International Dentistry Journal
Case Report (ISSN: 3065-4505)

Effectiveness of Immediate Implants in Patients with Periodontal Lesions

Viktoria Margaryan[1], Vladimir Margaryan[2], Hovhannes Karapetyan[3], Tigran Hakobyan[4], Lyudmila Tatintsyan[5], Gagik Hakobyan[6*]

[1]Department of Oral and Maxillofacial Surgery, Yerevan State Medical University, Yerevan, Armenia

[2]Toluca Dental Studio, Los-Angeles, USA

[3]Visiting lecturer Yerevan Sate Medical University, Yerevan, Armenia,

[4]Department of Oral and Maxillofacial Surgery, Yerevan State Medical University ,Yerevan, Armenia,

[5]Department of Therapeutic Stomatology, Yerevan State Medical University, Yerevan, Armenia

[6]Department of Oral and Maxillofacial Surgery, Yerevan State Medical University, Yerevan, Armenia

Citation: *Viktoria Margaryan, Vladimir Margaryan, Hovhannes Karapetyan, Tigran Hakobyan, Lyudmila Tatintsyan, Gagik Hakobyan. Effectiveness of Immediate Implants in Patients with Periodontal Lesions. Int Dent Jour. 2025;4(1):1-12.*

Received Date: 07 February, 2025; **Accepted Date:** 12 February, 2025; **Published Date:** 14 February, 2025

[*]**Corresponding author:** Gagik Hakobyan, Head of Department of Oral and Maxillofacial Surgery, Yerevan State Medical University, Yerevan, Armenia. USA

ABSTRACT

Objective: The aim of this study was to evaluate the effectiveness of immediate implants replacing the teeth with periodontal lesions.

Materials and Methods: This prospective study included 53 patients with periodontitis who underwent immediate implant placement from 2023 to 2025.

The patients were randomly assigned into two groups:

Group A 19 patients (12 males and 7 females, 42 to 58 years), periodontal treatment protocol - scaling and root planning (SRP)+Armenicum" paste, extraction of periodontally affected hopeless teeth and immediate implant placement.

Group B 34 patients (16 males and 18 females, 37 to 65 years) extraction of periodontally affected hopeless teeth and immediate implant placement. A total of 287 Bio3 implants (GmbH, Germany) were administered after the removal of hopeless teeth with periodontal disease.

All patients had assessed and indexed: bleeding on probing (BOP); probing pocket depth (PPD) and marginal bone loss (MBL) of the placed implants, at 6 months after 12 and 36 months. Patients were followed up at 12- month intervals.

Results: Serious complications were recorded neither during operation or in the postoperative period.

Postoperative monitoring of the patients showed no statistically significant differences were recorded average indices in Group A and Group B.

The results of the implant-supported restoration satisfied the patients, meeting their functional and aesthetic requirements. The success rate of implants after 3 years in patients Group-A was 97.4% and in Group-B 96.9 %.

Conclusions: Immediate implants in patients with periodontitis is a predictable treatment method, and encouraging results can be achieved if the treatment protocols are followed.

Keywords: Periodontitis; Immediate implants; Long-term effectiveness immediate implants

INTRODUCTION

Dental implants are currently the best solution for prosthetic restoration for the complex treatment of patients with various forms of edentulism [1,2].

One of the main causes of tooth loss is periodontitis. Periodontitis is one of the most common diseases of the oral cavity after caries, which according to the Global Burden of Disease Study (2016), severe periodontal disease was the 11th most prevalent condition in the world [3-5].

Patients with tooth loss currently prefer a restoration method that will allow them to have missing teeth immediately after tooth extraction;

Immediate implantation has shown predictable and long-term effectiveness when the correct treatment instructions are followed [6,7].

Immediate placement of a dental implant in an extraction socket was initially described by Schulte and Heimke in 1976 [8].

Immediate implant placement allows us to reduce the number of surgical interventions, reduce treatment time, allows the ideal three-dimensional positioning of the implant, prevents alveolar bone resorption, and ensures soft tissue aesthetics. These are the potential advantages of this treatment approach.

There are a number of contraindications for immediate implants, such as the morphology of alveolar bone, the presence of periapical pathology, the absence of keratinized tissue, the thin tissue biotype, and the lack of complete soft tissue closure at the extraction socket, which may negatively affect the effective osseointegration of immediately placed implants. Immediate placement of implants may also lead to implant failure, inability to predict future soft and hard tissue levels, and difficulty achieving primary implant stability [10].

Professionals still have concerns about the effectiveness of immediate implant placement into a recent extraction socket periodontally compromised teeth [11-15].

This concern is due to the fact that residual microbes in the periodontitis-affected tooth socket can cause inflammatory processes around the implant, which will cause disintegration of the implant as a result of disruption of the osseointegration processes [16-21].

In these patients, implantation can be effective and long-term successful with proper periodontal treatment, when the posoperative instructions are followed, and proper oral care and hygiene are maintained [22,23]. It is important that inflammation and infection are completely cured before the implantation procedure.

Although there are many published works about this, the direction, this problem still remains relevant, which dictates conducting research in this direction. Considering the relevance of the use of implants in patients with periodontitis, we initiated this study.

The aim of this study was to evaluate the effectiveness of immediate implants of teeth with periodontal lesions.

Materials and Methods

This prospective study included 53 patients with periodontitis (ages 42 -64 years with a mean age of 48.4 ± 8.7 years old, 28 males and 25 females) who underwent immediate implant placement from 2023 to 2025.

The study was approved by the ethics committee of the university and the written consent of the patients to participate in the study and to publish the research data was obtained.

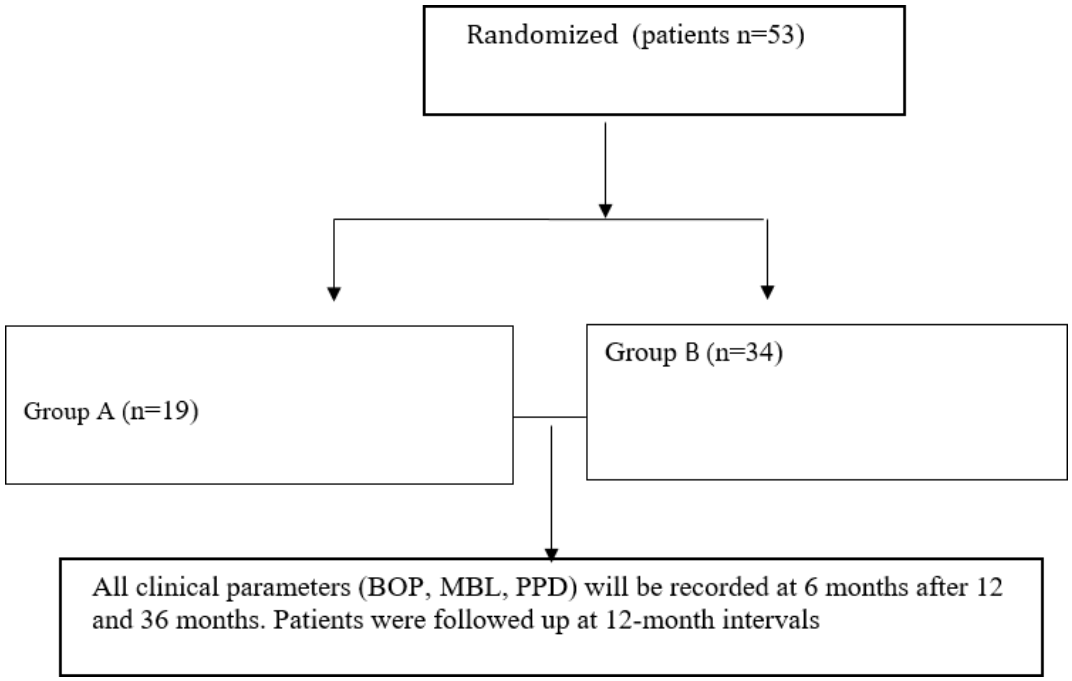
All patients underwent a comprehensive clinical and radiographic diagnostic CT scan, which allowed for the assessment of the quality and quantity of bone characteristics.

The patients were blinded and randomly assigned into two groups known only to the principal investigator, who is not involved in the measurement. The patient, the investigator who is taking the measurement, will be blinded by the 2 intervention groups. The study adheres to the CONSORT guidelines (Table1).

Group A19 patients (12 males and 7 females, 42 to 58 years) (SRP+"Armenicum" paste) and immediate implant placement.

Group B 34 patients (16 males and 18 females, 37 to 65 years) immediate implant placement.

Table 1: CONSORT Study participants



Under local anesthesia, scaling and root planning (SRP) was performed the were isolated with cotton rolls and the "Armenicum" paste was gently applied once inside the pocket and the top of the gums. Within 3 hours of applying the paste, patients were advised eat, drink or brush their teeth. "Armenicum" was applied for ten days thirty minutes with a gums bandage. "Armenicum" paste is a commercially available product (manufacturing company ARMENICUM, CJSC Armenia) 25g paste in a syringe.

The patients had implants placed after a comprehensive periodontal treatment. Hopeless teeth were extracted, the pathological tissues were removed from the tooth base by careful curettage then 0.2% chlorhexidine bigluconate antiseptic aqueous solution was applied, after which they were washed several times with sterile saline and immediate 124 Bio3 implants (GmbH, Germany) were placed. Immediate functional loading using precise

temporary prostheses was applied in 14 patients. After 6 hours, temporary prosthetic structures were fitted in the oral cavity, they were fixed onto multi-unit abutments using the screws with 25Ncm.

All the patients were prescribed antibiotics (amoxicillin 500mg and metronidazole) all the above antibiotics were administered for a duration of 7-10 days, and prescribed chlorhexidine mouthwash twice a day for 10 days (Figures 1-8).

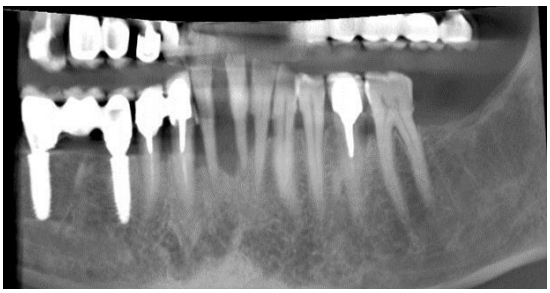


Figure 1: Preoperative CT showing local periodontal lesions on the 24,26 tooth.

Figure 2 and 3: Intraoral scanner shows clinical condition where periodontitis-affected 24, 26 teeth are visible.

Figure 4: Intraoral view after removal of periodontitis affected 24, 26 teeth.

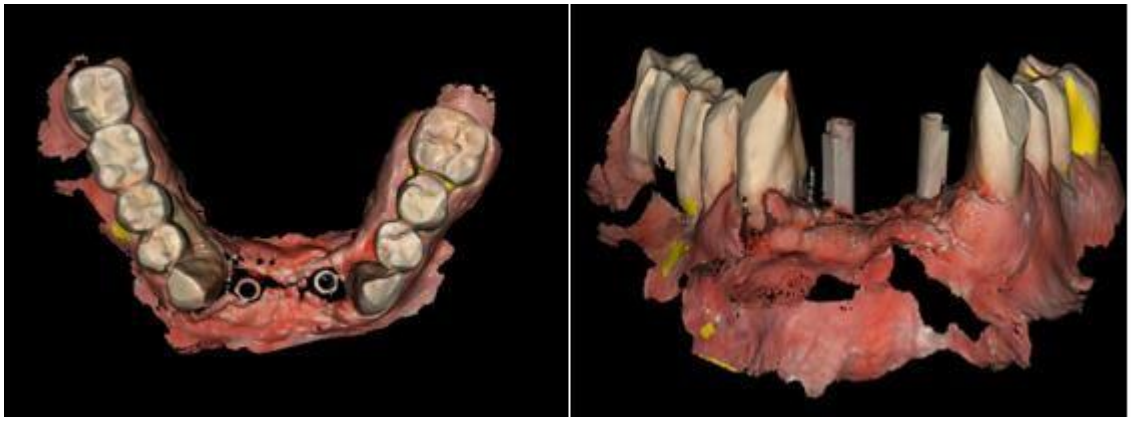


Figure 5 and 6: The impression (coping)transfers are placed on a multi-unit abutments on the 24,26 teeth and scanned.

Figure 7: Intraoral view of temporary construction fixed on immediately placed implants.

Figure 8: Intraoral view of zirconia construction delivered on immediately placed implants.

Treatment protocol Group B patients

Teeth with periodontal lesions were extracted, the pathological tissues were removed from socket by careful curettage, then 0.2% chlorhexidine bigluconate antiseptic aqueous solution was applied, after which they were washed several times with sterile saline.

163 implant Bio3 implants (GmbH, Germany) immediately were placement. Implants are placed according to the manufacturer's standard protocols with a minimum recommended insertion torque of 30-35Ncm. Prosthetic phase began 3-5 months after the healing period using implant fixed dental prosthesis or hybrid prostheses (Figure 9-15).

Immediate functional loading using precise temporary prostheses was applied in 28 patients. After 6 hours, temporary prosthetic structures were fitted in the oral cavity, they were fixed onto multiunit abutments using screws with 25Ncm.

All patients were prescribed antibiotic therapy (amoxicillin 500mg and metronidazole) all the above antibiotics were administered for a duration of 7-10 days, and prescribed chlorhexidine mouthwash twice a day for 10 days.

Figure 9: Intraoral preoperative view

Figure 10: Preoperative CT showing generalized periodontitis, remaining teeth are unreliable and subject to removal

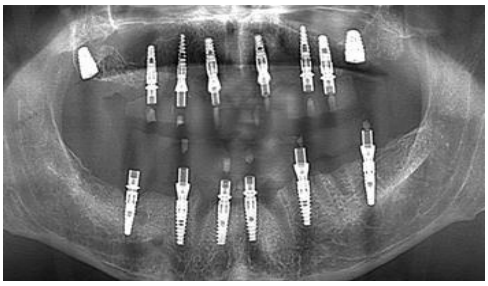


Figure 11: Postoperative CT (14 Bio3 implants).

Figure 12: Intraoral view of implant placed in the upper jaw.

Figure 13: Intraoral view of implant placed in the lower jaw.

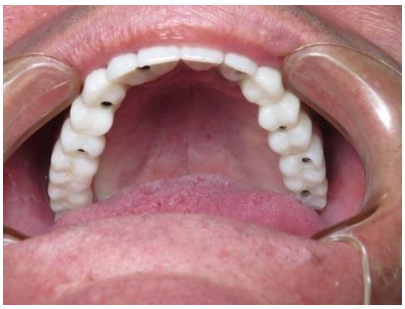


Figure 14: Intraoral view of temporary construction delivered on immediately placed implants.

Figure 15: Intraoral view after implant prosthetic rehabilitation.

A total of 287 Bio3 implants (GmbH, Germany) were placed after the removal of hopeless teeth with periodontal disease.

All patients had assessments and indexed: bleeding on probing (BOP), probing pocket depth (PPD) and marginal bone loss (MBL) of the placed implants, at 6 months after 12 and 36 months. Patients were followed up at 12-month intervals. All intraoperative and postoperative complications, implant survival rate, and patient functional and aesthetic satisfaction were recorded.

Statistical analysis: Statistical analysis was performed using SPSS (SPSS 25.0®; SPSS Software Company, Chicago, IL, USA). The p values <0.05 were considered statistically significant. Differences between observation periods were checked using the paired Student's t test.

RESULTS

No serious complications were recorded during the operation or in the postoperative period.

Postoperative monitoring with patients showed the following average indices: BOP, PPD, MBL at 6 months after 12 and 36 months (table 2). No statistically significant differences were recorded average indices in Group A and Group B.

Table 2: Average clinical index BOP, PD, MBL in patients Group-A, B.

		Time after implant surgery		
Clinical index	after 6 months	after 12 months	after 36 months	**p-value**
Group-A				
BOP	0.98	1.24	1.37	<0.05
PD	1.24 mm	1.72 mm	1.93mm	<0.05
MBL	0.43mm	0,84mm	1,25mm	<0.05
Group-B				
BOP	0,84	1.84	2.1	<0.05
PD	1,13mm	1.54mm	1.89 mm	<0.05
MBL	0,46 mm	1,79 mm	1,27 mm	<0.05

The results of the implant-prosthetic restoration satisfied the patients, restored chewing function, and improved esthetics. The success rate of implants after 3 years in patients Group-A was 97.4%, and in Group-B 96.9%.

DISCUSSION

Currently, dental implantation is a proven and effective method of prosthetics for patients with various types of adentia [24], but the effectiveness of implant treatment in patients with periodontitis is still a matter of debate among experts [25,26].

The differences in approaches are especially noticeable when it comes to whether immediate implants are reliable after placement in fresh sockets of teeth affected by periodontitis.

According to various scientific publications, chronic periodontal disease is associated with a high risk of implant failure, as pathogenic bacteria have been observed at the extraction sites even after extensive irrigation during implant surgery [27-30]. To reduce this risk, complete curettage of all soft tissue remnants of the granulation tissue and sockets is recommended [31-33]. As a result, many doctors avoid immediate placement of endosseous dental implants in sites infected with periodontitis, and periodontal infection is considered a contraindication to immediate implantation.

A group of experts believe that the modern development of implant dentistry opens up broad prospects for the rational use of implant prosthetic structures in patients with periodontal diseases, considering it a predictable and an effective treatment method, while another group of experts believe that even in this group the use of implants has low efficiency [34-40].

This question still does not have a clear answer, which requires long-term multicenter, unbiased studies in numerous patients. This concern is due to the fact that the pathogenic microflora of periodontitis is a risk factor for complications in the osseointegration process, which has been proven by numerous studies [41-48].

Immediate implantation has shown high long-term effectiveness, which cannot be denied in the case of periodontal lesions.

Prospective studies of the results of immediate implantation in patients with a history of periodontal diseases are highly desirable and served as the basis for this clinical study.

The article is devoted to one of the important problems of oral implantology - the analysis of the results of immediate implantation in patients with periodontitis.

The inclusion criteria for this study were 53 patients with chronic periodontitis who required 287 immediate implant placement after the extraction of affected teeth. All patients underwent a comprehensive clinical and radiographic examination before surgery; all patients were under constant supervision, and the biological and technical complications of the treatment were assessed by clinical and radiographic diagnosis.

In Group A patients, dental implantation was performed after complex periodontitis treatment, including "Armenicum" paste, which in our previous studies has shown good efficacy in the treatment of periodontitis [49]. "Armenicum" paste has antibacterial and antiviral activity, and acts as an antioxidant at the site of infection and inflammation. The therapeutic effect of its use in the treatment of periodontitis is based on the structure of "Armenicum", it consists of iodine, non-specific antimicrobial action of molecular and ionized iodine with systemic immunomodulatory properties of negatively charged polysaccharides [50-54].

The survival rate of the implants recorded in this study is equivalent to the survival rate of implants placed in patients without periodontitis, which has been recorded in numerous studies. The main reason for implant failure was untreated peri-implantitis in patients who did not undergo regular preventive examinations and were out of control.

The results of the study indicate that immediate implants can be successfully used in patients with periodontitis if appropriate protocols are followed.

In patients with periodontitis, adequate control of proximal infection and ensuring periodontal stability in the remaining teeth are important factors for the long-term survival of implant-prosthetic restorations.

CONCLUSIONS

Immediate implants in patients with periodontitis is a predictable treatment method, and encouraging results can be achieved if the treatment protocols and postoperative instructions are properly followed.

REFERENCES

1. Debbarma L. Restoring Oral Health: Implant-Supported Full-Mouth Rehabilitation for an Edentulous Patient. Cureus. 2024;16(8):e66732.
2. Grover RK, Jain S, Sharma R, Borse P, Singh A. Restoring Function and Esthetics in Complete Edentulism: A Case Report of Implant-Supported Hybrid Denture. Cureus. 2024;16(10):e71399.
3. GBD 2016 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet. 2017;390(10100):1211-1259.

4. Nazir MA. Prevalence of periodontal disease, its association with systemic diseases and prevention. Int J Health Sci (Qassim). 2017;11(2):72-80.
5. Papapanou PN, Susin C. Periodontitis epidemiology: is periodontitis under-recognized, over-diagnosed, or both? Periodontol 2000. 2017;75(1):45-51.
6. Ebenezer V, Balakrishnan K, Asir RV, Sragunar B. Immediate placement of endosseous implants into the extraction sockets. J Pharm Bioallied Sci. 2015;7(Suppl 1):S234-7.
7. Ortega-Martínez J, Pérez-Pascual T, Mareque-Bueno S, Hernández-Alfaro F, Ferrés-Padró E. Immediate implants following tooth extraction. A systematic review. Med Oral Patol Oral Cir Bucal. 2012;17(2):e251-61.
8. Schulte W, Heimke G. [The Tubinger immediate implant] Quintessenz. 1976;27:17-23.
9. Chen ST, Wilson TG, Hammerle CH. Immediate or early placement of im-plants following tooth extraction: review of biologic basis, clinical procedures, and out-comes. Int J Oral Maxillofac Implants. 2004;19;12-25.
10. Koh RU, Rudek I, Wang HL. Immediate implant placement: positives and negatives. Implant Dent. 2010;19(2):98-108.
11. Ganapathy V, Balaji A, Shanmugam M, Farjana N, Dheraj, Krishnan M. Survival Rate of Immediate Implants in Periodontally Compromised Patients: A Systematic Review. J Pharm Bioallied Sci. 2024;16(Suppl 2):S1038-S1042.
12. Mohammed AlMugeiren O, Salem Assari A, Abdullah Alshehri K, Abdulaziz Alsharidah M, Alotaibi AN, Hamad Alzaid A. Placement of immediate dental implants in extraction sockets exhibiting the apical pathosis. A meta-analysis. J Oral Biol Craniofac Res. 2024;14(3):290-300.
13. Prots H, Rozhko M, Pjuryk V, Nychyporchuk H, Pavelko N. Efficiency of dental implantation in prosthetic rehabilitation of patients with generalized periodontitis. Georgian Med News. 2021;(314):77-82.
14. Patel RM. Dental Implants for Patients with Periodontitis. Prim Dent J. 2020;8(4):54-61.
15. Karoussis IK, Kotsovilis S, Fourmousis I. A comprehensive and critical review of dental implant prognosis in periodontally compromised partially edentulous patients. Clin Oral Implants Res. 2007;18(6):669-79.
16. Veitz-Keenan A, Keenan JR. Implant outcomes poorer in patients with history of periodontal disease. Evid Based Dent. 2017;18(1):5.
17. Sgolastra F, Petrucci A, Severino M, Gatto R, Monaco A. Periodontitis, implant loss and peri-implantitis. A meta-analysis. Clin Oral Implants Res. 2015;26(4):e8-e16.
18. Lee DW. Periodontitis and dental implant loss. Evid Based Dent. 2014;15(2):59-60.
19. Schou S, Holmstrup P, Worthington HV, Esposito M. Outcome of implant therapy in patients with previous tooth loss due to periodontitis. Clin Oral Implants Res. 2006;17 Suppl 2:104-23.
20. Chrcanovic BR, Albrektsson T, Wennerberg A. Periodontally compromised vs. periodontally healthy patients and dental implants: a systematic review and meta-analysis. J Dent. 2014;42(12):1509-27.
21. Sousa V, Mardas N, Farias B, Petrie A, Needleman I, Spratt D, Donos N. A systematic review of implant outcomes in treated periodontitis patients. Clin Oral Implants Res. 2016;27(7):787-844.

22. Durrani F, Shukla A, Painuly H. Implant therapy in patients with chronic periodontitis: A short follow-up with a successful outcome. J Adv Periodontol Implant Dent. 2019;11(1):39-45.
23. Gulati M, Govila V, Anand V, Anand B. Implant Maintenance: A Clinical Update. Int Sch Res Notices. 2014;2014:908534.
24. Jawad S. The edentulous patient: the impact of implants on quality of life. Primary Dental Journal. 2024;13(3):91-98.
25. Durrani F, Shukla A, Painuly H. Implant therapy in patients with chronic periodontitis: A short follow-up with a successful outcome. J Adv Periodontol Implant Dent. 2019;11(1):39-45.
26. Karoussis IK, Müller S, Salvi GE, Heitz-Mayfield LJ, Brägger U, Lang NP. Association between periodontal and peri-implant conditions: a 10-year prospective study. Clin Oral Implants Res. 2004;15(1):1-7.
27. Zangrando MS, Damante CA, Sant'Ana AC, Rubo de Rezende ML, Greghi SL, Chambrone. Long-term evaluation of periodon-tal parameters and implant outcomes in periodontally compro-mised patients: a systematic review. J Periodontol. 2015;86:201-21.
28. King E, Patel R, Patel A, Addy A. Should implants be considered for patients with periodontal disease? Br Dent J. 2016;221(11):705-711.
29. Constantine T T Ong, Saso Ivanovski, Ian G Needleman, Maria Retzepi, David R Moles, Maurizio S Tonetti, et al. Systematic review of implant outcomes in treated periodontitis subjects. J Clin Periodontol 2008;35(5):438-462.
30. Roccuzzo M, De Angelis N, Bonino L, Aglietta M. Ten-year results of a three-arm prospective cohort study on implants in periodontally compromised patients. Part 1: implant loss and radiographic bone loss. Clin Oral Implants Res. 2010;21(5):490-496.
31. Patel RM. Dental Implants for Patients with Periodontitis. Prim Dent J. 2020;8(4):54-61.
32. Fragkioudakis I, Tseleki G, Doufexi AE, Sakellari D. Current Concepts on the Pathogenesis of Peri-implantitis: A Narrative Review. Eur J Dent. 2021;15(2):379-387.
33. Serroni M, Borgnakke WS, Romano L, Balice G, Paolantonio M, Saleh MHA, et al. History of periodontitis as a risk factor for implant failure and incidence of peri-implantitis: A systematic review, meta-analysis, and trial sequential analysis of prospective cohort studies. Clin Implant Dent Relat Res. 2024;26(3):482-508.
34. Gatti C, Gatti F, Chiapasco M, Esposito M. Outcome of dental implants in partially edentulous patients with and without a history of periodontitis: a 5-year interim analysis of a cohort study. European Journal of Oral Implantology. 2008;1(1):45-51.
35. Patel RM. Dental Implants for Patients with Periodontitis. Prim Dent J. 2020;8(4):54-61.
36. Correia F, Gouveia S, Felino AC, Costa AL, Almeida RF. Survival Rate of Dental Implants in Patients with History of Periodontal Disease: A Retrospective Cohort Study. Int J Oral Maxillofac Implants. 2017;32(4):927-934.
37. Evian CI, Emling R, Rosenberg ES, Waasdorp JA, Halpern W, Shah S, Garcia M. Retrospective analysis of implant survival and the influence of periodontal disease and immediate placement on long-term results. Int J Oral Maxillofac Implants. 2004;19(3):393-8.

38. Serroni M, Borgnakke WS, Romano L, Balice G, Paolantonio M, Saleh MHA, Ravidà A. History of periodontitis as a risk factor for implant failure and incidence of peri-implantitis: A systematic review, meta-analysis, and trial sequential analysis of prospective cohort studies. Clin Implant Dent Relat Res. 2024;26(3):482-508.
39. Wörner F, Eger T, Kasaj A, Ehmke B. Peri-implantitis, Risk of Recurrence and Implant Loss in Soldiers with Stage III/IV Periodontitis during 20-30 Years of Supportive Periodontal Therapy (SPT). Oral Health Prev Dent. 2024;22:695-704.
40. Sérgio Diniz Ferreira, Carolina Castro Martins, Sergio Antonucci Amaral, Thais Ribeiral Vieira, Bárbara Nascimento Albuquerque, Luís Otávio Miranda Cota, et al. Periodontitis as a risk factor for peri-implantitis: Systematic review and meta-analysis of observational studies. Journal of Dentistry. 2018;79; 1-10.
41. F. Sgolastra, A. Petrucci, M. Severino, R. Gatto, A. Monaco Periodontitis, implant loss and peri-implantitis. A meta-analysis. Clin Oral Implants Res.,2015;26;8-16.
42. B Ellegaard, V Baelum, T Karring. Implant therapy in periodontally compromised patients. Clin Oral Implants Res. 1997;8(3):180-188.
43. CR Hardt, K Grondahl U. Lekholm, JLWennstrom. Outcome of implant therapy in relation to experienced loss of periodontal bone support: a retrospective 5- year study. Clin Oral Implants Res. 2002;13(5):488-494.
44. K Swierkot, P Lottholz, L Flores-de-Jacoby, R Mengel. Mucositis, peri-implantitis, implant success, and survival of implants in patients with treated generalized aggressive periodontitis: 3- to 16-year results of a prospective long-term cohort study. J Periodontol. 2012;83(10);1213-1225.
45. A Mombelli. Aging and the periodontal and peri-implant microbiota. Periodontol. 2000. 1998;16:44-52.
46. SH Safii, RM Palmer, RF Wilson. Risk of implant failure and marginal bone loss in subjects with a history of periodontitis: a systematic review and meta-analysis. Clin Implant Dent Relat Res. 2010;12(3) :165-174.
47. BR. Chrcanovic, T. Albrektsson, A. Wennerberg. Periodontally compromised vs. periodontally healthy patients and dental implants: a systematic review and meta-analysis. J Dent. 2014;42(12):1509-1527.
48. Margaryan V, Aghasyan E, Yessayan L, Khachatryan H, Bollen C, Hakobyan G. Adjunctive therapea - a promising method in the treatment of periodontal disease. Clin Oral Investig. 2025;29(1):78.
49. Davtyan TK, Hakobyan IS, Muradyan RE, Hovhannisyan HG, Gabrielyan ES. Evaluation of amino acids as mediators for the antibacterial activity of iodine-lithium-a-dextrin in vitro and in vivo. Journal of Antimicrobial Chemotherapy. 2007;59(6):1114-22.
50. Melkonian AK, Hakobyan GV. Evaluation of the therapeutic action of original antiviral drug in SARS-CoV-2. Biotechnol Appl Biochem. 2024;71(5):1057-1069.
51. Melkonian AK, Hakobyan GV. Study of the Antiviral Activity and Toxicity of Dextrin. In Vitro Study. J Biomed Allied Res. 2023;5(1):1-9.
52. Oganyan TG, Stepanyan MM, Sargsyan VA, Pepanyan AA. Generalization of the results of statistical analysis of data from limited clinical studies of the drug “Armenicum” for various indications. Bulletin “Medicines and Medicine”, Yerevan. 2013;1:66-72.