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# RECONSTRUCTION OF ALVEOLAR BONE DEFECT WITH DENTIN GRAFT

## ALVEOLAR KEMİK DEFEKTİNİN DENTİN GREFT İLE REKONSTRÜKSİYONU

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**ABSTRACT**

**Introduction:** Autogenous dentin grafts are grafts obtained by various processes of teeth extracted from the same patient. They can be used as demineralized or mineralized. They have similar physical and chemical properties to bone. They are especially preferred in cases where teeth are extracted for periodontal reasons and are partially or completely impacted. They can be used in extraction sockets, sinus augmentation, and reconstruction of bone defects. The purpose of this report is to present a case reconstructed with autogenous mineralized dentin graft (MDG) and dental implants.

**Case:** A 47-year-old female patient applied to our clinic due to mobility and pain in her teeth. Clinical and radiographic examination revealed periodontal damage in the patient's teeth. The patient's teeth in the left mandibular region were planned to be extracted and implants were placed in the same session. After the teeth were extracted, implants were placed in the defective area and MDG obtained from the extracted teeth was applied. No resorption was observed around the implants in the control X-ray taken in the 4th month postoperatively.

**Conclusion:** Dentin grafts are thought to be a good alternative to bone grafts due to their advantages, such as the low cost, low immunogenic potential, and elimination of donor site morbidity.

**Keywords:** Alveolar Defect, Bone Regeneration, Dentin Graft

**ÖZET**

**Giriş:** Otojen dentin greftler, aynı hastadan çekilen dişlerin çeşitli işlemlerden geçirilmesi sonucu elde edilen greftlerdir. Demineralize veya mineralize olarak kullanılabilirler. Kemik ile benzer fiziksel ve kimyasal özellik gösterirler. Özellikle dişlerin periodontal nedenlerle çekildiği ve parsiyel veya tamamen gömülü olduğu durumlarda tercih edilirler. Çekim soketlerinde, sinüs ögmentasyonunda ve kemik defektlerinin rekonstrüksiyonunda kullanılabilirler. Bu raporun amacı Otojen mineralize dentin grefti (MDG) ve dental implantlar ile rekonstrükte edilen bir vakayı sunmaktır.

**Vaka:** 47 yaşındaki kadın hasta dişlerindeki mobilite ve ağrı nedeniyle kliniğimize başvurdu. Klinik ve radyografik muayenede hastanın genel olarak tüm dişlerinde periodontal harabiyet izlendi. Hastanın sol mandibular bölgedeki dişleri çekilerek aynı seans implant yapılması planlandı. Dişlerin çekiminin ardından defektif olduğu görülen bölgeye implantların yerleştirilmesinin ardından çekilen dişlerden elde edilen MDG uygulandı. Postoperatif 4. ayda alınan kontrol röntgeninde implantların çevresinde herhangi bir rezorpsiyon izlenmedi.

**Sonuç:** Dentin greftlerin; çekilen dişlerin düşük maliyetle kullanımı, immünojenik potansiyelinin düşük olması ve verici saha morbiditesinin ortadan kalkması gibi avantajları nedeniyle kemik greftlerine iyi bir alternatif oluşturduğu düşünülmektedir.

**Anahtar Kelimeler:** Alveolar Defekt, Dentin Greft, Kemik Rejenerasyonu

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## INTRODUCTION

Dental implant application is a treatment method that can be preferred for the rehabilitation of missing teeth and the restoration of function and aesthetics in partially or completely edentulous patients. However, in cases where the area is not treated for a long time after the extraction of teeth, it may become difficult to place implants due to alveolar crest resorption (Mahardawi et al., 2023; Rabelo et al., 2010). One of the methods used to overcome this situation is to place implants simultaneously with tooth extraction using graft materials in areas with bone defects (Li et al., 2018; Wu et al., 2019).

Bone grafts are materials of natural or synthetic origin that can be applied to bone defect areas alone or in combination with other materials and are documented to have bone healing capacity (Titsinides et al., 2019; Zhao et al., 2021). An autogenous bone graft obtained from the patient is considered the gold standard in bone regeneration due to its osteogenic potential. Although it does not pose a risk of immunological reaction, it has the disadvantage of causing donor site morbidity (García-Gareta et al., 2015; Pang et al., 2017). Xenografts and allografts, although they eliminate the need for additional surgery, are inadequate to reach the optimum properties of autogenous grafts. They have disadvantages such as causing infection or immune rejection, providing limited osteogenic effect, and high treatment costs (Mahardawi et al., 2023; Wu et al., 2019).

Dentin grafts are autogenic or allogenic grafts obtained by various processes of teeth extracted from the patient (Binderman et al., 2014.; Um et al., 2021). Autogenous dentin grafts have important advantages such as low immunogenic reaction potential and not causing donor site morbidity due to the use of teeth obtained from the same individual. They also have similar physical and chemical properties to bone (Pang et al., 2017; Santos et al., 2021). Alveolar bone and teeth develop from neural crest cells and many proteins are common in bone, dentin, and cementum. Dentin grafts can be preferred especially in cases where teeth are extracted due to periodontal reasons and are partially or completely impacted (Binderman et al., 2014). The aim of this report is to present a case reconstructed with autogenous mineralized dentin graft (MDG) and dental implants.

## CASE PRESENTATION

A 47-year-old female patient applied to the Ordu University Faculty of Dentistry, Oral and Maxillofacial Surgery Clinic due to mobility and pain in her teeth. In the medical history taken from the patient, it was learned that she had undergone a thyroidectomy operation due to papillary thyroid carcinoma in 2017 and received 1 session of radioactive iodine therapy. No contraindication was seen in the patient who was consulted to endocrinologist in terms of performing a minor surgical procedure. In the clinical examination, advanced mobility and periodontal damage were observed in all the patient's teeth. In the radiographic examination, generalized alveolar bone loss was observed in all of the teeth (Figure 1A).

The patient was planned to have immediate implantation by extracting the teeth in the left mandibular region. The procedure to be performed was explained in detail and informed consent was obtained from the patient. The principles of the Declaration of Helsinki were followed. Anesthesia was applied to the left mandibular region. After a sulcular incision from tooth 31 to tooth 38, a relaxing vertical incision was made from the mesial of tooth 41, and a full-thickness mucoperiosteal flap was raised. Teeth 31, 32, 33, and 34 were extracted. After caries, foreign substances, and tissue residues were removed with a high-speed handpiece, the extracted teeth 33 and 34 were dried and placed in the dentin grinder (Kometabio Smart Dentin Grinder, New York, NY, USA). After the grinding process, first the upper drawer containing 300-1200 micron particles and then the lower drawer containing particles smaller than 300 microns were removed and transferred to a sterile container. First, dentin cleanser solution was added to the container containing the dentin particles so that it completely covered the particles and kept at room temperature for 5 minutes. After drying with a sterile gauze, phosphate-buffered saline solution was added to the container in the same way. After drying, phosphate buffered saline solution was reapplied. MDG particles, which were ready for use, were applied simultaneously to the defective areas 33, and 34 after the implants were placed (Figure 1B). No resorption was observed around the implants in the control X-ray taken in the 4th postoperative month (Figure 1C).

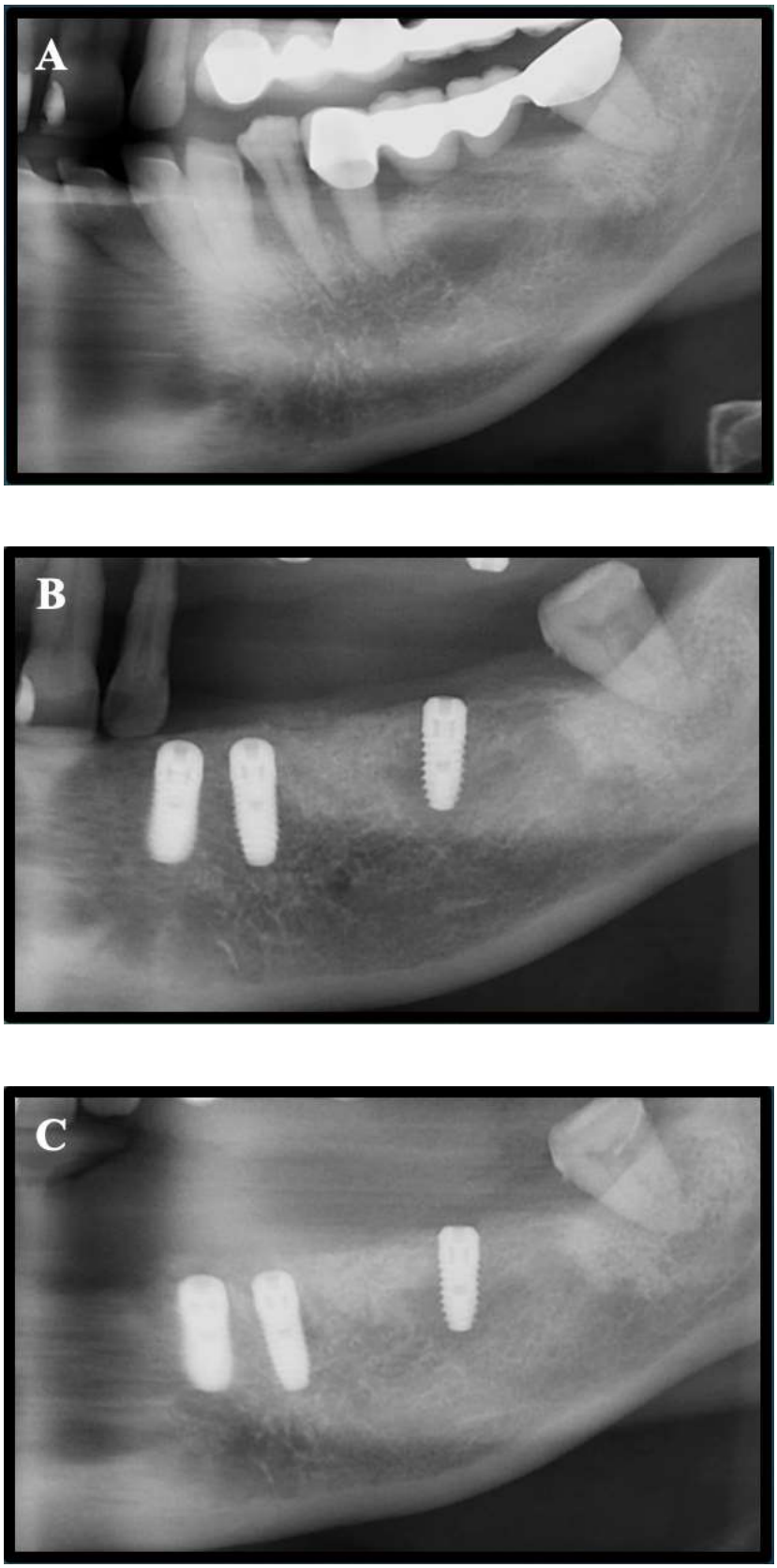


Figure 1. Preoperative (A), postoperative (B), and 4th month postoperative (C) panoramic radiograph of the patient

## DISCUSSION

Dentin grafts are divided into demineralized dentin grafts (DDG) and MDG according to their demineralization rate. Although the demineralization process reveals matrix-derived growth and differentiation factors in bone regeneration, it has several disadvantages. Extra time may be needed for demineralization with DDG and therefore an extra surgical session may be required (Binderman et al., 2014). It is also thought that demineralization weakens bone anchorage. MDG has the advantages of being obtained in the same session as tooth extraction and having a low risk of immune reactions. It also provides support to alveolar bone and soft tissue thanks to its slow remodeling (Özen and Karaca, 2023; Özkahraman et al., 2022). Dentin grafts have been used in particle or block form in extraction sockets, sinus augmentation, and reconstruction of alveolar bone defects (E. S. Kim et al., 2016; Y. K. Kim et al., 2014; Korsch and Peichl, 2021; Li et al., 2018; Schwarz et al., 2019; Wu et al., 2019).

Li et al. (2018) compared autogenous DDG with xenogenicbone granules for guided bone regeneration in cases of immediate implantation after periodontal extraction. After the implant was placed in the extraction socket, autogenous DDG particles or xenogenic bone granules were placed in the area between the implant and the socket. DDG particles showed clinical and radiographic performance like conventional bone grafts, and it was concluded that they could be an alternative to bone graft material in guided bone regeneration. Wu et al. (Wu et al., 2019) compared the effectiveness of autogenous DDG and xenogenic bone graft in immediate implantation in cases with bone defects. After tooth extraction, the extraction socket and labial bone defect were exposed and DDG obtained from the extracted tooth or xenogenic bone graft was applied to the area. DDG showed similar results to xenogenic bone graft in terms of bone volume change, and it was concluded that it is an acceptable graft material.

Santos et al. (2021) compared the results of autogenous MDG and xenograft implantation after tooth extraction in patients scheduled for delayed implantation. MDG showed similar implant stability to xenograft, but histomorphometrically significantly higher amounts of new bone formation were observed. Cinar et al. (2024) compared the effectiveness of autogenous MDG with deproteinized bovine bone in horizontal gap augmentation for patients who underwent immediate implantation after extraction and obtained similar results.

In our case, MDG particles obtained from teeth extracted due to periodontal damage were placed in the extraction socket and buccal bone defect area around the implant simultaneously with implant application. No resorption was observed around the implants in the control X-ray taken 4 months postoperatively.

As a result, dentin grafts are thought to be a good alternative to bone grafts due to their advantages such as low-cost, low immunogenic potential and elimination of donor site morbidity.

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