PAPER – OPEN ACCESS

Periodontal Regenerative Surgical Treatment in Periodontitis Patient With Diabetes Mellitus: Case Reports

Author : Eka Putri Sihotang, et al
DOI : 10.32734/tm.v2i1.2699
Electronic ISSN : 1234-1234
Print ISSN : 1234-5678

Volume 2 Issue 3 – 2025 TALENTA Conference Series: Tropical Medicine (TM)

TM Conference Series 02 (2025)
TALENTA Conference Series
Available online at https://talentaconfseries.usu.ac.id

Periodontal Regenerative Surgical Treatment in Periodontitis Patient With Diabetes Mellitus: Case Reports

Eka Putri Sihotang[1], Darius,[*] Pitu Wulandari[2], Martina Amalia[*], and Nindira[3]

[1]*Periodontic Residency Program, Faculty of Dentistry,Universitas Sumatera Utara, Medan, Indonesia*
[2]*Department of Periodontics, Faculty of Dentistry, Universitas Sumatera Utara, Medan, Indonesia*
[3]*Undergraduate Student, Faculty of Dentistry, Universitas Sumatera Utara, Indonesia*

Puput_seven@yahoo.co.id

Abstract

Periodontal disease and DM have a close relationship. Diabetes is a predisposing factor for periodontitis, and periodontitis will worsen metabolic control in diabetic patients. This clinical case report describes the success of periodontal regenerative surgical treatment in periodontitis sufferers with diabetes mellitus. Cases: Case I was A 50-year-old male patient with uncontrolled diabetes who came with a complaint of bleeding gums when brushing teeth and uncomfortable feeling due to mobility of some teeth. Clinical and radiograph examination: periodontal pocket 6 mm on tooth 33 and vertical bone loss. HbA1c was 9.2%. Case II was a 40-year-old male patient with uncontrolled diabetes who came with complaints of frequent bleeding gums when brushing teeth and some tooth mobility. Clinical and radiograph examination: periodontal pocket 4 mm in teeth 46,45,44,43, abscess on tooth 17, furcation lesions in some teeth, and vertical bone loss. HbA1c was 7,8%. In both cases, periodontal regenerative surgery with guided tissue regeneration using bone graft and collagen membrane was performed to correct the periodontal pocket and bone destruction. Re-evaluation was done at follow- up in three months. Periodontal regenerative surgical treatment in chronic periodontitis patients with DM can still be performed to repair periodontal tissue damage. Regenerative periodontal therapy can be a potential treatment in individuals with controlled diabetes mellitus who have chronic periodontitis, resulting in increased density of the bone defect area and crest alveolar level and decreased periodontal pocket depth.

Keywords: Periodontitis; Diabetes mellitus; Periodontal Regenerative Surgery; Bone Graft,; Membrane

1. Introduction

Periodontitis is a chronic inflammatory disease that damages the periodontium in susceptible individuals. Multiple contributing factors could include the inflammatory immune response, genetic factors, epigenetic modifications, exposure to harmful environments, and the dysbiotic microbiota. Clinical features of periodontitis include gingival bleeding, formation of a periodontal pocket between the gingiva and the tooth, clinical attachment loss, and radiographically assessed alveolar bone loss [1,2]. Periodontitis is very common, and the recent Global Burden of Disease Study (GBD, 1990–2010) indicates that severe periodontitis was 11.2 % and around 743 million people affected, representing the sixth-most prevalent worldwide [3,4].

Selection and peer-review under responsibility of Seminar Periodental Update 5 2024
p-ISSN: 1234-5678, e-ISSN: 1234-1234, DOI: 10.32734/tm.v2i1.2699

The chronic metabolic condition known as diabetes mellitus (DM) is brought on by the body's inability to produce the hormone insulin or to use its insulin production [5] effectively. Failure of blood glucose regulation results from deficiencies in the b-cells of the pancreas that produce insulin, a decline in insulin sensitivity, or a combination of both. With an estimated prevalence of 220.5 million cases or 2.8% of the global population, DM is currently one of the top 12 causes of death. In Indonesia, the prevalence of DM in 2008 was 5.7%, and it became one of the top 10 countries with most DM patients in the world [4].

Both diabetes mellitus and periodontal disease are chronic conditions with a high frequency that are closely related to one another [6]. The risk of developing periodontal dental complications is three times higher in those with type 2 diabetes than in people without the disease, according to studies. Compared to poorly controlled diabetes, patients with well-controlled diabetes have less severe periodontal disease, as indicated by their blood glycated hemoglobin levels [7]. Periodontitis and diabetes have a two-way relationship. Diabetes patients with periodontitis will have lower metabolic control since diabetes is a predisposing factor for periodontitis [8]. In other words, periodontitis' long- term inflammation and infection may potentially negatively impact a diabetic's ability to control their glycemic. In contrast, the effect of diabetes on immune function and inflammatory pathways may lead to negative impacts on periodontal health [5].

Among diabetic patients with periodontitis, periodontal treatment may have beneficial effects on glycemic control [9]. Periodontal treatment can affect glycemic control by reducing bacterial and inflammatory responses, but periodontal treatment in DM patients is different in that it requires several monitoring steps before, during, and after treatment to support treatment success [10]. Here, we report two cases of periodontitis and diabetes mellitus requiring periodontal treatment, including regenerative therapy. This paper aims to describe the success of periodontal regenerative surgical treatment in periodontitis sufferers with diabetes mellitus

2. Case Report

2.1. Case 1

A 50-year-old male patient came to Dental and Oral Hospital Universitas Sumatera Utara with complaints of bleeding gums when brushing teeth, discomfort due to calculus, and mobile teeth in the mandibula anterior region since two years ago. The patient had lost one anterior tooth mandibula seven years ago. It was found that the patient had a history of Diabetes Mellitus from the anamnesis. The blood sugar test "result" one week ago brought by the patient at the time of examination was 149 mg/dl, and HbA1c was 9.2%. Intraoral examination showed reddish gingiva, oedematous gingiva of the mandibular anterior teeth, positive bleeding on probing in all regions, recession in almost all tooth regions, and grade 1 mobile teeth 32, 33, 43, and grade 2 mobile teeth 41, 42. Other clinical examinations revealed probing depths of 6 mm in tooth 33 and 5 mm in teeth 42, 41, and 32. Radiographic examination revealed vertical bone loss in the mandibula anterior teeth 42,41,32,33. The diagnosis of this case is generalized periodontitis stage IV grade C with diabetes mellitus.

The patient was examined for intra-oral, extra-oral, radiographs, and dental health education at the first visit. The patient was first referred to an internal medicine specialist for consultation regarding care management of diabetes mellitus before further periodontal treatment. Initial treatment was initiated with scaling and root planing to remove etiological plaque and calculus, splinting with composite wires on teeth 43,42,41,32,33, and occlusal adjustment with selective grinding on teeth 41,32. Treatment evaluation was carried out one month after phase I periodontal therapy.

In phase II, regenerative surgery was performed using xenograft and a resorbable collagen membrane to correct vertical bone loss in teeth 42,41,32,33. Before surgery, the patient was referred to an internal medicine specialist for consultation about periodontal surgery. The HbA1c result a week before surgery was 3.8, and the patient received approval from the internal medicine doctor for periodontal surgery. After completing the informed consent, the

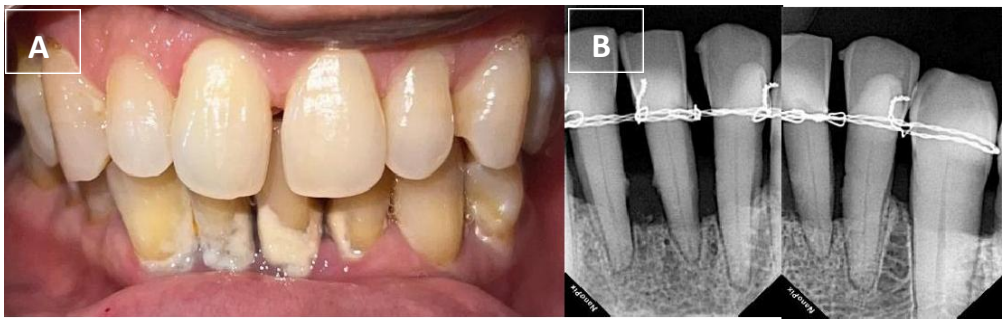

Figure 1. Pre-operative; A. Intraoral clinical, B. Periapical radiographic.

surgical procedure began with intra and extra-oral disinfection using 10% povidone-iodine and applying local anesthesia in the surgical area. Sulcular incision using a 15C blade on the labial and lingual areas, the flap was elevated using a periosteal elevator, and debridement was performed to remove granulation tissue. After that, bone graft and resorbable collagen membrane were placed in the infrabony defect area. The flap was returned to all positions, sutured with interrupted suture technique, and hyaluronic acid gel was applied to the surgical area, which was then covered with periodontal packs. The patient was given post-surgical instructions, chlorhexidine mouthwash, and prescribed medication.

Figure 2. Anesthesia

Figure 3. Sulcular incision

Figure 4. Flap elevation

Figure 5. Curettage

Figure 6. Bone defect

Figure 7. Bone graft placement in bone defect

Figure 8. Membrane applied

Figure 9. Suturing

2.2. Case 2

A 47-year-old male patient came to the Dental and Oral Hospital Universitas Sumatera Utara with complaints of the patient came with complaints of tooth mobility in the left molar and anterior mandibular ± 2-3 months ago. The gums sometimes bleed when brushing the teeth in the mandibular anterior region since ± 3 months ago. It was found t**A**hat the patient had a history of Diabetes Mellitus**B**from the anamnesis. His glycated hemoglobin (HbA1c) level was 7.8%, and his fasting plasma glucose level was 183 mg/dl. The patient has a bad habit of smoking two packs/day. Intraoral examination showed reddish gingiva, oedematous gingiva of the maxilla and mandibular teeth, positive bleeding on probing in all regions, recession is present in almost all tooth regions, and grade 1 mobile teeth 22,23,27,28,36,35,33,43,48 and grade 2 mobile teeth 13,24,32,31,41,42 and grade 3 mobile teeth17,14,12,11,25,26,47. Other clinical examinations revealed an abscess on tooth 17, furcation lesions grade II in teeth 36,48, grade III in tooth 47, and probing depths of 4 mm in teeth 46,45,44,43. Radiographic examination revealed vertical bone loss in the mandibula posterior teeth 46,45,44,43. The diagnosis of this case is generalized periodontitis stage IV grade C with diabetes mellitus.

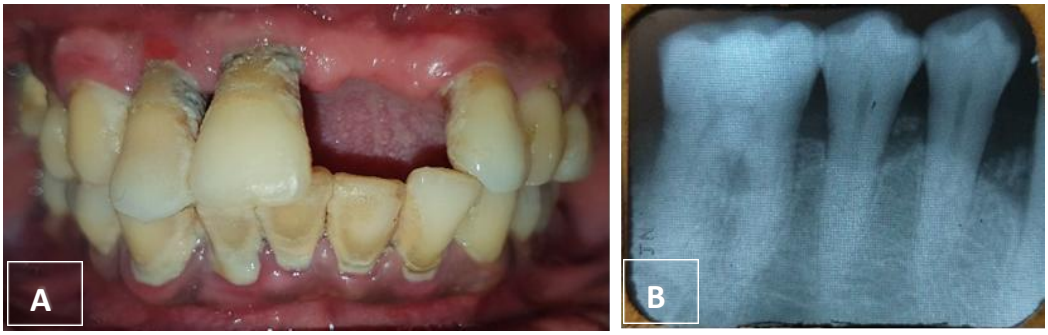

Figure 10. Pre-operative; A. Intraoral clinical, B. Periapical radiographic

Preliminary treatment began with drainage of the abscess of tooth 17 as a pre- eliminatory phase. Scaling and root planing, composite wire splinting, and tooth desensitization were the procedures that followed oral health education 43, 42, 41, 31, 32, 33. Treatment evaluation was carried out one month after phase I treatment.

In phase II, periodontal surgery was performed to remove granulation tissue and to correct vertical bone loss in teeth 46,45,44,43. Before surgery, the patient was referred to an internal medicine specialist for consultation about periodontal surgery. The Hba1c results in a week before surgery was 4.5, and the patient received approval from the

internal medicine doctor for periodontal surgery. After completing the informed consent, the surgical procedure began with intra and extra-oral disinfection using 10% povidone- iodine and applying local anesthesia in the surgical area. Sulcular incision using a 15C blade on the buccal and lingual areas, the flap was elevated using a periosteal elevator, and debridement was performed to remove granulation tissue. Afterward, guided tissue regeneration (GTR) was performed using bone graft from xenograft and resorbable collagen membrane to correct the infrabony defect area.

The flap was returned to all positions, sutured with interrupted suture technique, and hyaluronic acid gel was applied to the surgical area, which was then covered with periodontal packs. The patient was given post-surgical instructions, chlorhexidine mouthwash, and prescribed medication.

Figure 11. Anesthesia

Figure 12. Sulcular incision

Figure 13. Elevation flap

Figure 14. Curettage

Ten days following the procedure, the sutures were taken out. No postoperative bleeding, edema, suppuration, or flap dehiscence issues were noted. The patients received weekly**A**check-ups for the first six weeks follow**B**ing surgery. The patients were then monitored every month for six months following surgery. Prophylaxis and instructions on oral hygiene were given at every appointment. A periapical x-ray was taken, and periodontal CAL and PPD parameters at the operative sites were reassessed six months after the procedure.

3. Discussion

Diabetes was formerly believed to impact periodontal health directly through hyperglycemia and indirectly through advanced glycation end products (AGEs), based on epidemiological association [11,12]. The available data

Figure 15. Bone graft placement in bone defect

Figure 16. Membrane applied

Figure 17. Suturing

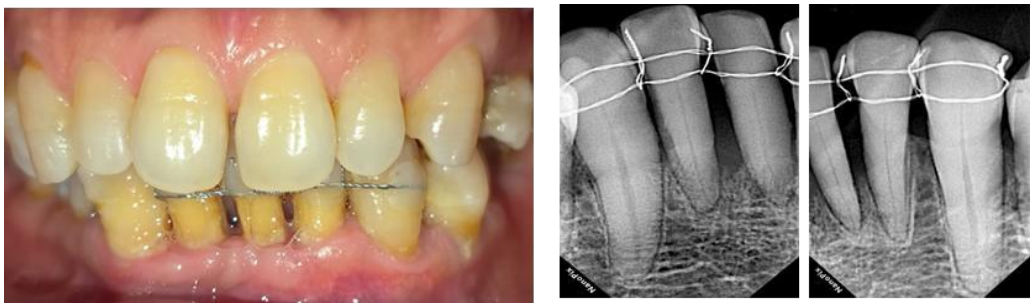

Figure 18. Follow up 3 months after surgery in case one; A. Intraoral clinical, B. Periapical radiographic

Figure 19. Follow up 3 months after surgery in case one; A. Intraoral clinical, B. Periapical radiographic

on the biological relationship between diabetes and periodontal disease supports the hypothesis that diabetes and ongoing hyperglycemia exacerbate the immune-inflammatory response to the periodontal pathogenic bacterial challenge, which accelerates and exacerbates the destruction of periodontal tissue [13–15]. Glycated hemoglobin (Hba1c) readings greater than 7% indicate poor glycemic control in diabetic individuals [16]

Several studies have found that patients with poorly managed diabetes have significantly worse periodontal health, including increased attachment loss and alveolar bone loss, compared to patients with better or well-managed diabetes and healthy individuals. Attachment loss is a commonly used parameter to measure periodontal health [5,12]. The beginning and development of diabetes are linked to inflammation. We will better understand the connection between diabetes and periodontitis by measuring the degree of periodontal inflammation and pathogenic bacterial load and improving metabolic management. Treatment of localized moderate periodontitis is probably less

likely to improve glycemic control in people with diabetes than treatment of the generalized severe form [17]. According to the findings of certain research, people with type 2 diabetes showed a significant improvement in their glycemic control after starting periodontal therapy as compared to a group that did not receive treatment [18].

Non-surgical periodontal treatment was performed in these two cases at phase 1. Measurements of periodontal disease and metabolic markers, such as glycated hemoglobin A1c (Hba1c), were also documented during the phase one evaluation. Hba1c values had decreased. The key conclusion of this case is that, after receiving mechanical subgingival therapy alone, type 2 diabetes patients' levels of HbA1c significantly decreased, and their the statistics validated clinical improvement. However, there was no reduction in periodontal pocket depth and bone loss from radiographic images. Regenerative surgical treatment using bone graft and collagen membrane in both cases gave good results, as shown by the reduction in pocket depth at follow-up in three months. Radiographically, there was an increase in density of the bone defect area and crest alveolar level and a decrease after regenerative surgical therapy. The xenograft-type bone graft material used in both cases had osteoconductive properties.

This proves that periodontal regenerative surgical treatment can still be performed to repair periodontal tissue damage in chronic periodontitis patients with DM. Maintaining blood sugar control is essential for treating periodontal disease. Diabetes mellitus patients with managed periodontitis respond positively to non-surgical, periodontal surgical, and maintenance therapies similar to periodontitis patients without DM.

4. Conclusion

Regenerative periodontal therapy can be a potential treatment in individuals with managed diabetes mellitus who have chronic periodontitis. Treatment of periodontitis cases involving bone destruction results in periodontal tissue healing and alveolar bone regeneration and healing in periodontitis patients without DM.

References

[1] Papapanou PN, Sanz M, Buduneli N, et al. Periodontitis: Consensus report of workgroup 2 of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions. *J Periodontol*. 2018;89:S173-S182. doi:10.1002/JPER.17-0721

[2] Nazir G, Amin J. Diabetes mellitus and periodontal diseases: A two way relationship. International Journal of Dentistry Research. 2021;6(2):43-56. doi:10.31254/dentistry.2021.6205

[3] Preshaw PM, Bissett SM. Periodontitis and Diabetes.; 2020. https://cpd.bda.org/

[4] Tonetti MS, Jepsen S, Jin L, Otomo-Corgel J. Impact of the global burden of periodontal diseases on health, nutrition and wellbeing of mankind: A call for global action. J Clin Periodontol. 2017;44(5):456-462. doi:10.1111/jcpe.12732

[5] Simpson TC, Clarkson JE, Worthington H V., et al. Treatment of periodontitis for glycaemic control in people with diabetes mellitus. Cochrane Database of Systematic Reviews. 2022;2022(4). doi:10.1002/14651858.CD004714.pub4

[6] Purnamasari D, Khumaedi AI, Soeroso Y, Marhamah S. The influence of diabetes and or periodontitis on inflammation and adiponectin level. Diabetes and Metabolic Syndrome: Clinical Research and Reviews. 2019;13(3):2176-2182. doi:10.1016/j.dsx.2019.05.012

[7] Bukleta D, Krasniqi S, Beretta G, et al. Impact of combined non-surgical and surgical periodontal treatment in patients with type 2 diabetes mellitus-a preliminary report randomized clinical study. Biomedical Research (India). 2018;29(3):633-639. doi:10.4066/biomedicalresearch.29-17-644

[8] Khumaedi AI, Purnamasari D, Wijaya IP, Soeroso Y. The relationship of diabetes, periodontitis and cardiovascular disease. Diabetes and Metabolic Syndrome: Clinical Research and Reviews. 2019;13(2):1675-1678. doi:10.1016/j.dsx.2019.03.023

[9] Newman MG, Takei HH. Newman and Carranza's Clinical Periodontology

[10] THIRTEENTH EDITION.

[11] Preshaw PM, Alba AL, Herrera D, et al. Periodontitis and diabetes: A two-way relationship. Diabetologia. 2012;55(1):21-31. doi:10.1007/s00125-011-2342-y

[12] Taiyeb-Ali TB, Raman RPC, Vaithilingam RD. Relationship between periodontal disease and diabetes mellitus: An Asian perspective. Periodontol 2000. 2011;56(1):258-268. doi:10.1111/j.1600-0757.2010.00370.x

[13] Chang PC, Lim LP. Interrelationships of periodontitis and diabetes: A review of the current literature. J Dent Sci. 2012;7(3):272-282. doi:10.1016/j.jds.2012.02.002

[14] Southerland JH, Taylor GW, Moss K, Beck JD, Offenbacher S. Commonality in Chronic Inflammatory Diseases: Periodontitis, Diabetes, and Coronary Artery Disease.

[15] Taylor GW, Borgnakke WS. Periodontal disease: Associations with diabetes, glycemic control and complications. Oral Dis. 2008;14(3):191-203. doi:10.1111/j.1601-0825.2008.01442.x

[16] Fusanori Nishimura YIYS. The periodontal host response with diabetes.

[17] Periodontol 2000. 2007;43:245-253.

[18] Mauricio Baeza AMCC. Effect of periodontal treatment in patients with periodontitis and diabetes: systemic review and meta-analysis. Journal of Applied Oral Science. Published online 2019.

[19] Teeuw WJ, Gerdes VEA, Loos BG. Effect of periodontal treatment on glycemic control of diabetic patients: A systematic review and meta-analysis. Diabetes Care. 2010;33(2):421-427. doi:10.2337/dc09-1378

[20] Kiran M, Arpak N, Ünsal E, Erdoğan MF. The effect of improved periodontal health on metabolic control in type 2 diabetes mellitus. J Clin Periodontol. 2005;32(3):266-272. doi:10.1111/j.1600-051X.2005.00658.x