University, 1-5-45 Yushima, Bunkyo-ku, Tokyo, Japan*

Manabu Kanazawa

*Gerodontology and Oral Rehabilitation, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University, 1-5-45 Yushima, Bunkyo-ku, Tokyo, Japan, m.kanazawa.gerd@tmd.ac.jp*

Mari Asami

*Gerodontology and Oral Rehabilitation, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University, 1-5-45 Yushima, Bunkyo-ku, Tokyo, Japan*

Vo Lam Thuy

*Gerodontology and Oral Rehabilitation, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University, 1-5-45 Yushima, Bunkyo-ku, Tokyo, Japan*

Khaing Myat Thu

*Gerodontology and Oral Rehabilitation, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University, 1-5-45 Yushima, Bunkyo-ku, Tokyo, Japan*

*See next page for additional authors*

Follow this and additional works at: <https://scholarhub.ui.ac.id/jdi>

### Recommended Citation

Miyayasu, A., Kanazawa, M., Asami, M., Thuy, V. L., Thu, K. M., Shimada, R., & Minakuchi, S. Mandibular Two Mini Implants Overdenture Using Magnetic Attachments: A Case Report. J Dent Indones. 2017;24(3): 98-103

This Case Report is brought to you for free and open access by the Faculty of Dentistry at UI Scholars Hub. It has been accepted for inclusion in Journal of Dentistry Indonesia by an authorized editor of UI Scholars Hub.

---

# Mandibular Two Mini Implants Overdenture Using Magnetic Attachments: A Case Report

## Authors

Anna Miyayasu, Manabu Kanazawa, Mari Asami, Vo Lam Thuy, Khaing Myat Thu, Ryo Shimada, and Shunsuke Minakuchi

## **CASE REPORT**

# **Mandibular Two Mini Implants Overdenture Using Magnetic Attachments: A Case Report**

**Anna Miyayasu, Manabu Kanazawa, Mari Asami, Vo Lam Thuy, Khaing Myat Thu, Ryo Shimada, Shunsuke Minakuchi**

*Gerodontology and Oral Rehabilitation, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University, 1-5-45 Yushima, Bunkyo-ku, Tokyo, Japan*

*Correspondence e-mail to: m.kanazawa.gerd@tmd.ac.jp*

## **ABSTRACT**

Many patients with an edentulous mandible struggle to use complete dentures. The instability of such dentures, caused by the lack of retention, often causes discomfort, as well as functional and psychosocial problems, which can be significantly improved using implant overdentures with retentive attachments. This case report describes a successful case of a mandibular implant overdenture using two mini implants and magnetic attachments for an elderly edentulous patient. **Case Report:** A 62-year-old female with a thin mandibular bone ridge presented with complaints of pain caused by an unstable and unretentive complete mandibular denture. This patient received two mini implants (diameter: 2.6 mm; length: 12 mm) with magnetic attachments. After three months, magnetic assemblies with magnetic attraction of 400 gf were incorporated into the intaglio surface of her mandibular overdenture. At 11 months, magnetic attraction was changed from 400 gf to 600 gf to provide a stronger magnetic force for improving the retention of this denture. **Conclusion:** Based on a two-year follow-up period, the mandibular two mini implants overdenture with magnetic attachments was successful in improving the patient's general satisfaction with her dentures.

**Key words:** dental implant, implant-supported denture; magnetic attachment; mandibular prosthesis; overdenture

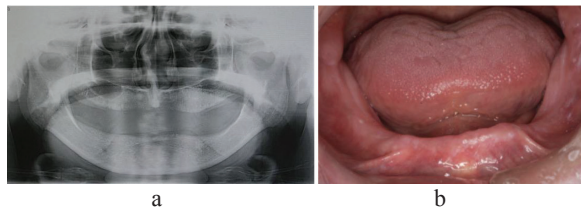
How to cite this article: Anna Miyayasu, Manabu Kanazawa, Mari Asami, Vo Lam Thuy, Khaing Myat Thu, Ryo Shimada, Shunsuke Minakuchi. Mandibular two mini implants overdenture using magnetic attachments: a case report. J Dent Indones. 2017;24(3): 98 - 103

## **INTRODUCTION**

Conventional complete dentures have been the traditional standard of care for edentulous patients, with few alternative options.<sup>1,2</sup> Many patients struggle with these prostheses due to the instability of this denture caused by lack of retention, which causes discomfort and leads to functional and psychosocial problems.<sup>3,4</sup> The introduction of implant overdentures (IODs) has improved successful treatment of edentulous patients, and several studies have shown that IODs provide adequate denture stability and retention, which improves patients' quality of life and satisfaction with treatment because they are able to function and speak comfortably.<sup>5,6</sup> The McGill and York consensus statements support the use of two standard implants as a first-choice treatment for overdenture prostheses in edentulous patients.<sup>7,8</sup>

Fixture-form dental implants of 3.75–4.2mm in diameter are standard diameter implants, while implants less than 3.0 mm in diameter are termed mini implants.<sup>9</sup> Initially, mini implants were temporary and used prior to insertion of standard diameter implants; however, they provide good stability and healing and have recently been used for complete and partial denture stabilization.<sup>10,11</sup> As a result, these implants have been used as IODs when standard implants are not feasible due to the need for advanced bone graft procedures or when bone graft procedures are unpredictable because of patient health. Mini implants are also cost effective and ensure minimal surgical stress in many cases.<sup>12</sup>

The survival rate of mini implants for mandibular IODs is 95% based on 1–7 years of follow-up, and vertical marginal bone loss around mini implants averages



**Figure 1.** The panoramic radiograph (a) and intra oral view of the case (b)

less than 1.5mm.<sup>13</sup> Sivaramakrishnan et al. found that IODs using mini implants with ball attachments or bar attachments provide good patient satisfaction compared to standard diameter IODs; however, other study noted that the number of mini implants for the IOD affects the implants survival rate as IODs.<sup>13,14</sup> In a randomized controlled trial, Souza et al. obtained a high failure rate for two mini IODs compared to four mini IODs with two IODs when using mini implants of 2.0mm in diameter and standard implants of 4.0mm in diameter.<sup>15</sup>

In the current case report, a successful case of mandibular overdenture using two mini implants and magnetic attachments for an elderly edentulous patient is described.

## CASE REPORT

### Patient

A 62-year-old edentulous female complained that her existing mandibular complete denture was no longer retentive and causing her pain. A panoramic radiograph was used to conduct a preoperative clinical assessment of her mandible arch, which revealed that the patient had good bone height but a clinically thin anterior mandibular bone plate (Figure 1). The existing mandibular complete denture was poorly retentive and unstable due to the strong oral muscular force of the patient. The treatment decision was to apply two mini implants and to retain the mandibular complete overdenture using magnetic attachments.

### Clinical procedures

The patient received a new mandibular complete denture to improve the denture fit as much as possible before replacing the implants. Treatment was performed following a computed tomography scan (Figure 2-b), which showed the thin anterior mandibular bone plate, and preoperative planning. For implant insertion surgery, local anesthesia was administered, and the mandibular denture was inserted into the patient's mouth to mark the positions for the implant (Figure 2-c). A minimal mid-crestal incision was placed, and a full-thickness mucoperiosteal flap was raised to provide adequate visualization of the labial and lingual cortical plates (Figure 2-d). The osteotomy was

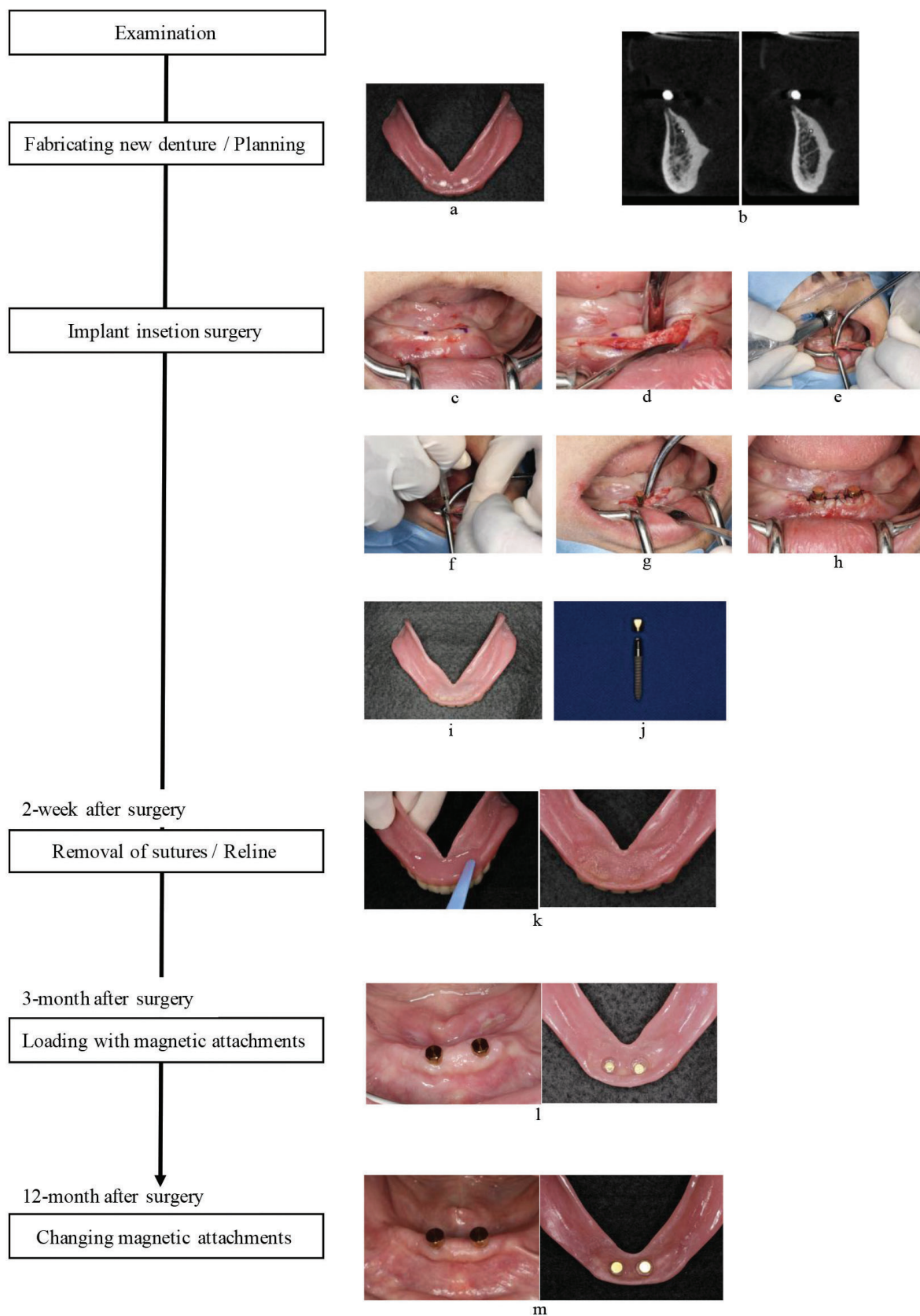
enlarged sequentially using a bone-drilling protocol as per the manufacturer's instructions (Figure 2-e). Once the osteotomy was prepared, two implants (Magfit MIP Fixture G2.4, Aichi Steel Co., Aichi, Japan), 2.6 mm in diameter and 12 mm in length, were wrenched into place using a hand wrench (Figure 2-f, -j). Magnetic keepers (Magfit sMIP Keeper Flat Type, Aichi Steel Co., Aichi, Japan), 3.7 mm in diameter and 3.1 mm in height, were connected to each implant using 15 Ncm of torque (Figure 2-g, -j), and sutures were made (Figure 2-h). The inner denture base around the keepers was relieved (Figure 2-i) so that denture contact was minimized to mitigate stress on the implants.

Two weeks after surgery, sutures were removed, and the denture base around the implant insertion area was relined with a soft acrylic temporary relining material (Tissue Conditioner II, SHOFU Inc., Aichi, Japan; Figure 2-k). Three months after surgery, magnetic assemblies (Magfit DXC Flat Type 400 gf, Aichi Steel Co., Aichi, Japan) with a magnetic attraction of 400 gf were incorporated into the intaglio surface of the dentures intra-orally using an autopolymerizing acrylic resin (Unifast III, GC, Tokyo, Japan; Figure 2-l). At 11 months after surgery, the magnetic attraction was increased from 400 gf to 600 gf (Magfit DXC Flat Type 600 gf, Aichi Steel Co., Aichi, Japan) with assemblies of 4mm in diameter (Figure 2-m).

### Clinical assessments

Figure 3 showed a flow chart of the assessments. Assessment-0 (A-0) was performed before the implant surgery and used as a baseline, Assessment-1 (A-1) was performed six months post-surgery with 400gf magnetic attachments, Assessment-2 (A-2) was performed at nine months post-surgery with 400gf magnetic attachments, Assessment-3 (A-3) was performed at 12 months post-surgery with 600 gf magnetic attachments, and Assessment-4 (A-4) was performed at 15 months post-surgery with 600gf magnetic attachments. The validated and reliable Japanese version of the Oral Health Impact Profile for edentulous patients (OHIP-EDENT-J) was used to measure the oral-health-related quality of life (OHRQoL) at A-0, A-1, and A-4 using 19 items answerable with a five-point Likert scale for responses of never (0), hardly ever (1), occasionally (2), fairly often (3), and very often (4).<sup>16,17</sup> Answers were totaled to obtain a summary score ranging from 0 to 76, with higher scores representing poorer OHRQoL. This questionnaire supported grouped questions according to seven subscales, each representing a specific dimension of the patient's OHRQoL.<sup>18</sup> The OHIP-EDENT-J provided assessment measurements of the impact of oral conditions on quality of life using a frequency estimation of disruption, such as discomfort and disability, in daily activities.<sup>19</sup>

General patient satisfaction was measured using a 100mm visual analogue scale (VAS) during A-0, A-1 based on anchor words including "completely



**Figure 2.** Summary of clinical procedures. New denture with radio markers (Radio graphic guide) (a); the CT scan (b); the marking the implant positions (c); the flap (d); the bone drilling (e); the implant insertions (f); the placement of keeper (g); the sutures (h); the relieving of the denture's inner aspect (i); the implant fixture and keeper (Magfit MIP) (j); the relining denture base (k); the Magfit DXC 400gf (l); the Magfit DXC 600gf (m)



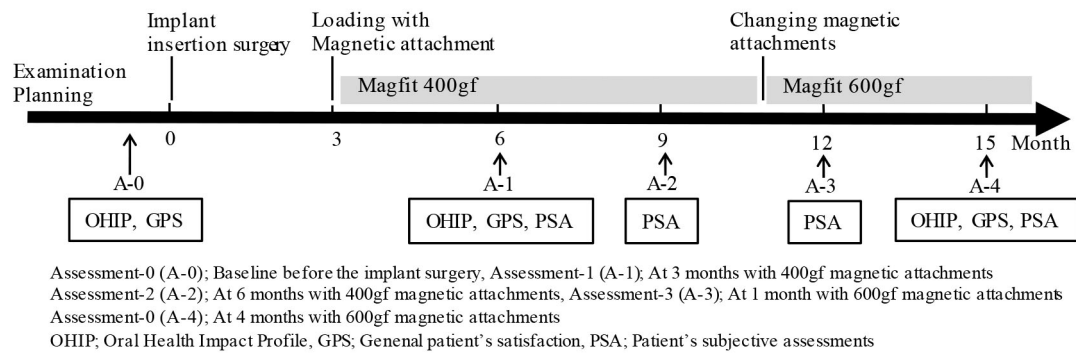


Figure 3. Flow chart of assessments



Figure 4. Panoramic radiograph after implant insertion

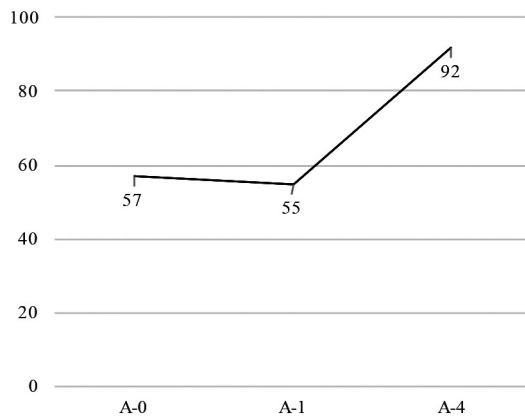


Figure 5. Results of general patient's satisfaction measured using a 100 mm VAS at (A-0) performed before implant surgery, (A-1) six months post-surgery with 400 gf magnetic attachments, (A-4) 15 months post-surgery with 600gf magnetic attachments

dissatisfied" and "completely satisfied." Each response was converted to a score on a scale of 0–100mm, and general patient satisfaction was assumed to vary in a continuous range from negative to positive.<sup>20</sup> The patient's subjective assessment measurements using the 100 mm VAS included "Wearing/removing

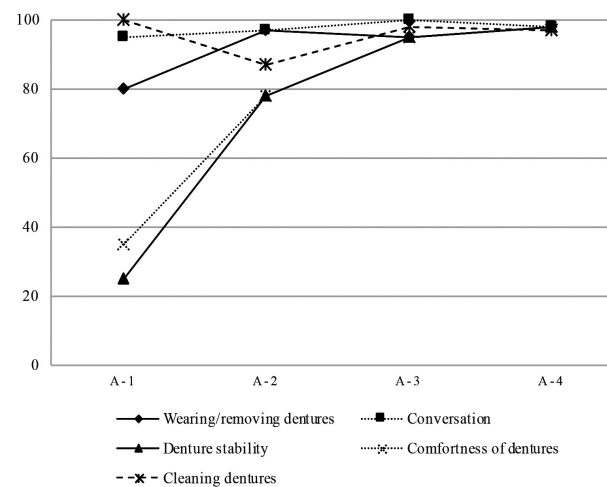


Figure 6. Results of patient's subjective assessments at (A-1) six months post-surgery with 400gf magnetic attachments, (A-2) nine months post-surgery with 400gf magnetic attachments, (A-3) performed at 12 months post-surgery with 600gf magnetic attachments, and (A-4) performed at 15 months post-surgery with 600gf magnetic attachments

denture," "Speech," "Denture stability," "Comfort," and "Denture cleaning" and were taken during A-1, A-2, A-3 and A-4.

Figure 4 showed the panoramic radiograph taken after implant insertion surgery. The patient continued with two years of follow-up, during which soft and hard tissues and implant fixtures remained stable without inflammation; however, the patient was dissatisfied with retention of her IOD using the 400gf magnetic attachments. Therefore, the magnetic attachments were change to provide 600gf of magnetic force. Table 1 shows the results of the OHIP-EDENT-J, which reveal minimal changes between A-0 and assessments performed after the procedure, with slight improvements in the summary score and function limitation. General patient satisfaction did not improved from A-0 to A-1 because the 400 gf magnetic

**Table 1.** Results of OHIP-EDENT-J in relation with the time of assessment

OHIP-EDENT-J Domain	ASSESSMENT PERIOD		
	A-0	A-1	A-4
Functional limitation	6	6	4
Pain	4	3	4
Psychological discomfort	4	2	3
Physical disability	5	4	6
Psychological disability	3	0	2
Social disability	0	0	0
Handicap	2	2	1
Summary score	24	17	20

\*(A-0) performed before implant surgery, (A-1) six months post-surgery with 400gf magnetic attachments, (A-4) 15 months post-surgery with 600gf magnetic attachments

attachments were used (Figure 5). After inserting 600gf magnetic attachments (A-4), the patient's general satisfaction rating improved significantly alongside denture stability and comfort ratings based on the patient's subjective assessment (Figure 6).

## DISCUSSION

Souza et al. used mini implants with diameters of 2.0 mm and ball attachments for two mini IODs and found that the survival rate of mini implants was lower than the rate of four mini IODs and two standard IODs.<sup>15</sup> The current clinical case used two mini IODs successfully because the diameter of the implants was 2.6mm, and the magnetic retention mechanisms reduced lateral force on the implants.

In the study of Omura et al.<sup>21</sup>, they mentioned that mandibular IODs using the standard implants with magnetic attachments, which have the 750gf of magnetic force, could significantly improve the general patient's satisfaction. However, in this clinical case, the patient's satisfaction rating was initially low because the 400gf magnetic attachments used had less retention force due to the small diameter. When these were changed to 600gf magnetic attachments, the patient's general satisfaction improved based functional limitation, stability, and comfort assessments. There is no evidence regarding to the denture retention and the patient's satisfaction, therefore, it is need to be reveal in the future study.

## CONCLUSION

In this clinical case report, mandibular two IODs with a diameter of 2.6mm and magnetic attachments were successfully administered, based on assessments

taken during a two-years follow-up period. However, adequate patient satisfaction required the use of stronger magnetic attachments with a retentive force of 600gf.

## ACKNOWLEDGEMENT

This clinical case report was supported by Aichi Steel Co., Aichi, Japan. We thank our colleagues from this company who provided insight and expertise that greatly assisted the case.

## CONFLICT OF INTEREST

The authors have no conflicts of interest directly relevant to the content of this article.

## REFERENCES

1. Owen PC. Appropriatech: prosthodontics for the many, not just for the few. *Int J Prosthodont.* 2004;17:261–2.
2. Cooper LF. The current and future treatment of edentulism. *J Prosthodont.* 2009;18:116–22.
3. Carlsson GE. Critical review of some dogmas in prosthodontics. *J Prosthodont Res.* 2009;53:3–10.
4. Cunha TR, Della Vecchia MP, Regis RR, Ribeiro AB, Muglia VA, Mestriner Jr W et al. A randomised trial on simplified and conventional methods for complete denture fabrication: masticatory performance and ability. *J Dent.* 2013;41:133–42.
5. Thomason JM, Heydecke G, Feine JS, Ellis JS. How do patients perceive the benefit of reconstructive dentistry with regard to oral health-related quality of life and patient satisfaction? A systematic review. *Clin Oral Implants Res.*

- 2007;18:168–88.
  6. Emami E, Heydecke G, Rompré PH, de Grandmont P, Feine JS. Impact of implant support for mandibular dentures on satisfaction, oral and general health-related quality of life: a meta-analysis of randomized-controlled trials. *Clin Oral Implants Res.* 2009;20:533–44.
  7. Feine JS, Carlsson GE, Awad MA et al. The McGill consensus statement on overdentures. *Int J Prosthodont.* 2002;15:413–4.
  8. Thomason JM, Feine J, Exley C et al. Mandibular two implant-supported overdentures as the first choice standard care for edentulous patients—the York Consensus Statement. *Br Dent J.* 2009;207:185–6.
  9. Kumari P, Verma M, Sainia V, Gupta A, Gupta R, Gill S. Mini-implants, mega solutions: a case series. *J Prosthodont.* 2016;25:682–86.
  10. Jackson BJ. Fixed partial denture treatment with mini dental implants. *J Oral Implantol.* 2014;40:744–50.
  11. Flanagan D, Mascolo A. The mini dental implant in fixed and removable prosthetics: a review. *J Oral Implantol.* 2011;37:123–32.
  12. Elsyad MA. Patient satisfaction and prosthetic aspects with mini-implants retained mandibular overdentures. A 5-year prospective study. *Clin Oral Implants Res.* 2016;27:926–33.
  13. Kim Y. Mini implant-retained complete overdenture can be an alternative treatment option for selected patients. *J Evid Based Dent Pract.* 2017;17:116–8.
  14. Sivaramakrishnan G, Sridharan K. Comparison of patient satisfaction with mini-implant versus standard diameter implant overdentures: a systematic review and meta-analysis of randomized controlled trials. *Int J Implant Dent.* 2017;3:29.
  15. de Souza RF, Ribeiro AB, Della Vecchia MP et al. Mini vs. standard implants for mandibular overdentures: a randomized trial. *J Dent Res.* 2015;94:1376–84.
  16. 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;15:446–50.
  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:e1033–7.
  18. Yamazaki M, Inukai M, Baba K, John MT. Japanese version of the Oral Health Impact Profile (OHIP-J). *J Oral Rehabil.* 2007;34:159–68.
  19. Komagamine Y, Kanazawa M, Kaiba Y, Sato Y, Minakuchi S. Reliability and validity of a questionnaire for self- assessment of complete dentures. *BMC Oral Health.* 2014;14:45.
  20. Montero J, Castillo-Oyagüe R, Lynch CD, Albaladejo A, Castaño A. Self-perceived changes in oral health-related quality of life after receiving different types of conventional prosthetic treatments: a cohort follow-up study. *J Dent.* 2013;41:493–503.
  21. Omura Y, Kanazawa M, Sato D, Kasugai S, Minakuchi S. Comparison of patient-reported outcomes between immediately and conventionally loaded mandibular two-implant overdentures: A preliminary study. *J Prosthodont Res.* 2016;60:185–92.
- (Received July 30, 2017; October 23, 2017)