Pesquisa Brasileira em Odontopediatria e Clínica Integrada
ISSN: 1519-0501
apesb@terra.com.br
Universidade Federal da Paraíba
Brasil

Ajanovic, Muhamed; Hamzic, Adis; Redžepagic, Sead; Kamber-Cesir, Alma; Kazazic, Lejla; Tosum Correio, Selma

Maxillary Crestal Bone Loss around Bredent Sky Blue Implants: One Year Study

Pesquisa Brasileira em Odontopediatria e Clínica Integrada, vol. 14, núm. 1, 2014, pp. 31-34
Universidade Federal da Paraíba
Paraíba, Brasil

ISSN - 1519-0501 DOI: 10.4034/PBOCI.2011.141.05

Maxillary Crestal Bone Loss around Bredent Sky Blue Implants: One Year Study

Muhamed Ajanović[1], Adis Hamzić[1], Sead Redžepagić[1], Alma Kamber-Ćesir[1], Lejla Kazazić[1], Selma Tosum Correio[1]

[1]Department of Prosthodontics, School of Dentistry University of Sarajevo, Bosnia and Herzegovina.

ABSTRACT

Objective: To analyze the amount of crestal bone loss of the mandible around implants of different diameters one year after implantation. **Material and Methods:** The study included a total of 42 male and female patients. A total of 73 implants were evaluated (12 implants of diameter 3.5 x 10 mm and 61 implants of diameter 4.0 x 8 mm). Dental panoramic radiographs were made before surgery, immediately after surgery and one year later. The measurements were performed using Kodak dental software 6.11.7.0 after implantation and one year later. The data were analyzed using the IBM SPSS v.17 software package (descriptive statistics, paired samples t-test). **Results:** Among male patients, 43.5% were smokers, while among females, 57.9% were nonsmokers. Crestal bone resorption was greater mesially than distally, although differences were not statistically significant ($p<0.05$). **Conclusion:** All implants showed successful tissue integration. Crestal bone resorption was greater mesially than distally, although differences were not statistically significant.

Key-words: Mandible, Crestal Bone Loss, Bredent Sky Blue Implants.

INTRODUCTION

The American Dental Association Council on Dental Materials, Instruments and Equipment states that consideration for endosteal implant should be given for the assessment of durability, bone loss, gingival health, pocket depth, effect on adjacent teeth, function, esthetics, presence of infection, discomfort, paresthesia, or anesthesia, intrusion on the mandibular canal and patient emotional and psychological attitude and satisfaction [1].

The amount of crestal bone loss during the first year may affect the sulcus depth and environment for the implant longevity. The crest module of an implant is the portion designed to retain the prosthetic component in a two-piece system. It also represents the transition zone from the implant body design to the transosteal region of the implant at the crest of the ridge [1]. Early crestal bone loss has been described in the crestal region of successfully osseointegrated implants, regardless of surgical approaches, and can range from loss of marginal bone to complete implant failure [2-5]. Surgical trauma often causes little bone loss, but on this occasion, bone loss may reach several millimeters. The dentist should assess the presence of surgical bone loss before manufacturing the prosthesis. Early crestal bone loss greater than 1mm from the microgap of the abutment after prosthesis delivery usually results from excess stress at the permucosal site or implant crest module design [6,7]. The crest module of the implant body refers to the transosteal region of the implant that receives the crestal stress to the implant after loading [8].

The effect of one-stage and two-stage implant surgery on crestal bone level changes has been evaluated in both experimental and clinical studies. It has been reported that the mean horizontal bone loss after osseous surgery with periosteal elevation is ~ 0.8 mm [9]. Bone loss at second stage surgery is generally vertical and measures 0.2–1.3 mm [10]. On the other hand, comparative studies have shown that using one- or two-stage surgical techniques had no clinically significant effect on marginal bone loss [11,12].

MATERIAL AND METHODS

This study analyzed a total of 73 Bredent SKY BLUE type implants. Four implants of diameter 3.5 x 10 mm were inserted into the mandible on the right side, and 8 on the left side. Thirty-three implants of diameter

4.0 x 8 mm were inserted into the mandible on the right side and 28 on the left side (two-stage implant surgery).

Dental panoramic radiographs were made before surgery, immediately after surgery and one year later using Ortopantomograph type Kodak 8000 c, XJAM530. Panoramic images were calibrated using CliniView (version 5.2 Instrumentarium Imaging). The measurements were performed by comparing images using Kodak dental software 6.11.7.0. The mesial and distal to the implant immediately after implant placement determines the highest level of bone resorption in the alveolar part, which is denoted as point A. One year later, OPG was performed again and the mesial and distal bone loss was determined, which is denoted as point B. The distance between points A and B was representative of the vertical bone loss approached in the present study.

The data were analyzed using the IBM SPSS v.17 software package (descriptive statistics, paired samples t-test).

RESULTS

The study included a total of 42 male and female patients. Among male patients, 43.5% were smokers, while 56.5% were nonsmokers. Among females, 42.1% were smokers and 57.9% nonsmokers. Among male patients, 78.3% were partially dentate, while 21.7% were totally edentulous. About 94.7% of females were partially dentate, only 5.3% were totally edentulous (Table 1).

The mean distal bone resorption around implant of diameter 3.5 x 10 mm in mandible on the right side was 0.85mm (±0.235 mm) with standard deviation of 0.24 mm, while the mean mesial bone resorption was 0.88mm (±0.294mm) with standard deviation of 0.30 mm. The difference between mesial and distal resorption is not statistically significant (p = 0.638). The mean distal bone resorption around implant of diameter 3.5 x 10 mm in mandible on the left side was 0.68mm (±0,274mm) with standard deviation of 0.40 mm, while the mean mesial bone resorption was 0.77mm (±0.255mm) with standard deviation of 0.36 mm. The difference between mesial and distal resorption is not statistically significant (p = 0.523).

The mean distal bone resorption around implant of diameter 4.0 x 8 mm in mandible on the right side was 0.49mm (±0.137 mm) with standard deviation of 0.40 mm, while the mean mesial resorption was 0.58mm (±0.118mm) with standard deviation of 0.35 mm. The difference between mesial and distal resorption is not statistically significant (p = 0.196). The mean distal bone resorption around implant of diameter 4.0 x 8 mm in mandible on the left side was 0.50mm (±0.137mm) with standard deviation of 0.36 mm, while the mean mesial resorption was 0.54±0.137 mm with standard deviation of 0.36 mm. The difference between mesial and distal resorption is not statistically significant (p = 0.456).

Tables 2 and 3 show the bone resorption values mesially and distally around implant of diameter 3.5 x 10 mm in different regions of the mandible. The differences between the mean resorption on the mesial and distal sides are not statistically significant.

Tables 4 and 5 show the bone resorption values mesially and distally around implant of diameter 4.0 x 8 mm in the different regions of the mandible. The differences between the mean resorption on the mesial and distal sides are not statistically significant.

Table 1. Frequency of inserted implants in the front and lateral region of mandible on the right and left side.

Region	Diameter of implant					
	3.5 x 10 mm		4.0 x 8 mm		Total	
	n	%	n	%	n	%
Mandible right front	3	25	1	1.6	4	5.5
Mandible left front	4	33.3	0	0.0	4	5.5
Mandible right lateral	1	8.4	32	52.5	33	45.2
Mandible left lateral	4	33.3	28	45.9	32	43.8
Total	12	100	61	100	73	100

Table 2. The level of bone resorption mesially and distally to the implant diameter 3.5 x 10 mm - mandible right and left front.

Implant 3.5x10 mm	95% CI of Mean	Standard Deviation
Mandible right front[1]		
Distal resorption (n=3)	0.93±0.235 mm	0.21
Mesial resorption (n=3)	1.00±0.235 mm	0.20
Mandible left front[2]		
Distal resorption (n=4)	0.90± 0.255 mm	0.26
Mesial resorption (n=4)	0.93± 0.235 mm	0.24

[1]Paired samples t-test (t= -2,00, df=2, p= 0.184); [2]Paired samples t-test (t= -0,522, df=3, p= 0,638)

Table 3. The level of bone resorption mesially and distally to the implant diameter 3.5 x 10 mm - mandible left front and right lateral.

Implant 3.5x10 mm	95% CI of Mean	Standard Deviation
Mandible left front		
Distal resorption (n=4)	0.90± 0.255 mm	0.26
Mesial resorption (n=4)	0.93± 0.235 mm	0.24
Mandible right lateral[1]		
Distal resorption (n=1)	0.60 mm	/
Mesial resorption (n=1)	0.50 mm	/

[1]Only one case.

Table 4. The level of bone resorption mesially and distally to the implant diameter 3.5 x 10 mm and 4.0 x 8 mm.

Implants	95% CI of Mean	Standard Deviation
Implant 3.5x10 mm (mandible left lateral)*		
Distal resorption (n=4)	0.45±0.412 *mm*	0.42
Mesial resorption (n=4)	0.62±0.412 *mm*	0.42
Implant 4.0x8 mm (mandible right front)**		
Distal resorption (n=1)	0,00 *mm*	/
Mesial resorption (n=1)	0,30 *mm*	/

*Paired samples t-test (t= -0,559, df=3, p= 0.615); only one case.

Table 5. The level of bone resorption mesially and distally to the implant diameter 4.0 x 8 mm.

Implants	95% CI of Mean	Standard Deviation
Implant 4.0x8 mm (mandible right lateral)*		
Distal resorption (n=32)	0.51±0.137 *mm*	0.40
Mesial resorption (n=32)	0.59±0.118 *mm*	0.36
Implant 4.0x8 mm (mandible left lateral)**		
Distal resorption (n=28)	0.50±0.137 *mm*	0.36
Mesial resorption (n=28)	0.54±0.137 *mm*	0.36

*Paired samples t-test (t= - 1.193, df=31, p= 0.242); **Paired samples t-test (t= -0.756, df=27, p= 0.456).

DISCUSSION

The clinical success and longevity of endosteal dental implants are largely controlled by the health of the surrounding crestal region of bone and soft tissues [1]. The therapy success is surgically, esthetically and functionally predictable only if we have sufficient bone and gingival tissue [13]. Following evaluation of the general state of health of the patients, it is very important to properly assess anatomical features of the jaws and according to data received, in order to choose the correct treatment method. Implantation in the posterior mandible is particular as the inferior alveolar nerve (IAN) is located at this region [14].

The present study included 42 patients with 73 implants in mandible. All implants showed successful tissue integration. Patients with systemic diseases were excluded and implant prognosis was based on different implant diameters.

Previous study assessed crestal bone resorption 5 years after loading by conducting a clinical and radiographic evaluation of 112 Frialit-2 implants consecutively placed in 51 patients from January 1994 to June 1994. Crestal bone resorption was > 3 mm for 32 implants (28.6%); the mean crestal bone resorption was 2.17+/-1.6 mm. It is suggested that with strict plaque control, and provided that the patient follows a regular supportive therapy program, crestal bone resorption around a 2-stage implant system may be limited [15].

The results of the present study were similar to those reported by others authors who investigated bone loss of Nobel Biocare Replace ® System implants 1 year after loading. In their study, the mean (standard error) overall bone loss was calculated as 0.966 mm (0.092) in mandibular implants. The mean (standard error) distal bone loss of mandibular implants was 0.759 mm (0.088) and the mean mesial bone loss of mandibular implants was also 0.701 mm (0.088). They found no statistically significant differences between different bone qualities at implant sites regarding distal, mesial, and overall bone losses. There were no significant correlations between implant lengths, diameters and splint numbers with

mesial, distal and overall bone losses [16].

Many authors presented different findings regarding implant bone loss one year after implantation. Some authors have reported mean bone loss of 1-1.5 mm for the first year of implant placement [17]. However, other researchers showed mean bone loss of 0.4 mm throughout the first year [18]. Implant diameter is a significant determinant of bone loss occurring around the implant with the risk of bone loss around a 3.5 mm-diameter implant of 5.91 times more than a 4 mm-diameter implant [19].

The critical bone loss values one year after implantation have been proposed to be less than 1.5 mm with mean of 0.1 mm annual rate in the following years [11,20,21]. In this study, the mean mesial and distal bone loss of implants was less than the mentioned critical value, which may be regarded as successful.

CONCLUSION

All Bredent SKY BLUE type implants showed successful tissue integration. Crestal bone resorption was greater mesially than distally, although differences were not statistically significant.

REFERENCES

1. Misch CE. Dental implant prosthetic. Library of Congres Cataloging in-Publication Data. St Louis: Mosby, 2005.
2. Linkow LI. Stastical analyses of 173 patients. J Oral Implantol 1974; 4:540-62.
3. Adell R, Lekholm U, Rockler B, Brånemark PI. A 15 year study of osteointegrated implants in the treatment of the edentulous jaw. Int J Oral Surg 1981; 10(6):387-416.
4. Adell R, Lekholm U, Rockler B, Branemark PI, Lindhe J, Eriksson B, Sbordone L. Marginal tissue reactions at osteointegrated titanium fixtures(1): a 3- year longitudinal prospective study. Int J Oral Maxillofac Surg 1986; 15(1):39-52.
5. Toneti MS, Schmid J. Pathogenesis of implant failures. Periodontology 2000 1994; 4:127-138.
6. Oh TJ, Yoon J, Misch CE, Wang HL. The causes of early implant bone loss: myth or science? J Periodontol 2002; 73(3):322-33.
7. Misch CE. Early crestal bone loss etiology and its effect on treatment planning for implants. Postgrad Dent. 1995; 2:3-17.
8. Misch CE. Dental evaluation: Factors of stress. 2nd. ed. St. Louis: Mosby, 1999. p. 122-23.
9. Wilderman MN, Pennel BM, King K, Barron JM. Histogenesis of repair following osseous surgery. J Periodontol 1970;41:551-65.
10. Misch CE, Dietsh-Misch F, Hoar J, Beck G, Hazen R, Misch CM. A bone quality-based implant system: first year of prosthetic loading. J Oral Implantol 1999; 25(3):185-97.
11. Astrand P, Engquist B, Anzén B, Bergendal T, Hallman M, Karlsson U, Kvint S, Lysell L, Rundcranz T. A three-year follow-up report of a comparative study of ITI Dental Implants and Branemark System implants in the treatment of the partially edentulous maxilla. Clin Implant Dent Relat Res 2004; 6(3):130-41.
12. Moberg LE, Kondell PA, Sagulin GB, Bolin A, Heimdahl A, Gynther GW. Branemark System and ITI Dental Implant System for treatment of mandibular edentulism. A comparative randomized study: 3-year follow-up. Clin Oral Implants Res 2001; 12:450-61.
13. Živko-Babić J, Jakovac M, Carek A, Lovrić Ž. Implant prosthetic therapy of a missing front tooth. Acta Stomatol Croat 2009; 43(3):234-41.
14. Juodzbalys G, Bojarskas S. Peculiarities of implantation in the posterior mandible. Acta Stomatol Croat 2003; 37(1):81-4.
15. Ricci G, Aimetti M, Stablum W, Guasti A. Crestal bone resorption 5 years after implant loading: clinical and radiologic results with a 2-stage implant system. Int J Oral Maxillofac Implants 2004; 19(4):597-602.
16. Rasouli Ghahroudi AAR, Talaeepour AR, Mesgarzadeh A, Rokn AR, Khorsand A, Mesgarzadeh NN, Kharazi Fard MJ. Radiographic vertical bone loss evaluation around dental implants following one year of functional loading. J Dent 2010; 7(2):89-97.
17. Hobo S, Ishida F, Garcia LT. Osseointegration and occlusal rehabilitation. 2nd. ed. Tokyo: Quintessence Pub., 1990. p. 43.
18. Johansson LA, Ekfeldt A. Implant-supported fixed partial prostheses: a retrospective study. Int J Prosthodont 2003; 16(2):172-76.
19. Tamizi M, Ghanavati F, Radvar M, Ghanavati F, Rahmani MA. Comparison of bone healing around nonsubmerged and submerged implants in Maestro system of Biohorizon technology. Shahid Beheshti Uni Dental School J 2005; 23(1):18-27.
20. Becker W, Becker BE, Israelson H, Lucchini JP, Handelsman M, Ammons W, Rosenberg E, Rose L, Tucker LM, Lekholm U. One-step surgical placement of Branemark implants: a prospective multicenter clinical study. Int J Oral Maxillofac Implants 1997; 12(4):454-62.
21. Hänggi MP, Hänggi DC, Schoolfield JD, Meyer J, Cochran DL, Hermann JS. Crestal bone changes around titanium implants. Part I: A retrospective radiographic evaluation in humans comparing two non-submerged implant designs with different machined collar lengths. J Periodontol 2005; 76(5):791-802.

Received: 23/07/2013
Approved: 15/10/2013

Correspondence:
Muhamed Ajanović
University of Sarajevo, School of Dentistry
Department of Prosthodontics
Bolnička 4, 71000 Sarajevo - Bosnia and Herzegovina
Tel: 0038761134522
E-mail: ajanovic@bih.net.ba