Open Flap Debridement Treatment With Bovine-Derived Xenograft In Chronic Periodontitis : A Case Report

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ABSTRACT

Backgrounds: Chronic periodontitis is a periodontal tissue disease caused by specific microorganisms, resulting in periodontal tissue destruction. The gold standard for cases of periodontal tissue destruction is regenerative flap surgery combined with bone graft. The aim of this case report is to describe the repair of bone defects caused by chronic periodontitis with open flap debridement treatment combined with bovine-derived xenograft bone graft and pericardium membrane.
Case: A 46-year-old female patient came complaining that her right upper back tooth was swollen and hurt while eating. Clinical findings showed that tooth 16 had grade 2 mobility with a 7 mm periodontal pocket on the distal side accompanied by vertical bone loss on radiographic examination.
Method: Emergency treatment was carried out for drainage of the abscess on tooth 16, and then antibiotic medication was given. Initial treatment involves scaling and root planing, occlusion adjustment and splinting. Next, open flap debridement was carried out on tooth 16, bone graft application (Ti-OSS®), followed by pericardium membrane application.
Discussion: Evaluation of the results was carried out up to 3 months after treatment; it was found that clinical attachment loss (CAL) was reduced, and radiographic images showed an increase in bone in the distal tooth 16.
Conclusion: The use of bovine-derived xenograft bone-graft and pericardium membrane is able to increase the regeneration of alveolar tissue and bone in cases of chronic periodontitis.

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INTRODUCTION

Chronic periodontitis is an inflammatory condition in periodontal tissue caused by subgingival bacterial plaque such as Porphyromonas gingivalis, Prevotella intermedia, and Fusobacterium nucleatum.[1] Chronic periodontitis can be characterized by loss of periodontal ligament attachment and periodontal tissue destruction, such as alveolar bone resorption.[2] This destruction can become a periodontal pocket as a place for bacterial accumulation and, if left unchecked, will cause a periodontal abscess.[3] This condition must be treated immediately to eliminate the etiopatogenic factors that cause destruction. Periodontal treatment is expected to provide good regeneration. Regenerative treatment in this condition can be treated with open flap debridement combined with additional materials to accelerate bone regeneration. One of these additional materials is bone graft. Bone graft is an additional material that can accelerate bone healing. Its advantages are low immunogenicity, easy material manipulation, low patient morbidity, angiogenic properties, and is easy to obtain and affordable.[4] Bonegraft functions as a scaffold and matrix for the attachment and proliferation of osteoblast cells to form new bone structures (osteogenesis). Apart from requiring a bone graft, the flap surgical procedure also requires a periodontal membrane or Guided Tissue Regeneration (GTR) to maintain the shape of the gingiva and provide opportunities for bone growth. Periodontal membranes are also useful for healing wounds, isolating destruction from the gingiva and stabilizing blood clots.[5] This case report aims to describe the repair of bone defects caused by periodontal abscess due to periodontitis using open flap debridement treatment combined with bovine-derived xenograft (BDX) bone graft and pericardium membrane. This therapy not only accelerate the regeneration process but also prevent further damage to the alveolar bone.[6]

CASE REPORT

A 46-year-old female patient came to the emergency room at RSGM. Prof. Soedomo complained that her right upper back tooth was swollen and hurt when she ate. This complaint has been felt since three days ago. The patient denied any allergies or systemic disease. On extraoral examination, no abnormalities were found. On intraoral examination, the gingiva of region one on tooth 46 was swollen with pus and blood (Figure 1). Grade 2 mobility and pocket depth reached 7 mm on the distal side (Figure 2). Panoramic radiographic examination showed a vertical bone defect at the distal root of tooth 46 (Figure 3). Based on the examination that has been carried out, the diagnosis in this patient is chronic periodontitis stage III grade B. The treatment plan, in this case, is abscess drainage and antibiotic medication in the emergency phase, scaling and root planing, occlusion adjustment, and splinting in the initial phase, and continued with open flap debridement with a combination of bone graft and pericardium membrane in the surgical phase.

Figure 1. Periodontal abscess on tooth 16

Figure 2. Periodontal pocket examination on tooth 16 shows a pocket depth of 7 mm.

Figure 3. Radiograph examination.

CASE MANAGEMENT

The first visit was to drain the abscess on tooth 46 and then give antibiotic medication. The patient was asked to check again after five days. The second visit is scaling and root planing, occlusion adjustment and splinting. When she arrived, the gingiva was no longer swollen, pustules were not coming out, and it was not painful. An examination was carried out with a UNC 15 probe to measure the pocket depth after the swelling had subsided. The patient was educated and explained about his condition and the stages of the follow-up treatment plan that would be carried out, and the patient agreed. The patient was instructed to control and came on the 14th day after the initial procedure. On intraoral examination, the pocket depth was still 7 mm (Figure 4).

Figure 4. Intraoral view after initial treatment.

The third visit was open flap debridement surgery with a combination of bone graft and pericardium membrane. Perform asepsis first in region 1 with povidone iodine, then carry out infiltration anesthesia on the mucobuccal and palatal folds of teeth 17 to 15. After anesthesia, make a vertical incision using blade no. 15c on the distal tooth 15, followed by an intrasulcular incision to tooth 17 (Figure 5). Flap elevation using a full-thickness periosteal elevator. After the alveolar bone is visible, debridement is performed using a Gracey curette and scaler until the necrotic tissue and granulation tissue are removed. Then the tissue is cleaned with a saline solution (Figure 6). After it is clean and minimal bleeding, apply the bone graft mixed with saline to the bone defect. The bone graft used is bovine-derived xenograft (BDX) with the brand Ti-OSS® (South Korea). After the defect is closed by the bone graft, the pericardium membrane, which has been cut according to the operation area, is continued to be applied (Figure 7). Suturing was performed using a size 5.0 thread (Figure 8), and the surgical area was covered with periodontal dressing (Figure 9). The patient was given antibiotics, NSAIDs, and chlorhexidine mouthwash, then instructed to carry out control at one week, two weeks, one month and three months after surgery.

Figure 5. Flap incision.

Figure 6. Open flap debridement.

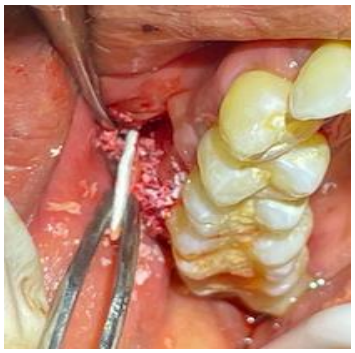

Figure 7. Application of bonegraft and pericardium membrane.

Figure 8. Suturing with vertical mattress technique.

Figure 9. Periodontal dressing application.

Patient evaluation was carried out at one week, 3 weeks, 1 month and 3 months after the open flap debridement procedure with a combination of bone graft. At 1 month after the procedure, there was a decrease in pocket depth to 3.5 mm and to 3 mm at the control 3 months after the procedure (Figure 10). It can be seen on the periapical x-ray that there is an increase in the height of the alveolar bone (Figure 11). The patient was satisfied and had no complaints after the procedure.

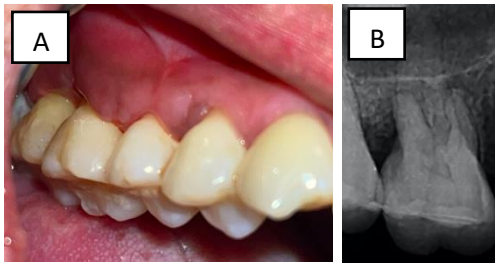

Figure 10. Control after 1 month. (A) Intraoral conditions. (B) Periapical x-ray.

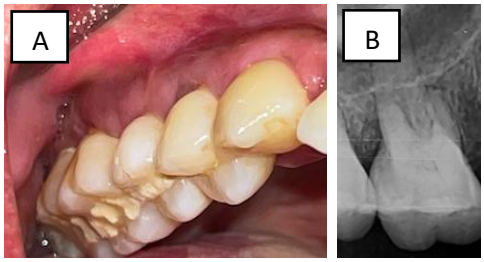

Figure 11. Control after 3 months. (A) Intraoral conditions. (B) Periapical x-ray.

DISCUSSION

Chronic periodontitis can cause destruction to the alveolar bone, as in the case above. It can be treated with debridement to remove necrotic tissue in the periodontal pocket and provide a bone graft to repair the bone destruction. There are four types of hard tissue replacement graft materials: autografts, allografts, xenografts, and alloplasts. Autograft: Graft taken from the same body, allograft: Graft taken from another body of the same species, xenograft: Graft taken from a different species, and alloplast: Bone substitute made from synthetic materials. Requirements for grafts are biocompatibility (must be well-accepted by the body), non-toxic (should not release harmful substances), non-allergenic (should not trigger allergic reactions), supports bone formation that ability to stimulate osteoblast activity in hard tissues (Osteoconduction), ability to induce differentiation into mature bone cells (osteoinduction), and direct formation of new bone tissue (osteogenesis).[7,8] Although autografts are considered the "gold standard," they have several disadvantages, such as limited availability of patient bone volume, morbidity at the donor site, and unpredictable replacement rates.[9]

In this case, the author used bovine-derived xenograft bone graft material. **Xenograft is a bone graft substitute derived from bone tissue taken from one species and transferred to another species as the recipient. An example is bovine bone, which is biocompatible and structurally similar to human bone, exhibiting osteoconductive properties. Known as bovine-derived bone xenograft (BDX), it is produced through a freeze-drying process at extremely low temperatures, leaving only the inorganic (mineral) components while preserving the bone architecture. This material is osteoconductive as it induces osteoblast activity in the formation of new bone.[10,11]** Generally, what is used for periodontal therapy comes from an inorganic bovine-derived hydroxyapatite matrix.[12] Using xenograft combined with the pericardium membrane as a periodontal tissue regeneration treatment provides good results. Several studies have shown satisfactory results regarding the addition of membranes. Membrane placement is based on the biological principle of GTR, which prevents apical migration of gingival epithelial cells during the early stages of healing, thereby allowing periodontal ligament cells to repopulate the root surface.[13]

The periodontal treatment plan should include oral hygiene instruction and strengthening and evaluation of the patient's plaque control, supra- and subgingival scaling and root planing to remove plaque and calculus, control of other local factors, occlusal therapy if necessary, periodontal surgery if necessary, and periodontal tissue maintenance.[14] The success of regenerative open flap debridement treatment combined with bone graft

shows clinical results with a reduction in probing pocket depth and an increase in Clinical Attachment Level (CAL) as well as bone filling visible radiographically.[5]

CONCLUSION

Using bovine-derived xenograft bone graft and pericardium membrane can increase the regeneration of alveolar tissue and bone in cases of chronic periodontitis. This case will continue to be evaluated for up to 1 year after the procedure to see the formation of new bone at the distal root of tooth 16. It is necessary to consider the flap suture technique to prevent gingival recession after the flap surgery.

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