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(CASE REPORT)

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Management of chronic periodontitis by combined modified splinting and regenerative periodontal therapy: A case report

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Abstract

Background: Periodontal disease is an infectious disease characterized by inflammation of the tooth-supportive tissues, which can destroy the periodontal ligament and alveolar bone and possibly lead to tooth loss. Splinting becomes necessary only if tooth mobility interferes with the patient's satisfaction or the masticatory function, if an increase is anticipated following surgical interventions, or if regenerative periodontal therapies are planned. Regeneration of periodontal tissues may be achieved by Guided Tissue Regeneration (GTR), using resorbable or non-resorbable membranes.

Purpose: The purpose of this case report is to describe the stages of chronic periodontitis treatment with a combination of splinting followed by regenerative periodontal therapy.

Case: A 34-year-old came with a complaint of maxillary front incisor mobility 5 years ago and no pain. The diagnosis of tooth 11 and tooth 21 was chronic periodontitis. The treatment plan that will be carried out is regenerative surgery on tooth 11 and tooth 21.

Case Management: The splinting treatment performed in this case report uses composite fiber to stabilize the teeth that will be subjected to regenerative periodontal therapy. Regenerative periodontal therapy uses bone graft and membrane pericardium after debridement of granulation tissue in the defect area. Flap fixation was performed with an interrupted suture using Nylon 5.0. The 30th-day postoperative control showed satisfactory results both clinically and radiographically.

Conclusion: Treatment of chronic periodontitis with a combination of good splinting and periodontal regenerative therapy using xenografts and membranes can provide satisfactory results.

Keywords: Chronic periodontitis; Fiber composite splinting; Regenerative periodontal therapy; Xenografts

1. Introduction

Periodontal disease is an infectious disease characterized by inflammation of the tooth-supportive tissues, which can destroy the periodontal ligament and alveolar bone and possibly lead to tooth loss1,2. If left untreated, the continuous loss of the supporting tissues during periodontal disease progression may result in increased tooth mobility, ultimately yielding to tooth drifting and exfoliation3,4. Mobility could cause occlusal instability, discomfort, or pain during function including speaking, biting, and chewing4,5,6.

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The excessive mobility issues are treated with periodontal splints2. Periodontal splinting may improve the prognosis of mobile teeth and patient comfort and provide better control of the occlusion if the anterior teeth are mobile5. Splinting is considered an important part of periodontal treatment to increase the lifespan of teeth that have mobility due to periodontal tissue disorders, which can improve prognosis4,6. Periodontal splinting alone does not treat mobility. It is an adjunct to the periodontal therapy7,8.

Treatment of periodontitis aims to prevent further disease progression, minimize symptoms and perception of the disease, possibly restore lost tissues, and support patients in maintaining a healthy periodontium9. Any type of surgical periodontal intervention is planned only after the initial periodontal treatment has been completed10. Despite our best efforts at meticulous nonsurgical instrumentation, residual plaque, and calculus may still be found. In situations where signs of inflammation persist, surgical therapy may be indicated. The access flap to the root surfaces, root concavities, and furcations for adequate debridement11. The purpose of this case report is to describe the stages of chronic periodontitis treatment with a combination of splinting followed by regenerative periodontal therapy.

2. Case Report

A 34-year-old systemically healthy female came to the Department of Periodontics of Dental Hospital Universitas Airlangga Surabaya. The patient complained of maxillary front incisor mobility since 5 years ago. There was no complaint of pain. The patient wanted his teeth treated.

Intra-oral examination revealed plaque, calculus, and BOP (+) in all dental quadrants; tooth 11 and tooth 21 migration, recession, mobility grade 2 (miller classification); periodontal pockets of tooth 11 distolabial 9 mm, distopalatal and midlabial 6 mm, mesiopalatal 5 mm; periodontal pockets of tooth 21 mesiopalatal, midpalatal, distopalatal, distolabial 5 mm. Periapical radiographs showed tooth 11 and tooth 21 with widening of the periodontal membrane, disconnection of the lamina dura, and alveolar bone resorption (Figure 1).

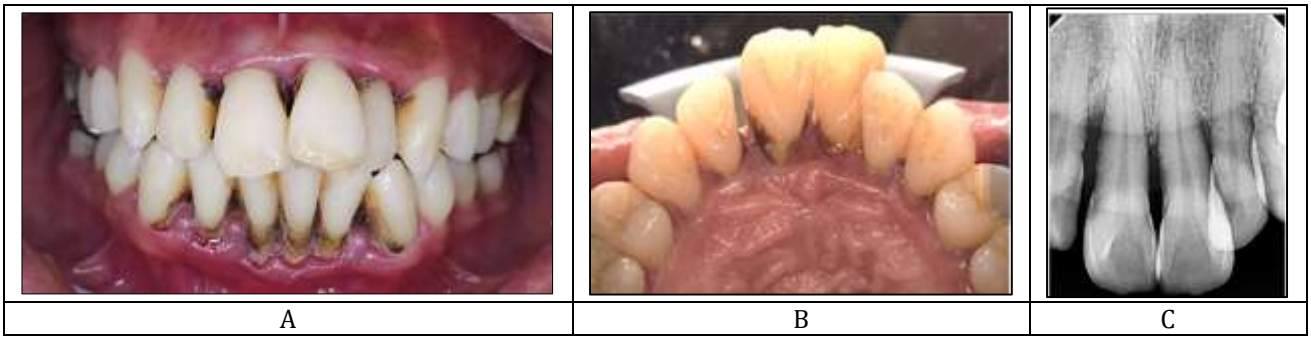

Figure 1 Baseline. (A & B) Clinical photographs. (C) Periapical radiograph of tooth 11 tooth 21

The diagnosis of tooth 11 and tooth 21 were chronic periodontitis. The treatment plan is to conduct Dental Health Education (DHE); scaling root planning, splinting reinforced composite; recontouring of crown tooth 11; the evaluation phase; and regenerative surgery on tooth 11 tooth 21.

3. Case Management

The patient underwent supra- and subgingival scaling and was evaluated at 4 weeks, followed by intracoronal splinting using composite fiber on teeth 13,12,11,21,22,23 and recontouring of tooth 11 to cover the diastema between tooth 11 tooth 12 (Figure 2). The patient had good compliance with oral hygiene instructions. Regenerative periodontal treatment was then planned.

Figure 2 Splinting procedure of teeth 13-23. (a) before splinting, there was a diastema between teeth 11 and 12 (b) tooth preparation was horizontal with a width of 2.5 mm and a depth of 1.5 mm using a round and fissure-shaped diamond bur (c) distal etching of tooth 11 and mesial etching of tooth 12 (d) etching of the prepared area for splinting placement. (e-f) application of the bonding and place the fiber using dental floss to pull the fiber to follow the palatal and interdental curves of the tooth (palatal view; labial view). (g) The fiber composite is in the desired position in the palatal view. (h) labial view of fiber composite with diastema that disturbed the patient's aesthetics. (i) recontouring tooth 11. (j) polishing tooth 11. (k) After recontouring tooth 11

The patient signed an informed consent before starting the flap surgery of tooth 11. Extraoral and intraoral asepsis was started using povidone-iodine 10% following administration of local infiltration anesthesia. An intrasulcular full-thickness flap incision was made from the distal of tooth 13 to the distal of tooth 21 using scalpel number 15c followed by mucoperiosteal flap reflection using rasparatorium so that granulation tissue appeared on the root surface of tooth 11. Root planing of the root surface of tooth 13 tooth 12 tooth 11 tooth 21 dengan scaler dan curettage of granulation tissue in the labial dan palatal area of tooth 11 that a defect appeared around tooth 11. Sharp bone surfaces are smoothed with a bone file. Ensure that the flap is in passive tension. Perform irrigation using saline solution (Figure 3).

Figure 3 Periodontal regenerative therapy procedure. (a) Intra-oral asepsis (b) Infiltration anesthesia (c) Intrasulcular incision with blade no. 15c of tooth 13 tooth 12 tooth 11 tooth 21 (d) Flap reflection using rasparatorium (e) granulation tissue and calculus are visible on the root surface. (f) Root planing of root surface with scaler (g) Debridement of granulation tissue using Gracey curette. (h) use a bone file on sharp bones.

Tetracycline was applied to the root surface to remove the smear layer and irrigation with saline solution. Bone graft (Batan Graft®, Bone Xenograft Steril Radiasi, PT. Focustindo Cemerlang, Indonesia) that has been mixed with Platelet Rich Fibrin (PRF) was applied in contained defects 11 followed by placement of a pericardium membrane (Batan Bran®, Membran Pericardium Steril Radiasi 2x3 cm, PT.Focustindo Cemerlang, Indonesia) to cover the root surface of tooth 11. Xenograft that has been mixed with Platelet Rich Fibrin (PRF) is applied to the defect area of tooth 11 followed by the placement of a membrane to cover the tooth's root surface. Flap repositioning and fixation were used by suturing modified horizontal mattress sutures and additional single interrupted sutures for papilla adaptation (Nylon 5.0). At the time of control, the patient reported no complaints. Suturing was removed on day 14 (Figure 4).

Figure 4 Continued periodontal regenerative therapy procedure. (g-h) Defect in tooth 11 (i) Application of tetracycline on the root surface. (j) Irrigation with NaCl solution. (k) Application of platelet-poor plasma. (l) Membrane pericardium placed over the bone graft and sutured to the labial gingiva. (m) The application of bone graft is mixed in platelet-rich fibrin (PRF). (n) Bone graft has filled the defect area of tooth 11. (o) Flap repositioning & fixation with modified horizontal mattress sutures and single interrupted sutures. (p) post-surgery. (q) 1-day control. (r) 14-day control

The patient was instructed to avoid eating and drinking hot, sour, spicy, and hard food, take prescribed medication regularly, maintain oral hygiene by not brushing teeth in the surgical area, avoid chewing food on the side of the surgical area, avoid sucking on the surgical wound and not gargle too hard, contact the operator if there is discomfort that cannot be resolved, or if there is bleeding after 24 hours. The patient had no complaints until a follow-up 2 months after surgery. The periapical photograph shows an increase in the height of the alveolar bone in the surgical area (Figure 5).

Figure 5 (a) Clinical condition before regenerative surgery of tooth 11. (b) Radiographic image before regenerative surgery on tooth 11. (c) Clinical condition after regenerative surgery of tooth 11 (follow up 2 months). (d) Radiographic image after regenerative surgery of tooth 11 (follow up 2 months)

4. Discussion

Splinting of the teeth helps in the redistribution of the forces on stronger teeth, thereby reducing the occlusal load on the reduced periodontium. Splinting induces a bone remodeling process to prevent bone loss2,4. The advantages of splinting with fiber and composite is easy to apply with minimal preparation, has low cost, is easy to remove if the splint is no longer needed, is easy to repair if there is an error during bonding, and has good aesthetic value12,13.

A study demonstrated a positive influence of splinting on clinical healing following the use of bone replacement grafts as part of a reconstructive approach to the treatment of periodontal bone defects. The residual mobility of each tooth is enough to provide the functional stimulus of its periodontium during the period of regeneration14. Splinting becomes necessary only if tooth mobility interferes with the patient's satisfaction or the masticatory function, if an increase is anticipated following planned surgical interventions, or if regenerative periodontal therapies are planned. Regeneration of periodontal tissues may be achieved by Guided Tissue Regeneration (GTR), using resorbable or non-resorbable membranes10.

Surgical treatment aims to provide access for scaling root planning during initial therapy with a non-surgical approach, eliminate residual inflammation and stop the progress of the periodontal disease, establish an environment conducive to adequate plaque control in the long term, and regenerate the periodontal tissues, including alveolar bone, periodontal ligament, and cementum10. When combined with a flap debridement operation, regenerative medicine treatment produces positive outcomes. Guided Tissue Regeneration (GTR) exhibits better clinical results when compared to traditional flap surgery15. GTR procedure is a procedure that involves the removal of granulation tissue and the placement of bone graft to create healthy periodontal tissue16.

In the present case, flap debridement was done above the right first incisor on the maxilla, and pericardium membrane and Demineralized Freezedried Bone Xenograft (DFDBX) regeneration material were applied. DFDBX's osteoconductive properties enable it to promote bone repair in defects17,18. Xenograft bone graft has osteoconductive properties and acts as a scaffold for the growth and deposition of new bone formation16. The bone morphogenic protein (BMP) and growth factors that are generated during acid demineralization confer DFDBX with osteoconductive properties. By encouraging the growth of new blood vessels in the alveolar bone, the BMP can accelerate regeneration. On days 90 and 180, the bone density increased17,18. A xenograft is a biocompatible and osteoconductive material that acts as a scaffold, in which osteoblasts function to form bone and maintain space for regeneration. Complete bone formation occurs within a year after periodontal surgery16,19.

A resorbable membrane was used as a barrier toward the epithelial cells. Absorbable membranes can be of animal origin or synthetic polymers and are gradually hydrolyzed or enzymatically degraded, therefore, they do not require a second stage of surgical removal of the membrane16. In this case, a bone graft was used followed by bovine membrane pericardium. The bovine pericardium membrane has the potential to act as a barrier membrane as well as a scaffold for the guided tissue regeneration procedure16,20. In this case, the membrane was sutured to the labial gingiva to hold the pericardium membrane in place and facilitate bone graft placement. The periapical follow-up photo 2 months post-op showed an increase in alveolar bone height. This indicates that the bone graft is still in the defect area because it is protected by a membrane fixed by suturing. The limitation of the present report is the lack of long-term evaluation until there are more than 6 months of follow-up to come to a generalized conclusion about the success of the treatment.

5. Conclusion

Good splinting has a positive influence on regenerative periodontal treatment using bone graft and membrane giving satisfactory results. Long-term treatment success is strongly influenced by meticulous diagnosis, appropriate microsurgical techniques, adequate plaque control, and high motivation in patients for periodic maintenance.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

[1] Graziani F, Karapetsa D, Alonso B, Herrera D. Nonsurgical and surgical treatment of periodontitis: how many options for one disease? Periodontol 2000. 2017;75(1):152–88.

[2] Sulijaya B, Hutomo DI, Jesson A, Rahdewati H, Tadjoedin FM. Periodontal Status in Periodontitis Patients with Temporary Periodontal Splint: A Retrospective Study. Open Dent J. 2024;18(1):1–9.

[3] Khalid W, Varghese SS, Sankari M, Jayakumar ND. Comparison of Serum Levels of Endothelin-1 in Chronic Periodontitis Patients Before and After Treatment. J Clin Diagn Res. 2017;11(4).

[4] Hanif A. Periodontal Splinting - An Adjunct to Non-Surgical Periodontal Therapy to Manage Tooth Mobility. Int J Clin Stud Med Case Reports. 2022;22(4):12–5.

[5] Menon A, Kareem N, Vadivel JK, Sciences T, Nadu T, Lecturer S, et al. Assessment of Periodontal Splinting Procedures Done Using Fiber and Composite Versus Wire and Composite. Int J Dent Oral Sci. 2021;8(8):4000–4.

[6] Sonnenschein SK, Betzler C, Rütters MA, Krisam J, Saure D, Kim TS. Long-term stability of splinted anterior mandibular teeth during supportive periodontal therapy. Acta Odontol Scand. 2017;75(7):475–82.

[7] Bali V, Singh RJ, Thind BSK. Review article on criteria for selection of patient for periodontal splinting. Int J Heal Sci. 2021;281–4.

[8] Rauch A, Mehlhorn S, Muhle M, Ziebolz D. A glass fiber-reinforced resin composite splint to stabilize and replace teeth in a periodontally compromised patient. Case Rep Dent. 2020;20(20):1–7.

[9] Jonsson B, Baker SR, Lindberg P, Oscarson N AK. Factors influencing oral hygiene behaviour and gingival outcomes 3 and 12 months after initial periodontal treat ment: an exploratory test of an extended Theory of Reasoned Action. J Clin Periodontol. 2012;39:138–44.

[10] Walter C, Weiger R, Zitzmann NU. Periodontal surgery in furcation-involved maxillary molars revisited-an introduction of guidelines for comprehensive treatment. Clin Oral Investig. 2011;15(1):9–20.

[11] Heitz-Mayfield LJA, Lang NP. Surgical and nonsurgical periodontal therapy. Learned and unlearned concepts. Periodontol 2000. 2013;62(1):218–31.

[12] Dyah Ambarawati IGA. Penatalaksanaan mobilitas gigi dengan splinting fiber komposit. Medicina (B Aires). 2019;50(2):226–9.

[13] Sinha H, Jaiswal P. Splinting in Periodontics: An Update. J Pharm Res Int. 2022;34:10–5.

[14] Schulz A, Hilgers RD, Niedermeier W. The effect of splinting of teeth in combination with reconstructive periodontal surgery in humans. Clin Oral Investig. 2000;4(2):98–105.

[15] Peeran SW, Ramalingam K, Sethuraman S, Thiruneervannan M. Furcation Involvement in Periodontal Disease: A Narrative Review. Cureus. 2024;16(3):1–14.

[16] Amalia M, Budi B, Estu Kurmaena I, Yanti N, Nurcahyanti H. Clinically Effective Regener e Regenerative Therapy for Primar y for Primary Endodontic y Endodontic Lesions with Secondary Periodontal Lesions: A Case Report. J Dent Indones. 2023;30(3):240–5.

[17] N. Gadkari, S. Bawane, R. Chopra. Demineralized freeze-dried bone allograft vs biphasic calcium phosphate: a comparison of two graft materials in sinus augmentation procedures-a pilot study. Adv Oral Maxillofac Surg. 2021;4.

[18] Fajrianti H, Karimah F, Dewi SK, Ratih DN, Devitaningtyas N, Karina VM, et al. Case Report Regenerative Surgical Management of an Endodontic Periodontic Lesion of the Mandibular Molar Combined With External Inflammation Root Resorption. Case Rep Dent Dent. 2024;2024.

[19] Fernandez de Grado G, Keller L, Idoux-Gillet Y, Wagner Q, Musset AM, Benkirane-Jessel N, et al. Bone substitutes: A review of their characteristics, clinical use, and perspectives for large bone defects management. J Tissue Eng. 2018;9.

[20] Athar Y, Zainuddin SLA, Berahim Z, Hassan A, Sagheer A, Alam MK. Bovine Pericardium Membrane and Periodontal Guided Tissue Regeneration: A SEM Study. Int Med J. 2014;21(3):325–7.