



## Research article

# Socket Preservation Using Bovine Bone Graft and Pericardium Membrane: A Case Report

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**Abstract.**

**Background:** Tooth extraction is followed by a resorption of the bone in the buccal or facial portion, up to 50% in the first six months after the extraction. Bone loss mainly results from damage to the periodontal bone ligament complex. Socket preservation is a surgical procedure aimed to maintain an alveolar ridge after extraction, eliminating or minimizing the need for future augmentation in implant-prosthetic rehabilitation. Socket preservation techniques use some regenerative material such as bone graft and membrane.

**Objective:** To discuss socket preservation procedures using bovine bone graft and pericardium membrane.

**Method:** A 48-year-old woman presented to the Dental and Oral Hospital of Hasanuddin University to have tooth 47, which was mobile and extruded, extracted. Patient had no systemic disease and did not use any drugs. Clinical and radiograph examinations showed bone resorption in the surrounding edentulous area. The patient wanted to wear prosthesis but the bone resorption showed that socket preservation was needed to maintain the alveolar ridge high. The case was diagnosed as chronic periodontitis. Atraumatic extraction was done and bovine bone graft was placed in the socket, followed by the placement of pericardium membrane. Soft tissue healing was clinically evaluated.

**Results:** Control period after one week showed apparent uneventful clinical healing in the socket. Patient was satisfied with the treatment.

**Conclusion:** The socket preservation procedure is an effective treatment for maintaining the alveolar ridge high from excessive resorption, especially for prosthesis treatment.

**Keywords:** alveolar ridge, bone bovine, pericardium membrane, socket preservation

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## 1. Introduction

Bone loss mainly occurs due to damage to the periodontal bone-ligament bundle complex. Post-extraction of alveolar bone resorption can cause significant problems for restorative dentistry because tooth extraction can cause changes in morphology and dimensions of alveolar bone [1]. To reduce alveolar bone loss to an acceptable level, several alveolar ridge preservation procedures (ARP) have been proposed. Ridge alveolar preservation includes extraction of teeth with minimal traumatic, followed by grafting immediate socket extraction using particulate bone graft, Guide bone regeneration (GBR) with or without bone graft and socket seal techniques using different tissue graft materials. The use of graft materials in addition to GBR techniques or socket seals is based on the assumption that this material not only in preventing soft tissue membranes or graft filling into the socket area but also in increasing the formation of new bone through osteoinduction and osteoconduction [2].

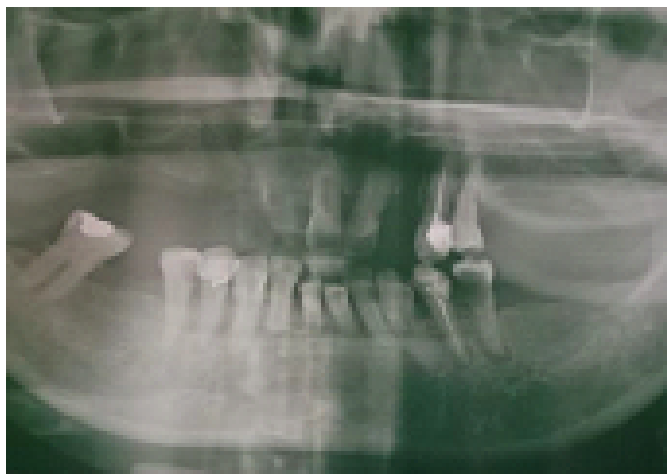
Thus, preservation of sockets on extracted teeth are needed to reduce the occurrence of alveolar bone resorption. Alveolar socket preservation (ASP) is a procedure in which graft material is placed in the extracted tooth socket at the time of extraction, with or without application of membrane barrier or soft tissue cover, to maintain or increase the dimensions of the original ridge and to allow for the ideal implant location [3].

Bone graft is a bone replacement material taken from somewhere both from the same individual (autograft) and from different individuals and the same species (allograft), different species (xenograft) and synthetic (alloplastic). Autograft is still a golden standard in treatment using bone graft but has limitations in its acquisition. Therefore, some clinicians use xenograft as a cheap and easy-to-obtain bone replacement material [4]. One of the bone grafts that is often used in dentistry is xenograft because it is relatively easy to apply. The most commonly used type is bone xenograft derived from cows made from demineralized cow bones in which organic minerals have been removed. Demineralized freeze-dried bovine bone xenograft (DFBBX) was immunogenic properties have been removed. DFBBX is osteoconductive where this bone replacement material does not activate bone formation but plays a role in the formation of the skeleton where bone growth and is also osteoinductive that exposes bone morphogenic protein (BMP) in the bone matrix, so as to accelerate bone regeneration [5]. In the use of bone grafts, it is often combined with other materials, including the use of a pericardial membrane. The combination of socket preservation treatment using bovine bone graft and pericardium membrane can further accelerate the process of bone formation. The aim of the case

study was to evaluate the healing of post-extraction sockets following alveolar ridge preservation clinically.

## 2. Case Report

A 48-years-old female patient came to Dental and Oral Hospital of Hasanuddin University to extract tooth 47 because the tooth was mobile and extruded. Patient has no systemic disease or used any drugs. Clinical and radiograph examination showed bone resorption in the surrounding edentulous area (Figure 1). Patient want to wear prosthesis but the bone resorption showed that socket preservation were needed to maintain the alveolar ridge high. From clinical and radiological examinations, resorption in the surrounding edentulous area has occurred. Diagnose of this case is chronic periodontitis, differential diagnosis was periapical abscess and the prognosis is good. A traumatic extraction was done then bovine bone graft was placed in the socket, followed by the placement of pericardium membrane. Soft tissue healing is clinically evaluated. Control period after 1 week showed apparent uneventful clinical healing in the socket. Patient felt satisfy with the treatment.



**Figure 1:** Radiograph before the socket preservation procedure (Source: Author's own work).

Panoramic radiographs are performed to see the overall condition of the teeth as well as the condition of the alveolar bone in the maxilla and mandible. Patient asked for informed consent before the surgical procedure were performed. After disinfection in the work area with povidone iodine, administering anesthesia using lidocaine with block technique (Figure 2). Tooth extraction was done carefully to avoid injury to the socket after extraction (Figure 3). The pocket is cleaned and irrigated and then places bone xenograft from bovine followed by pericardium membrane then hectin is done

before pack placement (Figure 4 and 5). After that, the patient was given amoxicillin 500 mg 3 times a day and paracetamol 500 mg 3 times a day. Patients were instructed to control 1 week later.



**Figure 2:** Clinical conditions of the teeth before (Source: Author's own work).



**Figure 3:** Clinical conditions after extraction (Source: Author's own work).



**Figure 4:** Placement of bone bovine followed by membrane (Source: Author's own work).



**Figure 5:** After hecting is finished (Source: Author's own work).

After 1 week the patient came for control. The wound is not completely closed (Figure 6). The patient came again 1 month later and the tissue healed and the wound was completely closed (Figure 7). Patients are satisfied with the actions taken.



**Figure 6:** One week after extraction (Source: Author's own work).



**Figure 7:** One month After Extraction (Source: Author's own work).

### 3. Discussion

Socket preservation is a procedure to minimize alveolar bone resorption after tooth extraction. This procedure is usually performed immediately after tooth extraction by placing bone graft material, barrier membrane, and/or biologic agents in the tooth socket [6]. As a result of tooth extraction will cause changes in the dimensions of the alveolar bone both vertically and horizontally, this condition will make it difficult for dentists when replacing teeth with either implants or removable prostheses [7]. Research has shown that socket preservation measures can reduce excessive resorption due to tooth extraction [8]. Therefore, bone graft material is needed to maintain the dimensions of the alveolar bone. The bone graft material used in this case is a xenograft. Xenografts are considered to be the most commonly used bone fillers in socket preservation procedures because of their osteoconductive properties that promote the growth of new bone around them [8].

In this case, in addition to bone graft material, pericardial membrane is also used to prevent the entry of epithelial tissue cells and connective tissue from entering the root surface or bone defects called Guide Bone Regeneration [9]. Several types of membranes on the market include: dental allograft membrane, metal reinforced membrane, collagen membrane, synthetic dental membrane and collagen plug. The pericardial membrane is part of the dental membrane allograft [10]. In this case, we used bovine pericardium membrane because it is a biomaterial rich in collagen as the main constituent of the extracellular matrix of bone. Therefore, the combination of bone graft and the addition of a bovine pericardium membrane in the preservation socket action provides good healing, and bone regeneration.

In this case the control 1 week after the procedure was performed and clinically visible healing occurred. Histological examination was not performed, there were no patient complaints about the presence of pain and swelling. In line with research conducted by Kresnadi that DFBBX is effective in reducing inflammation, decreasing osteoclasts, decreasing alveolar bone resorption, and increasing BMP2 expression and alveolar bone regeneration [5]. It in contrast to a systematic review the ARP study, reported a higher rate of complications and increased frequency of edema, facial pain and erythema [2].

Previous experiments reported that Socket Preservation with bovine bone graft and biologically absorbable collagen membranes enables maintenance of most of the original ridge dimensions. In this case after atraumatic extraction followed by placement of bovine bone graft then placement of the pericardium membrane, and first control after one week showed good healing and alveolar ridge conditions. An earlier systematic review concluded that the use of GBR seems to be more effective in limiting changes in the dimensions of alveolar ridge post extraction [8].

However, the socket preservation procedure still requires several further examinations such as clinical, histological and radiographic examinations but it cannot be done because the schedule prepared for the examination is constrained by the outbreak condition.

## 4. Conclusion

Within the limitations of the follow-up this case shows that the use of bovine bone graft and pericardium membrane facilitates healing of soft tissue after extraction, the use of the material appears biocompatible because there is no inflammation and

other complaints that show tissue reaction. Preservation sockets produce a significant reduction in changes in vertical bone dimensions after tooth extraction.

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