

Evaluation of dental implants at 5 years from the completion of implant-prosthetic treatment

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Abstract. Introduction. The increasingly frequent use of dental implants for the treatment of partial and total edentation was the basis of this research. Aim. This study monitored the durability of the implant-prosthetic treatment at 5 years from the completion of therapy. Material and method. We performed a statistical study in a group of 24 implants placed 5-6 years before, for the prosthetic restoration of partial and total maxillary and mandibular edentation. The patients were assessed based on the filling of a questionnaire, followed by clinical and radiological examination monitoring certain indices for each individual implant. Results. In 92% of the examined implants, the peri-implant mucosa had a normal appearance, and in 8% of these, peri-implant erythema was present. The same desitubition was found when bleeding on probing was detected (2 of 24 implants presented bleeding on probing). Oral probing revealed values lower than 3 mm in 22 implants, and between 3 and 5 mm in 2 implants. Orthopantomography indicated that 6 implants had peri-implant bone resorption compared to the X-ray performed after the placement of the implant-supported prosthetic restoration. Peri-implant bone resorption did not exceed in any case one third of the implant height. Conclusion The study showed that implant-prosthetic rehabilitation is a therapeutic solution with an increased success rate at 5 years from treatment.

Key Words: peri-mucositis, peri-implantitis, dental implant

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Introduction

The implant-prosthetic treatment is an alternative to conventional prosthetic treatment such as fixed partial dentures, removable partial dentures, or even total dentures (Misch 1993; Bratu & Nussbaum 2006).

Today, the rehabilitation of partial and/or total edentation by endosseous implants is a very widely used therapy. Endosseous implant-supported prosthetic restorations can be fixed or removable, the indication depending on the clinical situation of the patient.

The placement of implant-prosthetic restorations in partially edentulous regions is a complex procedure, due to the need for a correct evaluation of the patient in order to elaborate an adequate therapeutic plan (Băciuț 2007). The dentist should monitor and detect the associated pathology of the patient, the administered medication, the presence of periodontal pathology, of the smoking habit, as well as the patient's ability to maintain the future restoration.

The disregard of the doctor's indications, of rigorous cleaning habits or the non-cessation of smoking may cause peri-implant pathology (peri-implant mucositis and peri-implantitis), accompanied by the risk of the loss of the implant-prosthetic restoration. Peri-implant mucositis is characterized by the inflammation of the peri-implant mucosa, without associated bone loss. The signs of this disorder are: redness, inflammation and bleeding on probing.

Peri-implantitis is the inflammation of the peri-implant mucosa associated with bone resorption. The signs of peri-implantitis are: suppuration on probing and increased probing depth (Bratu 2002). Peri-implant mucositis can be found in 75% of patients or 50% of implants, unlike peri-implantitis, which occurs in 10-28% of the patients at 5-10 years.

The risk factors of peri-implantitis are the following: poor oral hygiene, a history of periodontal disease, smoking (Covaci et al 2008; Heitz-Mayfield 2008).

The patient should be informed about the cleaning techniques. For this, the implant-supported prosthetic restoration should be designed so as to favor good oral hygiene. In order to reduce the risk of peri-implantitis, the implementation of smoking cessation programs is indicated (Koldslund 2010). Also, the correct follow-up of patients with implant-prosthetic restorations is very important. In this context, the treating dentist should establish a follow-up plan, with the monitoring of gingival bleeding at the implant site and of the probing depth. As part of the monitoring program, the data obtained following clinical examination should be correlated with the data of paraclinical-radiological investigations.

The study was aimed at evaluating the rehabilitation of partial and total edentation by implant-prosthetic therapy 5-6 years after its completion, in order to assess whether this therapeutic variant is a viable solution, with long-lasting functional and aesthetic results.

Material and method

The objective of the study was to detect peri-implant mucositis or peri-implantitis, using the clinical examination inspection and palpation, and current X-rays that were compared to those performed after the placement of the implant-supported prosthetic restoration. Inspection was aimed at evidencing tumefaction, erythema and the presence of fistula on the peri-implant mucosa, while palpation was aimed at detecting the mobility of the implant and the implant-supported restoration, bleeding, suppuration, and the probing depth.

We carried out a statistical study in a group of 24 implants placed for the restoration of partial/total maxillary/mandibular edentation in patients aged between 28 and 63 years.

The evaluation of the patients was based on the filling of a questionnaire, followed by clinical and radiological examination monitoring some indices for each individual implant.

QUESTIONNAIRE

Name: _____ M/F

Age: _____

Occupation: _____

1. Do you or did you have one of the following diseases:

Cardiovascular disease YES/NO
(myocardial infarction, angina pectoris, arterial hypertension, other disorders)

Type 1 or type 2 diabetes mellitus YES/NO

Hepatic disorders YES/NO

Hematologic disorders YES/NO

(prolonged bleeding following trauma or surgery)

Do you take any drugs? YES/NO

Which are these? _____

2. When was the implant placed? Year _____ Month _____

3. How do you maintain oral hygiene?

Tooth brushing YES/NO

Special cleaning means:

Dental floss YES/NO

Mouth rinse YES/NO

Interdental brush YES/NO

Oral showers YES/NO

4. How often do you brush your teeth?

a. once a day

b. twice a day

c. three times a day

d. other _____

5. How do you maintain peri-implant hygiene? _____

6. Do you smoke? YES/NO

7. How many cigarettes do you smoke per day? _____

8. Did you smoke before the implant placement? YES/NO

9. Have you been informed by the dentist that you suffer from periodontal disease? YES/NO

10. Please score your degree of satisfaction with the implant-supported prosthetic restoration (5. Very high/ 4. High/ 3. Moderate/ 2. Low/ 1. Very low).

11. Does the implant-supported prosthetic restoration provide comfort during mastication and speech and does it meet your aesthetic criteria? (5. Very high satisfaction/ 4. High satisfaction/

3. Moderate satisfaction/ 2. Low satisfaction/ 1. Very low satisfaction).

Date _____

Signature _____

CLINICAL EXAMINATION OF THE PATIENT

Name: _____ M/F

Age: _____

1. Mobility of the implant +/-

2. Mobility of the implant-supported prosthetic restoration +/-

3. Tumefied peri-implant mucosa +/-

4. Erythematous peri-implant muco +/-

5. Bleeding on probing +/-

6. Suppuration on probing +/-

7. Probing depth

MV	<3mm	3-5 mm	>5 mm
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CV	<3 mm	3-5 mm	>5 mm
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DV	<3 mm	3-5 mm	>5 mm
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O	<3 mm	3-5 mm	>5 mm
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8. Presence of fistula on the mucosa adjacent to the implant +/-

9. Peri-implant bone resorption compared to postoperative X-ray +/-

Date _____

Results

Results provided by the questionnaires:

The statistical study was performed in 6 patients, of which 4 men and 2 women. The sex distribution can be seen in Fig. 1.

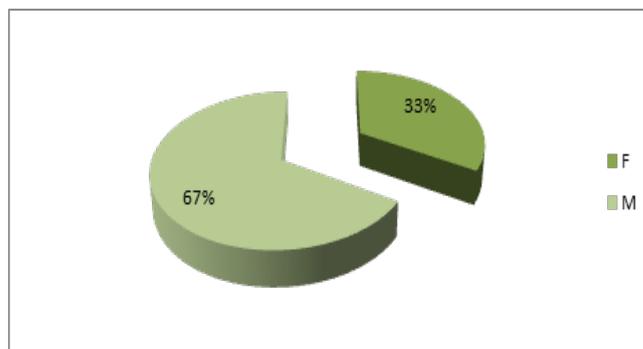


Fig. 1. Sex distribution

The mean age of patients with implants was 41.17±14.02. The age distribution histogram is found in Fig. 2.

Cardiovascular disease was present in 1 of the 6 patients (Fig. 3). All patients denied the presence of hepatic pathology, hematological pathology, or type 1 or 2 diabetes mellitus.

The implants were placed in 2007 and 2008, being 5 and 6 years old, respectively. In 50% of the patients, the implants were placed 5 years before, and in 50%, 6 years before.

Five of the 6 patients, representing 83% of all patients included in the study, reported to use dental floss as a cleaning means (Fig. 4).

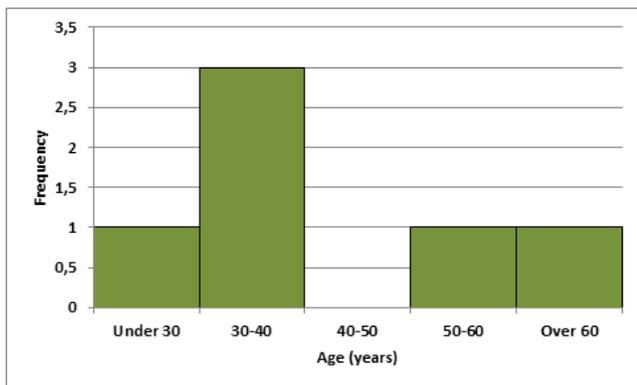


Fig. 2. Age distribution

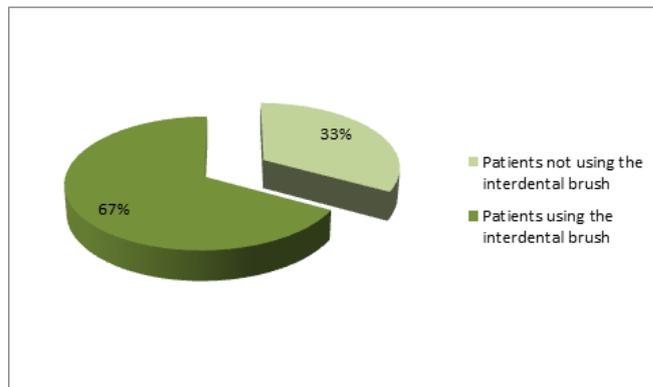


Fig. 5. Proportion of patients using the interdental brush.

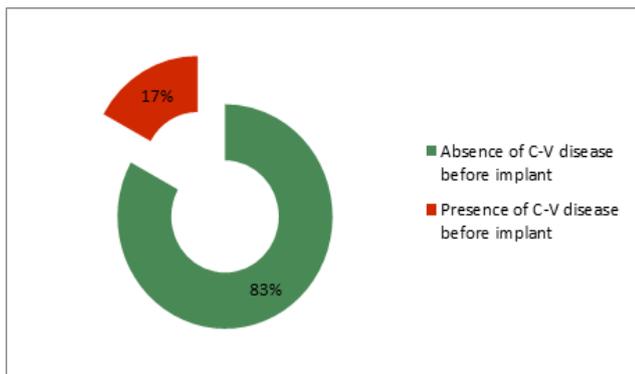


Fig. 3. Prevalence of cardiovascular disease

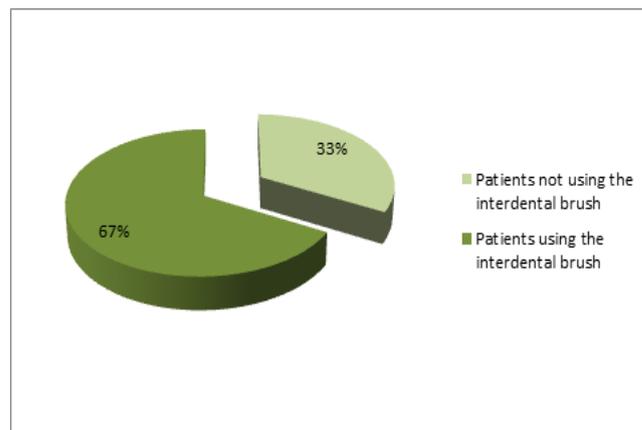


Fig. 6. Proportion of patients using oral showers

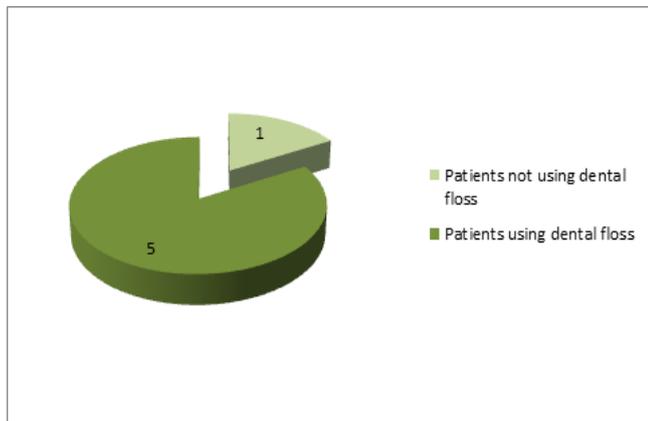


Fig. 4. Proportion of patients using dental floss

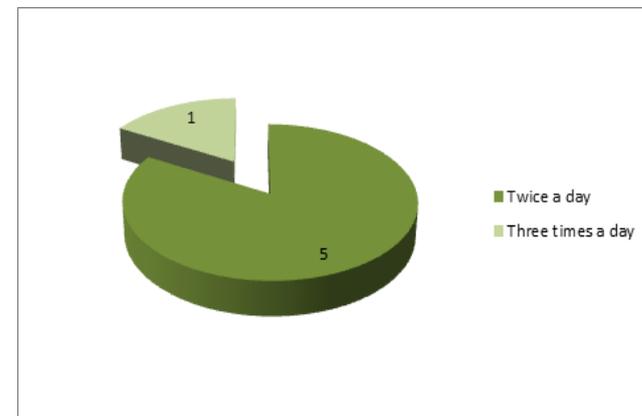


Fig. 7. Frequency of tooth brushing

All patients reported to use oral rinse solutions as an auxiliary cleaning means, after tooth brushing.

Four patients reported to maintain local oral hygiene around the implant using the interdental brush (Fig. 5).

The distribution of patients reporting to use oral showers after tooth brushing is shown in Fig. 6.

The frequency of tooth brushing ranged between two and three times a day and can be seen in Fig. 7. It was found that 83% of all examined patients brushed their teeth two times a day.

The prevalence of smokers at the time of the examination of the patients, as well as before the placement of the implants, included in the study was 67%, which means that 4 of the 6 patients were smokers (Fig. 8).

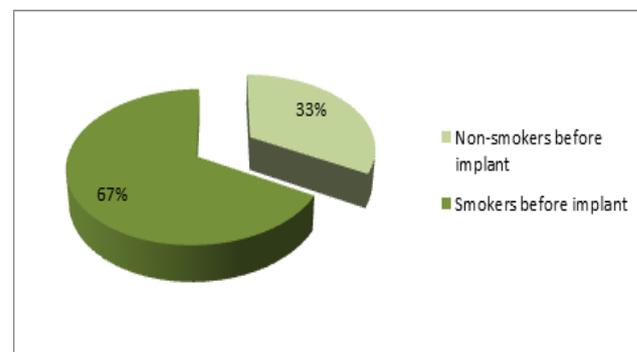


Fig. 8. Prevalence of smokers at the time of examination

The presence of periodontal disease before the placement of the implants was found in 2 of the 6 patients assessed in the study, which represented 33% (Fig. 9).

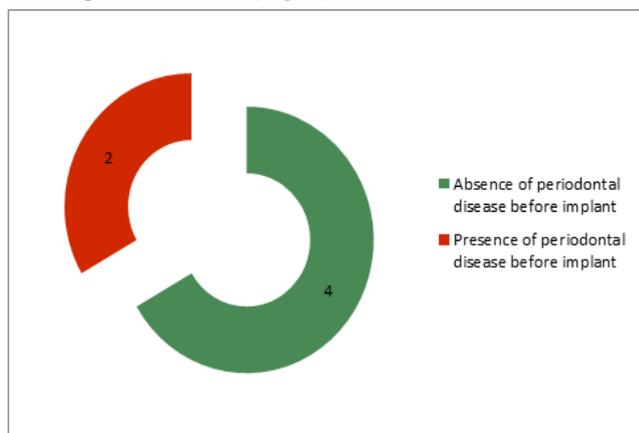


Fig. 9. Prevalence of patients suffering from periodontal disease

Results obtained following the clinical examination of each individual implant:

In 92% of the examined implants, the peri-implant mucosa had a normal appearance, and in 8% of these, peri-implant erythema was present (Fig. 10). Of all 24 examined implants, 2 implants presented peri-implant erythema. The same desitubation was found when bleeding on probing was detected (2 of 24 implants presented bleeding on probing).

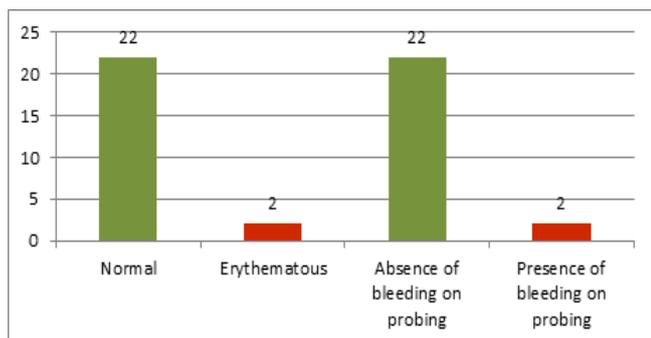


Fig. 10. Prevalence of peri-implant erythema and bleeding on probing

For each individual implant, peri-implant probing at mesiovestibular, centrovestibular, distovestibular and oral level was performed using a periodontal probe. The probing depth values were monitored and they were assigned to one of the following categories: lower than 3 mm, between 3 and 5 mm, or higher than 5 mm.

At mesiovestibular level, 16 implants had values lower than 3 mm, and 8 implants had values between 3 and 5 mm.

At centrovestibular level, 22 implants had values lower than 3 mm on probing, and 2 implants had values between 3 and 5 mm.

At distovestibular level, 18 implants had a probing depth lower than 3 mm, and 6 implants had values between 3 and 5 mm.

Oral probing revealed values lower than 3 mm in 22 implants, and between 3 and 5 mm in 2 implants.

Peri-implant probing did not show probing depth values higher than 5 mm.

The values obtained following probing are presented in Table I and the diagram corresponding to these values is shown in Fig. 11.

Table I. Values obtained by peri-implant probing

	MV	CV	DV	O
<3 mm	16	22	18	22
3-5 mm	8	2	6	2

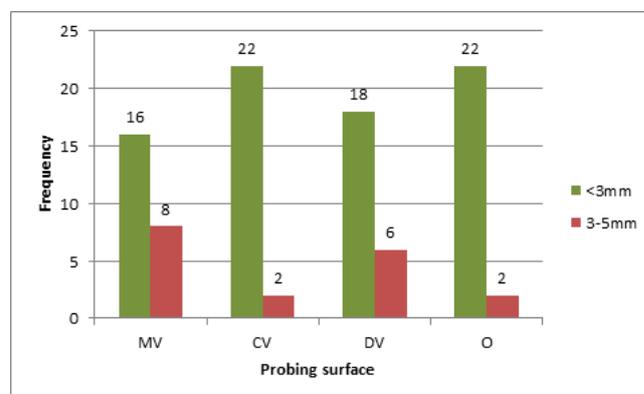


Fig. 11. Values obtained by peri-implant probing

Orthopantomography was indicated for the comparison of the peri-implant bone level at the time of examination with the peri-implant bone status after the completion of implant-prosthetic therapy. Of the 24 implants evaluated in the study, 6 implants had peri-implant bone resorption compared to the X-ray performed after the placement of the implant-supported prosthetic restoration, accounting for a total percentage of 26%. Peri-implant bone resorption did not exceed in any case one third of the implant height. The results can be seen in Fig. 12.

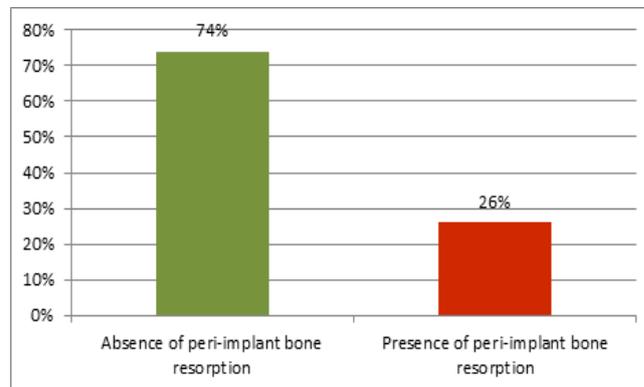


Fig. 12. Peri-implant bone resorption compared to the X-ray performed after the completion of the implant-prosthetic treatment

Discussions

Following the evaluation of the 24 implants in the 6 patients, it was found that no implant and no implant-supported prosthetic restoration was mobile, the peri-implant mucosa was not tumefied, and suppuration on probing was absent in all examined cases.

The success rate of the 24 implants included in the study, assessed at 5 and 6 years from their placement, was high, but the results are realistic considering the literature reports (Lindh & Meyle 2008; Lang & Berglundh 2011).

Success was quantified using some objective indicators: the mobility of the implant, the mobility of the implant-supported prosthetic restoration, the tumefaction and erythema of the

peri-implant mucosa, bleeding and suppuration on probing, the probing depth, the presence of fistula on the peri-implant mucosa, and bone resorption compared to the X-ray performed after the placement of the implant-supported prosthetic restoration. In the case of this study, the mobility of the implant or of the implant-supported prosthetic restoration was not evidenced in any of the 24 examined implants.

The tumefaction of the peri-implant mucosa was also absent in all cases.

The erythema of the peri-implant mucosa was evidenced in 8% of the implants included in the study (2 of 24 implants), and bleeding on probing was also detected in 8% of the cases. The probing depth was measured at mesiovestibular, centrovestibular, distovestibular and oral level, and the values obtained were distributed as follows:

- MV <3 mm - 16 implants 3-5 mm - 8 implants
- CV <3 mm - 22 implants 3-5 mm - 2 implants
- DV <3 mm - 18 implants 3-5 mm - 6 implants
- O <3 mm - 22 implants 3-5 mm - 2 implants

A probing depth higher than 5 mm was not detected in any of the 24 implants assessed in this study.

Suppuration on probing as well as the presence of fistula on the peri-implant mucosa were not evidenced in any of the examined cases.

Bone resorption compared to the X-ray performed after the completion of the implant-prosthetic treatment was present in 26% of the examined implants, but did not exceed one third of the implant height in any of the evaluated cases.

The oral hygiene of the patients included in the study was good or very good in some cases, and a high percentage of patients was found to use auxiliary cleaning means. However, risk factors for peri-implant pathology were present in many cases: 17% of patients had associated pathology (cardiovascular disease), 67% were smokers, and 33% were informed that they suffered from periodontal disease before the placement of the implants. Some authors have expressed a minimal concern about implant placement in patients with a history of periodontal disease (Nevins 2001), due to the fact that a high success rate of implant-prosthetic treatment has been documented in these cases as well, reaching 97-98% at 1-8 years from the completion of implant-prosthetic therapy.

Smoking is considered an important risk factor for implant durability, and the prospective studies conducted by Brain in 1996 evidenced a higher success rate in the case of patients who quit smoking following implant placement, compared to those who continued to smoke (Karoussis 2003).

In 1978, Schnitman and Schulman elaborated some criteria that certify the osseointegration of a dental implant:

1. A 5-year success rate of 75% of the dental implant
2. A peri-implant bone loss of less than 1/3 of the bone height
3. An implant mobility in any direction of less than 1 mm
4. No obvious peri-implant infection.

The criteria for an osseointegrated dental implant elaborated by Zarb and Smith (1989) are more rigorous than the previous ones:

1. Absence of dental implant mobility
2. Absence of peri-implant radiotransparency, assessed radiologically
3. A vertical bone loss of less than 0.2 mm/year
4. Absence of persistent pain or discomfort in the dental implant area

5. Possibility of a fixed or removable implant-supported prosthetic restoration, adequate from the point of view of the design, physiognomy and functionality

6. A 5-year success rate of 85% and a 10-year success rate of 80% after the placement of the prosthetic restoration (Burlibasa 2007).

Conclusion

Considering the criteria established in order to quantify therapeutic success for the 24 examined implants and the presence of a great number of risk factors in the patients assessed in the study, it can be concluded that the success rate at 5-6 years from the completion of implant-prosthetic therapy was high. This favorable result can be correlated with correct surgery, the periodic monitoring of the patient, as well as with a careful maintenance of the implant-prosthetic restoration at home, including rigorous cleaning and the use of auxiliary cleaning means.

References

- Băciuț M. Implantologie orală. Editura Medicală Universitară „Iuliu Hațieganu” Cluj-Napoca, 2007:16-216.
- Bratu D, Nussbaum R. Bazele clinice și tehnice ale protezării fixe. Editura Medicală București, 2006:424-427.
- Bratu E. Implantologie orală și restaurări protetice cu sprijin implantar. Lito U.M.F. „Victor Babeș” Timișoara, 2002:61-176.
- Burlibasa M, Sfeatcu R, Ionescu I, Ciocinaru A, Tănase G, Stănescu G. Unele aspecte privind periimplantitele. Sibiul Medical 2007;18:13-16.
- Covaci L, Nicolae S, Oros R, Nicolae V. Infecțiile periimplantare- etiologie, profilaxie, diagnostic și atitudine terapeutică. AMT Sibiu 2008;2:89-92.
- Heitz-Mayfield LJ. Peri-implant diseases: diagnosis and risk indicators. Journal of Clinical Periodontology 2008;35:292-304.
- Karoussis IK, Salvi GE, Heitz-Mayfield LJA, Brägger U, Hämmerle CHF, Lang NP. Long-term implant prognosis in patients with and without a history of chronic periodontitis: a 10-year prospective cohort study of the ITI® Dental Implant System. Clin Oral Impl Res 2003:329-336.
- Koldslund OC, Scheie AA, Aass AM. Prevalence of peri-implantitis related to severity of the disease with different degrees of bone loss. Journal of Periodontology 2010:231-238.
- Lang NP, Berglundh T. Periimplant diseases: where are we now? Consensus of the Seventh European Workshop on Periodontology. Journal of Clinical Periodontology 2011;38:178-181.
- Lindhe J, Meyle J. Peri-implant diseases: Consensus Report of the Sixth European Workshop on Periodontology. Journal of Clinical Periodontology 2008;35:282-285.
- Misch CE. Contemporary implant dentistry. Mosby, St. Louis, 1993:123-204.
- Nevins M. A new approach to continuing education. Int J Periodontics Restorative Dent 2001;21(1):5.
- Schnitman PA and Shulman LB, Recommendations of the consensus development conference on dental implants. The Journal of the American Dental Association March 1, 1979 vol. 98 no. 3 373-377 The Journal of the American Dental Association 1979;98:373-377.
- Smith DE, Zarb GA Criteria for success of osseointegrated endosseous implants. J Prosthet Dent 1989;62(5):567-72.

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