Kobe University Repository : Kernel

PDF issue: 2026-11-12

Clinical Study of 19 Cases Resulting in Dental Implant Removal

Suzuki, Hiroaki ; Takahashi, Daiki ; Matsuo, Kenji ; Kimoto, Akira ; Matsumoto, Kousuke ; Hasegawa, Takumi ; Akashi, Masaya ; Komori,…

(Citation)
The Kobe journal of the medical sciences,61(4):102-108

(Issue Date)
2015

(Resource Type)
departmental bulletin paper

(Version)
Version of Record

(JaLCDOI)
https://doi.org/10.24546/81009221

(URL)
https://hdl.handle.net/20.500.14094/81009221

KOBE UNIVERSITY

Kobe J. Med. Sci., Vol. 61, No. 4, pp. E102-E108, 2015

Clinical Study of 19 Cases Resulting in Dental Implant Removal

HIROAKI SUZUKI*, DAIKI TAKAHASHI, KENJI MATSUO, AKIRA KIMOTO, KOUSUKE MATSUMOTO, TAKUMI HASEGAWA, MASAYA AKASHI, and TAKAHIDE KOMORI

Department of Oral and Maxillofacial Surgery, Kobe University Graduate School of Medicine
**Corresponding author*

Received 15 October 2015/ Accepted 16 November 2015

Key words: Implant Removal, Primary stability, Peri-implantitis

Dental implant treatment is a highly anticipated therapy with widespread use. However, various accidental symptoms and complications have been reported, and we may reluctantly have to remove an implant body out of necessity. This study evaluated 19 cases (21 jaws) that resulted in removal after the enforcement of implant treatment in our hospital from January 2003 to August 2013 and clarified the details of the removals clinically for the purpose of improvement of future treatment results. Implants were removed at a higher frequency in elderly patients, particularly those 70 years of age or older. The removal rate regarding the tooth missing style was high in edentulous jaw cases in both the maxilla and mandible, and was low in defective cases of middle teeth. Regarding the duration and cause of removal, approximately half of the implants were removed due to defective primary stability within 6 months; for periods greater than 6 months, all cases except 1 jaw were removed within 30 months and many cases were due to peri-implantitis. Preoperation evaluations, primary stability of the implant body at the time of the operation, long-term observation and maintenance, and patient education are crucial to reduce the frequency of removal.

INTRODUCTION

The concept of osseointegrated implant made by pure titanium devised by Brånemark et al. was applied to the clinical practice in 1965, and the implant treatment spread widely thereafter [1]. In recent years, the operation method in itself has been systematized by the improvement in the material used for the implant body and the rapid progress of the surgery method [2, 3, 5, 6, 10, 13, 17, 19, 21, 23]. Implant treatment is anticipated to be widely used with a higher curative effect than the currently available choices, such as dentures. On the other hand, various accidental symptoms and complications have been reported [7, 8, 11], and we must remove a placed implant body when it becomes defective. Accidental symptoms and the complications of implant treatment include fractures of the implant body, perforation to the maxillary sinus, falling of the implant body, postoperative infection, paresthesia and alveolar bone resorption [8, 14, 16, 18]. In addition, systemic disease, the bone quality of the implant placement part, artificial materials which are used at the time of operation, the form of the superstructure, occluding relation, and oral hygiene state can affect the operation technique and the implant treatment, which are important factors controlling the prognosis. Therefore, the purpose of this study was to clarify the details of implant removal after implant treatment at our hospital and identify the optimal management strategy for such cases.

SUBJECTS AND METHODS

The subjects included 19 cases (21 jaws) that required implant removal among 275 cases (311 jaws) that received the placement of an implant body in Kobe University Hospital from January 2003 to August 2013. This study was exempt for approval from the Medical Ethics Committee of Kobe University due to its retrospective nature. All of the patients visited our hospital for the replacement of single or multiple teeth by osseointegrated implants. Regarding the breakdown of the 275 cases, 146 were males and 129 were females. The age range was 16-90 years, with an average age of 51.6 years. We collected clinical data which included sex, age, tooth missing style, the period until implant removal, and the cause of the removal. Statistical analyses were conducted using Fisher's PLSD test and P values < 0.05 were considered to be statistically significant.

Phone: +81-8-382-6212 Fax: +81-8-382-6229 E-mail: hsuzuki@med.kobe-u.ac.jp

RESULTS

Regarding the breakdown of the removal rate of the implant body according to gender, 12/146 cases (8.2%) were male and 7/129 cases (5.4%) were female (**Figure 1**). When considering the removal rate according to generation, none of the 29 patients younger than 30 years of age required implant removal. However, 3/59 cases (5.1%) in the patients aged 30-49 years, 10/150(6.7%) in the patients aged 50-69 years, and 6/37 (16.2%) in patients older than 70 years of age required implant removal. The removal rate was thus significantly higher in elderly patients, particularly in those older than 70 years of age ($p < 0.05$, **Figure 2**).

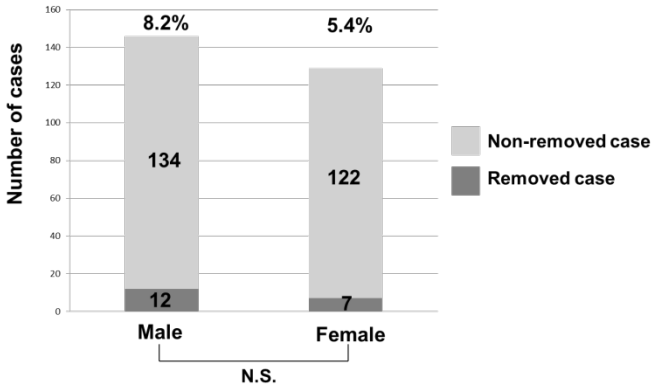


Figure 1. Breakdown of the removal rate of the implant body by gender

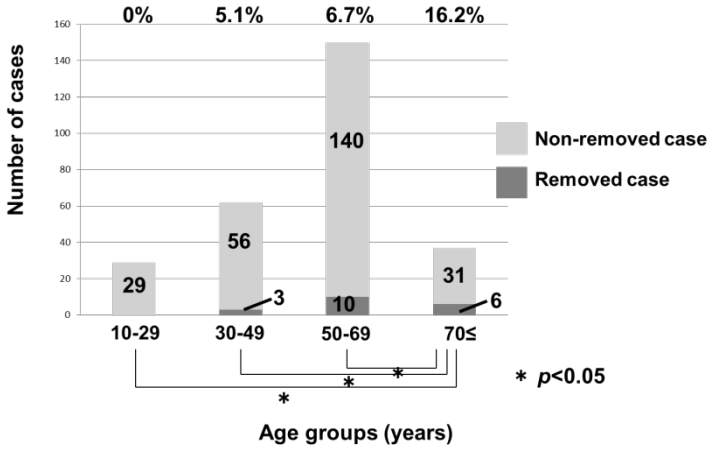


Figure 2. Breakdown of the removal rate of the implant body by generation

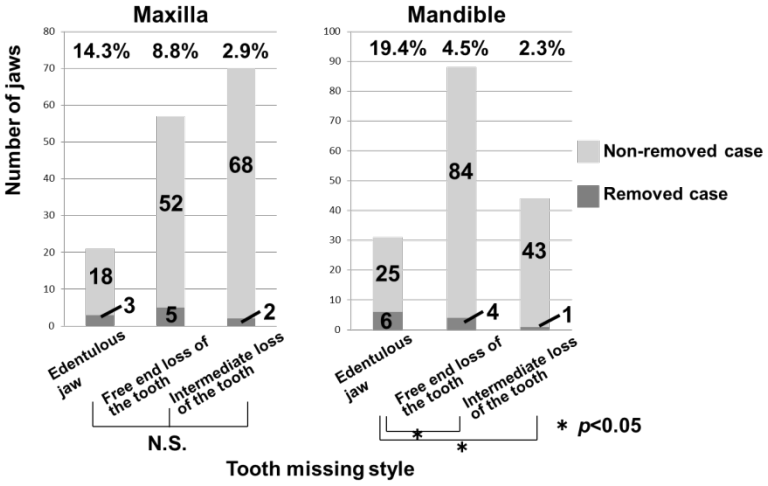


Figure 3. Breakdown of the tooth missing style of the removal cases in the maxilla and mandible

We also determined the breakdown of the tooth missing style of the removal cases according to location (**Figure 3**). We classified the cases into three groups, edentulous jaw, free end loss of the tooth, and intermediate loss of the tooth, and examined the frequency of each style in the maxilla and mandible. In the maxilla, edentulous jaw comprised 3/21 (14.3%), free end loss 5/57 (8.8%), and intermediate loss 2/70 (2.9%) of the removal cases. In the mandible, edentulous jaw comprised 6/31(19.4 %), free end loss 4/88 (4.5%), and intermediate loss 1/44 (2.3%) of the removal cases. Thus, the removal rate of

the edentulous jaw was highest in both the maxilla and mandible, whereas that in the intermediate loss was the lowest.

With regard to the period until the implant body was removed, cases of less than 6 months were most frequent with 10/21 jaw (47.6%) cases; 7-14 months were 6/21 (28.6%), 15-29 months were 4/21 (19.0%), 30-59 months were 1/21 (4.8%), and no case of more than 60 months was observed (**Figure 4**).

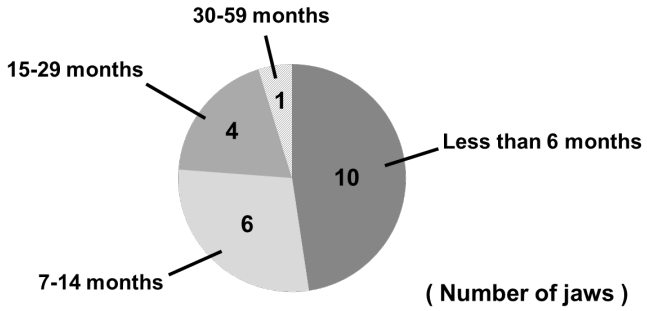


Figure 4. The period until the implant body was removed

With respect to the cause of removal, peri-implantitis occurred most frequently in the 10 jaws; acquisition failure of primary stability occurred in 6 jaws, excessive loading was observed in 2 jaws. When we categorized the period that led to implant removal as cases occurring less than 6 months versus more than 6 months, the former had more cases caused by acquisition failure of primary stability, whereas the latter was caused predominantly by peri-implantitis (**Figure 5**).

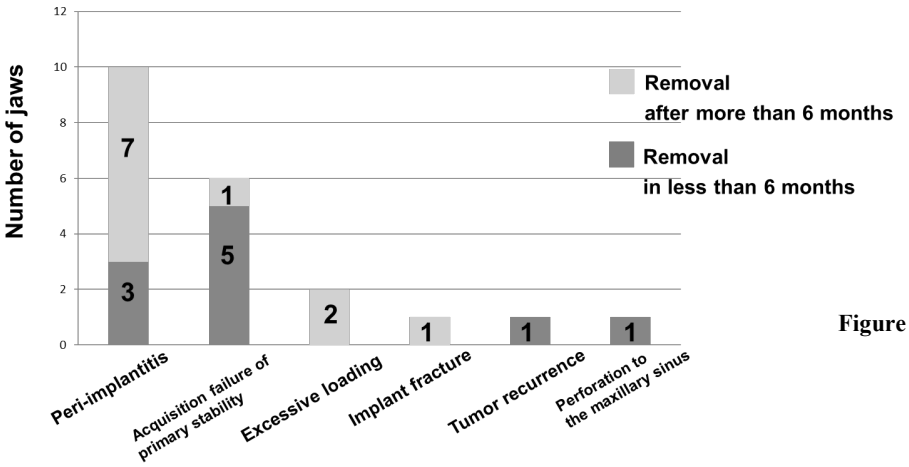


Figure 5. The cause for implant body removal

Regarding the history of treatment, treatments such as jaw resection, radiotherapy, chemotherapy, and reconstruction of the cleft and lip palate were performed in 9 jaws (42.9%), and these cases accounted for more than 40% among 21 jaws which required implant removal at this time (**Figure 6**).

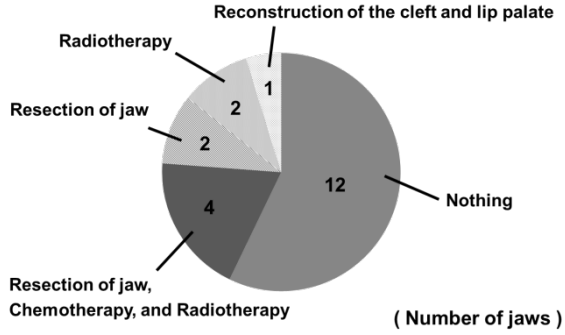


Figure 6. The patient's pre-treatment history

CLINICAL CASES

Case 1: A case that required implant removal less than 6 months after the placement of the implant body

The patient was a 43-year-old man with no remarkable clinical findings. His second molar of the left maxilla was extracted by his neighborhood dentist due to apical periodontitis in September 2010. In February 2011, he wished for implant treatment and visited our hospital. No issue was observed in the vertical or horizontal width

of the alveolar bone according to dental panoramic radiography and CT images at the time of initial diagnosis, and we performed an implant body placement in the same month. Primary stability was somewhat poor and was monitored because we used the two stage method. A cover screw exposed at 1 month after surgery and mobility of the implant body occurred. Because the mobility did not disappear even at postoperative month 4, we removed the implant body, performed debridement of the soft tissue of the removed portion, and filled the synthetic bone. Implant body placement was performed again in January 2012. The primary stability was good, and we were able to set the final superstructure crown. The patient is currently being followed up (**Figure 7**).

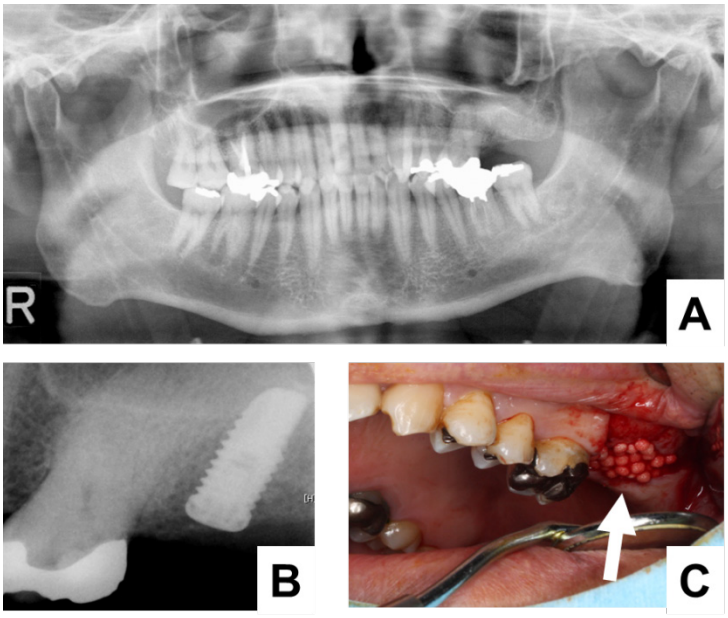


Figure 7. (A) Panoramic radiograph at the time of initial diagnosis. (B) Dental radiograph immediately after implant body placement. (C) Synthetic bone was filled after the removal of the implant body.

Case 2: A case that required implant removal more than 6 months after the placement of the implant body

The patient was a 70-year-old man who had a history of paroxysmal atrial fibrillation and sinus imperfection syndrome. In May 2008, he was referred by his neighborhood dentist and a canine, first premolar, and first molar tooth of the right maxilla were extracted at our hospital. The patient desired implant treatment for the extracted teeth. Implant placement was performed three months after tooth extraction. The final superstructure crown was set in July 2009. In July 2010, alveolar bone resorption around the implant body due to peri-implantitis was confirmed by dental radiography and the implant was removed because the mobility became remarkable. After the wound healed, we set a partial denture in the area (**Figure 8**).

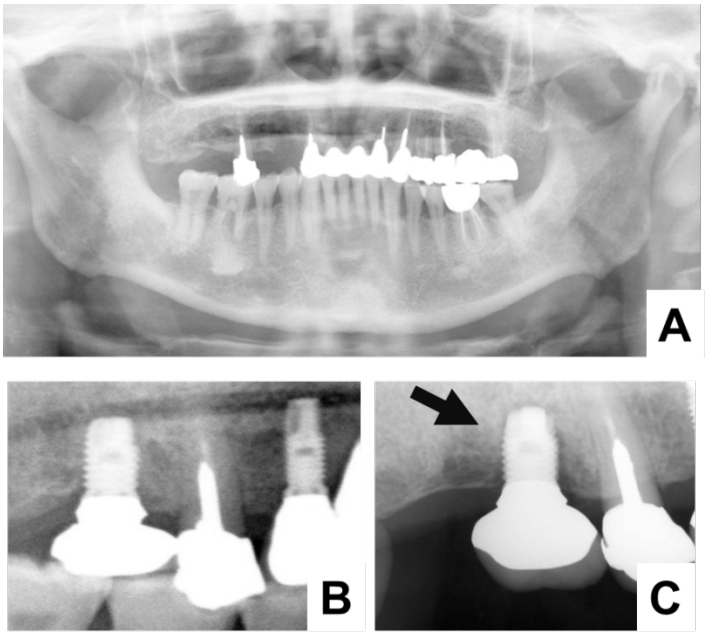


Figure 8. (A) Panoramic radiograph before implant placement. (B) Magnification of the panoramic radiograph immediately after setting the superstructure. (C) Dental radiograph just prior to the removal of the implant body.

Case 3: A case that required implant removal with a treatment history of jaw resection, radiotherapy, and chemotherapy

The patient was a 65-year-old man who had a surgical history for mandibular gingiva carcinoma. His other history was unremarkable. In October 1984, after receiving preoperative chemotherapy and radiotherapy (54 Gy in total), he underwent excision of the tumor and mandibulectomy. Transplantation was performed for the missing part of the mandible, and fixation with a titanium plate was enforced. To stabilize the dentures with support from the implant body, we placed 2 implant bodies in the right mandible molar teeth in November 2012. Then, we set an implant supported mandibular overdenture in April 2013, but had to remove the implant body 3 months later because the first molar tooth of the right mandible resulted in remarkable mobility, and the second molar tooth of the right mandible was also extracted at this time. Three months later, we performed the placement of 2 implant bodies in the molar tooth region of the right mandible and created an implant-supported mandibular overdenture. The patient is currently being followed up (**Figure 9**).

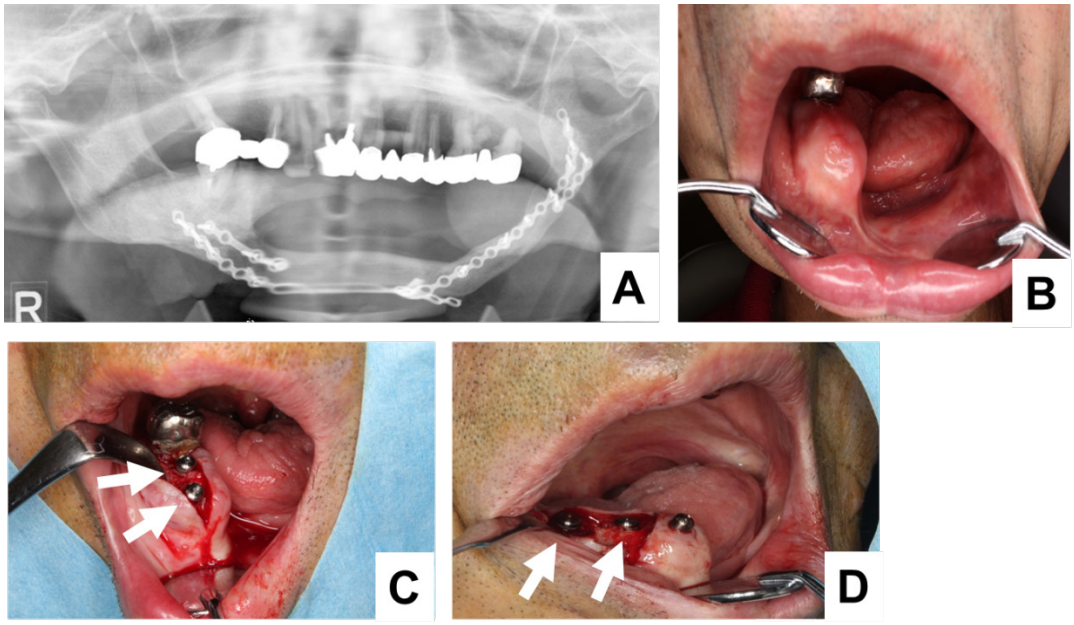


Figure 9. (A) Panoramic radiograph before implant placement. (B) Preoperative intra-oral photo. (C) Two implant bodies were initially placed at the right mandible molar teeth.
(D) After the removal of an implant body equivalent to the first molar tooth of the right mandible and extraction of the second molar tooth of the right mandible, 2 implant bodies were replaced in the respective molar teeth regions of the right mandible.

DISCUSSION

It is not necessary to discuss that the foreseeability and functionality of dental implant treatment are superior to denture mounted on the mucous membrane and bridge fixed to the teeth. However, removal of the implant body may be necessary due to complications during and after surgery. Certain treatments such those for caries, periodontal disease, or tumors have specific purposes. On the other hand, implant treatment is a measure that is carried out due to the patient's wishes, which is limited by the discretion of the dentist. Dentists must take potential complications of the implant into consideration before performing an operation and attempt to evade these at the time of operation; it is vital to exclude various factors that can lead to the removal of the implant body after an operation as much as possible.

Sex differences between men and women were not recognized in the 19 cases that required the removal of the implant body in this study. However, regarding age, our study revealed that the removal rate significantly rose as patients became older. When the cases were limited to the removal cases, the average age was 62.1 years, approximately 10 years old than the overall cohort age (51.6 years old). Because the elderly patients mostly have jaw ridge absorption and various systemic diseases, the application of implant treatment is often more challenging than in young patients before surgery. Thus, adverse effects on the maintenance of the implant body after operation appeared to occur more frequently in elderly patients.

Although a significant difference was not recognized with the maxilla, the removal rate was the tendency that was high with edentulous jaw cases (14.3%). The removal rate with mandible significantly rose in edentulous

jaw. This result suggests that it is difficult to enforce effective prosthetic measures for edentulous jaw cases. In addition, edentulous jaw patients tended to be older. Therefore, concerns similar to discussion about the age mentioned above must be considered when focusing on the tooth missing style. Conversely, young patients accounted for most cases of intermediate loss of the tooth, which had a lower removal rate.

It is reported that the loss of osseointegration occurs relatively early after an increased functional load, whereas the most frequent postoperative complications are peri-implantitis with inflammation of the peri-implant mucosa and alveolar bone resorption [9, 20].

In this study, nearly half of the cases resulted in acquisition failure of primary stability in less than 6 months, which may be explained by the immaturity of the operation technique and the lack of preoperative knowledge regarding bony-hardness and bone forms. In addition, for removal cases that occurred after six months, the removal of the implant body was performed within 30 months (except 1 jaw case), and peri-implantitis was considered to be the cause for most cases. However, we believed we could prevent peri-implantitis caused by a deficiency of the oral cleaning state, imperfect superstructure, and lack of maintenance, though osseointegration was achieved. Zitzmann et al. stated that peri-implantitis develops at a rate of 28-56% postoperatively [24]. On the other hand, though we did not investigate the survival rate of osseointegrated implants this time, according to previous report, the 5- and 10-year survival rates were 90-98% and 89-95%, respectively [4, 12, 15, 22]. Therefore, patient instruction, long-term observation, maintenance, and TBI are important to improve the survival rate of osseointegrated implants.

Furthermore, because implant removal may be necessary due to prosthetics, including excessive loading at the time of the occlusion, and implant fractures, continuous monitoring and adjusting of the superstructure are also necessary. In addition, careful case history taking is important, especially because implant removal may be caused by previous treatments, such as case 3 in our study who had a history of jaw resection, chemotherapy and radiotherapy.

As a specific example, there was one case which removed an implant body by tumor recurrence after the tumor excision. Because it is thought that we will have more experiences in future about the opportunity when we place an implant body with tumor excision for the purpose of postoperative denture stability, it is necessary to make a treatment plan after having done various evaluation in preoperation.

ACKNOWLEDGEMENTS

None of the authors has any conflicts of interest or any financial ties to disclose.

REFERENCES

1. **Adell, R., Lekholm, U., Rockler B, Brånemark, P.I.** A 15-year study of osseointegrated implants in the treatment of the edentulous jaw. Int J Oral Surg 1981; **10:** 387-416.
2. **Aykent, F., Inan, O., Ozyesil, A.G., Alptekin, N.O.** A 1- to 12-year clinical evaluation of 106 endosseous implants supporting fixed and removable prostheses. 1. Int J Periodontics Restorative Dent 2007; **27:** 358-367.
3. **Balshe, A.A., Assad, D.A., Eckert, S.E., Koka, S., Weaver, A.L.** A retrospective study of the survival of smooth- and rough-surface dental implants. Int J Oral Maxillofac Implants 2009; **24:**1113-1118.
4. **Brocard, D., Barthet, P., Baysse, E., Duffort, J.F., Eller, P., Justumus, P., Marin, P., Oscaby, F., Simonet, T., Benqué, E., Brunel, G.** A multicenter report on 1,022 consecutively placed ITI implants: a 7-year longitudinal study. Int J Oral Maxillofac Implants 2000; **15:** 691-700.
5. **Busenlechner, D., Fürhauser, R., Haas, R., Watzek, G., Mailath, G., Pommer, B.** Long-term implant success at the Academy for Oral Implantology: 8-year follow-up and risk factor analysis. J Periodontal Implant Sci 2014; **44:**102-108.
6. **Charyeva, O., Altynbekov, K., Zhartybaev, R., Sabdanaliev, A.** Long-term dental implant success and survival--a clinical study after an observation period up to 6 years. Swed Dent J 2012; **36:** 1-6.
7. **Clementini, M., Rossetti, P.H., Penarrocha, D., Micarelli, C., Bonachela, W.C., Canullo, L.** Systemic risk factors for peri-implant bone loss: a systematic review and meta-analysis. Int J Oral Maxillofac Surg 2014; **43:** 323-334.
8. **Diz, P., Scully, C., Sanz, M.** Dental implants in the medically compromised patient. J Dent 2013; **41:** 195-206.
9. **Esposito, M., Hirsch, J.M., Lekholm, U., Thomsen, P.** Biological factors contributing to failures of osseointegrated oral implants. (I). Success criteria and epidemiology. Eur J Oral Sci 1998; **106:** 527-551.
10. **Ferrigno, N., Laureti, M., Fanali, S., Grippaudo, G.** A long-term follow-up study of non-submerged ITI implants in the treatment of totally edentulous jaws. Part I: Ten-year life table analysis of a prospective multicenter study with 1286 implants. Clin Oral Implants Res 2002; **13:** 260-273.

11. **Han, H.J., Kim, S., Han, D.H.** Multifactorial evaluation of implant failure: a 19-year retrospective study. Int J Oral Maxillofac Implants 2014; **29:** 303-310.
12. **Hultin, M., Gustafsson, A., Klinge, B.** Long-term evaluation of osseointegrated dental implants in the treatment of partly edentulous patients. J Clin Periodontol 2000; **27:** 128-133.
13. **Lambrecht, J.T., Filippi, A., Künzel, A.R., Schiel, H.J.** Long-term evaluation of submerged and nonsubmerged ITI solid-screw titanium implants: a 10-year life table analysis of 468 implants. Int J Oral Maxillofac Implants 2003; **18:** 826-834.
14. **Lee, J.H., Frias, V., Lee, K.W., Wright, R.F.** Effect of implant size and shape on implant success rates: a literature review. J Prosthet Dent 2005; **94:** 377-381.
15. **Leonhardt, A., Gröndahl, K., Bergström, C., Lekholm, U.** Long-term follow-up of osseointegrated titanium implants using clinical, radiographic and microbiological parameters. Clin Oral Implants Res 2002; **13:** 127-132.
16. **Ma, S., Fenton, A.** Screw- versus cement-retained implant prostheses: a systematic review of prosthodontic maintenance and complications. Int J Prosthodont 2015; **28:** 127-145.
17. **Miyamoto, Y., Fujisawa, K., Takechi, M., Momota, Y., Yuasa, T., Tatehara, S., Nagayama, M., Yamauchi, E.** Effect of the additional installation of implants in the posterior region on the prognosis of treatment in the edentulous mandibular jaw. Clin Oral Implants Res 2003; **14:** 727-733.
18. **Moraschini, V., Porto Barboza, E.** Immediate versus conventional loaded single implants in the posterior mandible: a meta-analysis of randomized controlled trials. Int J Oral Maxillofac Surg 2015; **8**.
19. **Romeo, E., Lops, D., Margutti, E., Ghisolfi, M., Chiapasco, M., Vogel, G.** Long-term survival and success of oral implants in the treatment of full and partial arches: a 7-year prospective study with the ITI dental implant system. Int J Oral Maxillofac Implants 2004; **19:** 247-259.
20. **Rosenberg, E.S., Cho, S.C., Elian, N., Jalbout, Z.N., Froum, S., Evian, C.I.** A comparison of characteristics of implant failure and survival in periodontally compromised and periodontally healthy patients: a clinical report. Int J Oral Maxillofac Implants 2004; **19:** 873-879.
21. **Telleman, G., Meijer, H.J., Raghoebar, G.M.** Long-term evaluation of hollow screw and hollow cylinder dental implants: clinical and radiographic results after 10 years. J Periodontol 2006; **77:** 203-210.
22. **Weibrich, G., Buch, R.S., Wegener, J., Wagner, W.** Five-year prospective follow-up report of the Astra tech standard dental implant in clinical treatment. Int J Oral Maxillofac Implants 2001; **16:** 557-562.
23. **Wittneben, J.G., Millen, C., Brägger, U.** Clinical performance of screw- versus cement-retained fixed implant-supported reconstructions--a systematic review. Int J Oral Maxillofac Implants 2014; **29:** 84-98.
24. **Zitzmann, N.U., Berglundh, T.** Definition and prevalence of peri-implant diseases. J Clin Periodontol 2008; **35:** 286-291.