



## CASE REPORT

### Multidisciplinary Approach for Odontogenic Keratocyst Treatment: A Case Report Odontojenik Keratokist Tedavisinde Multidisipliner Yaklaşım: Bir Olgu Sunumu

Emine Fulya Akkoyun<sup>1</sup> , Burcu Diker<sup>2</sup> , Özge Serpil Çakır<sup>1</sup> , Taha Pergel<sup>1</sup> , Doğan Dolanmaz<sup>1</sup> 

<sup>1</sup>Oral and Maxillofacial Surgery Department, Faculty of Dentistry, Bezmialem Vakif University, Istanbul, Turkey

<sup>2</sup>Prosthodontics Department, Faculty of Dentistry, Bezmialem Vakif University, Istanbul, Turkey

#### ABSTRACT

**Objective:** Odontogenic keratocyst is an aggressive cystic lesion and a common type of tooth-derived cyst due to the presence of odontogenic epithelial remnants in various regions of the jaw. Odontogenic keratocysts can occur at any age, but are typically observed in individuals under 40 years old. Complete eradication is challenging due to the cyst's delicate and thin nature, with recurrence rates ranging from 13% to 60%. The treatment may cause large defects which requires bone reconstruction. Guided bone regeneration (GBR) utilizing titanium mesh is a prevalent technique for bone augmentation, especially in cases of significant alveolar ridge defects, providing stable and excellent results. This paper reports the treatment of a recurrent odontogenic keratocyst case and reconstruction of the remaining bone defect.

**Case:** A 19-year-old female patient presented with swelling and pain in the right anterior mandibular region because of the third recurrences of keratocyst. Clinical and radiographic assessments revealed a unilocular cystic lesion. Under general anesthesia, the cyst was enucleated, and associated teeth were extracted. Aggressive curettage and peripheral osteotomy was performed to prevent recurrence of the lesion. Implant treatment was planned for the edentulous space. Following cystic cavity healing; vertical and horizontal defect augmentation was performed using autogenous graft and custom titanium membrane. Subsequently, two dental implants were placed, followed by prosthetic rehabilitation

**Conclusion:** This multidisciplinary approach addressed both the cystic lesion and subsequent bone loss, resulting in successful implant integration and functional restoration. Our case highlights the efficacy of combining surgical and prosthetic interventions in managing odontogenic keratocysts, leading to favorable clinical outcomes.

**Keywords:** Keratocyst, custom-made titanium membrane, implant dentistry

#### ÖZET

**Amaç:** Odontojenik keratokist, çenenin çeşitli bölgelerinde, odontojenik epitel kalıntılarından köken alan agresif bir kistik lezyon olup, odontojenik kistlerin yaygın bir türüdür. Odontojenik keratokistler her yaşta görülebilir, ancak genellikle 40 yaş altındaki bireylerde gözlemlenir. Kistin hassas ve ince yapısı nedeniyle tam olarak çıkarılması zordur ve nüks oranları %13 ile %60 arasında değişmektedir. Tedavi, büyük defektlere neden olabilir ve bu da kemik rekonstrüksiyonu gerektirebilir. Titanyum ağı kullanılarak yönlendirilmiş kemik rejenerasyonu (YKR), özellikle şiddetli alveolar kret defektlerinde yaygın bir kemik artırma tekniğidir ve stabil sonuçlar sağlar. Bu makale, tekrarlayan bir odontojenik keratokist vakasının tedavisi ve kalan kemik defektinin rekonstrüksiyonunu rapor etmektedir.

**Vaka:** 19 yaşında kadın hasta, keratokistin üçüncü tekrarı nedeniyle sağ ön mandibular bölgede şişlik ve ağrı şikayetiyle başvurdu. Klinik ve radyografik değerlendirmelerde uniloküler bir kistik lezyon tespit edildi. Genel anestezi altında kist enükle edildi ve ilgili dişler çekildi. Lezyonun tekrarlamasını önlemek amacıyla agresif küretaj ve periferik osteotomi yapıldı. Dişsiz alan için implant tedavisi planlandı. Kistik boşluğun iyileşmesini takiben, otogen greft ve özel titanyum membran kullanılarak vertikal ve horizontal defekt artırımı yapıldı. Sonrasında iki dental implant yerleştirildi ve protetik tedavi tamamlandı.

**Sonuç:** Bu multidisipliner yaklaşım, hem kistik lezyonu hem de sonrasında oluşan kemik kaybını ele alarak başarılı implant entegrasyonu ve fonksiyonel restorasyon sağladı. Vakamız, odontojenik keratokistlerin yönetiminde cerrahi ve protez müdahalelerinin birleştirilmesinin etkinliğini vurgulamakta ve olumlu klinik sonuçlara yol açmaktadır.

**Anahtar Kelimeler:** Keratokist, kişiye özel titanyum membran, implantoloji

Submission Date: October 2, 2024  
Acceptance Date: December 12, 2024  
Corresponding author: Özge Serpil Çakır  
Address: Bezmialem Vakif University Faculty of Dentistry  
Department of Oral and Maxillofacial Surgery Fatih, Istanbul, Turkey  
Phone: +905372676871  
Email: ozgescakir@gmail.com

Emine Fulya Akkoyun 0000-0003-4154-2503  
Burcu Diker 0000-0001-5367-9369  
Özge Serpil Çakır 0009-0009-9232-0485  
Taha Pergel 0000-0001-9896-8295  
Doğan Dolanmaz 0000-0002-7390-1147



# EurAsian Journal of Oral and Maxillofacial Surgery

Official publication of AÇBİD  
(Association of Oral and Maxillofacial Surgery Society)

EurAsian Journal of Oral and Maxillofacial Surgery



## INTRODUCTION

**O**dontogenic keratocyst (OKC) is an aggressive cyst derived from the dental lamina and its remnants.<sup>1</sup> They strongly prefer the mandible,<sup>2</sup> particularly in the molar-ramus region.<sup>3</sup>

Treating a recurrent OKC may result in the loss of multiple teeth, necessitating implant-supported prosthesis. Additionally, significant alveolar bone defects may require horizontal and vertical bone reconstruction.

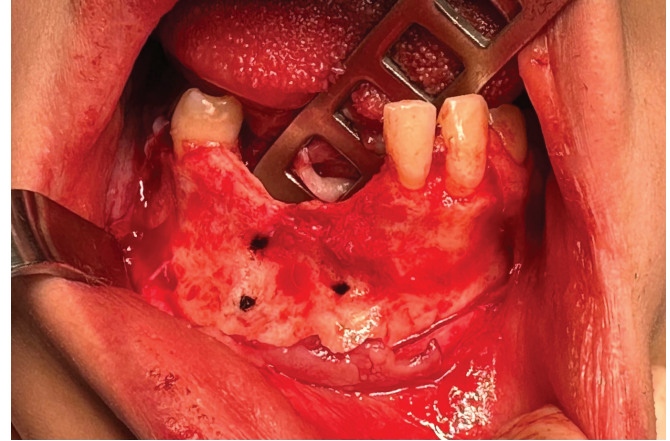
Guided bone regeneration (GBR) allowed practitioners to offer patients more reliable and durable bone augmentation outcomes.<sup>4</sup> When treating significant bone defects with GBR, especially in cases of vertical deficiencies, the choice of membrane is crucial. Resorbable membranes may not offer enough rigidity and stabilization, so using non-resorbable, rigid membranes would be more beneficial.<sup>5</sup> We report a recurrent OKC, which treated with GBR using custom-made titanium membrane after aggressive curettage in anterior mandible.

## CASE

A 19-year-old systemically healthy female patient was referred to Bezmialem Vakıf University Oral and Maxillofacial Surgery department with a third recurrence of OKC. After clinical examination, swelling and pain in the right anterior mandibular region were observed, and radiographic assessments revealed a unilocular cystic lesion extending between 31 to 44 teeth. Under general anesthesia, the cyst was enucleated, and associated teeth were extracted. Aggressive curettage and peripheral osteotomy were performed to prevent the recurrence of the lesion.

Following cystic cavity healing, implant treatment was planned for edentulous space. Vertical and horizontal augmentations were indicated because of significant bone defect after recurrent cyst operations (Figure 1). The patient was followed for one year to observe the risk of recurrence and healing before undergoing bone augmentation.

One year after the cyst operation, the patient underwent a dental volumetric tomography (DVT) to determine the extent of the defect. The DVT was sent to "Custimesh Private Healthcare Services", and a lower jaw model was created based on it. A custom-made titanium membrane was designed using this model, manufactured and for sterilized in an autoclave.



**Figure 1.** Vertical and horizontal bone defect caused by recurrent OKC

The patient underwent an operation under general anesthesia for bone augmentation. The mucoperiosteal flap was elevated between teeth number 46 to 34 due to allowing stretching of the periosteum after placing the titanium membrane. Autogenous bone graft was harvested from the iliac crest and mixed with 1 cc Botis-Cerabone bovine-derived bone graft to provide mechanical strength. Graft material was placed in titanium membrane, and the membrane was placed on the defective bone area. The membrane was fixed with three 5-millimeter screws (Figure 2). After fixation was controlled, the rest of

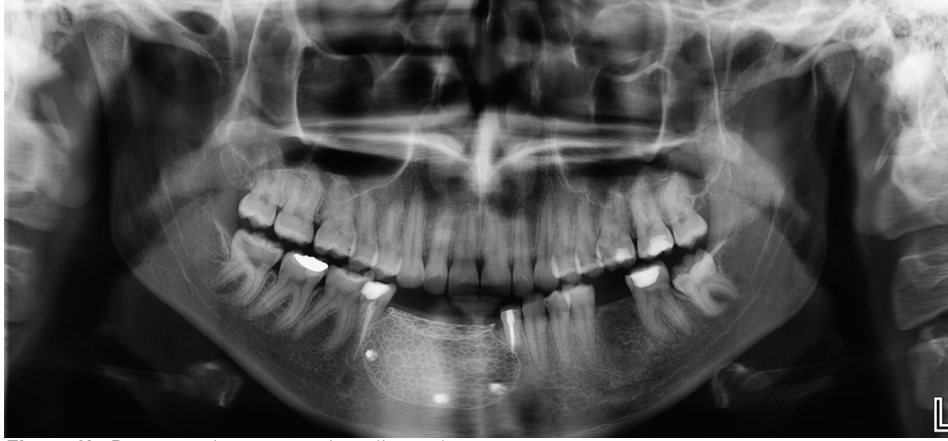


**Figure 2a.** Customized titanium membrane was stabilized via three 5-mm screws.



# EurAsian Journal of Oral and Maxillofacial Surgery

Official publication of AÇBİD  
(Association of Oral and Maxillofacial Surgery Society)



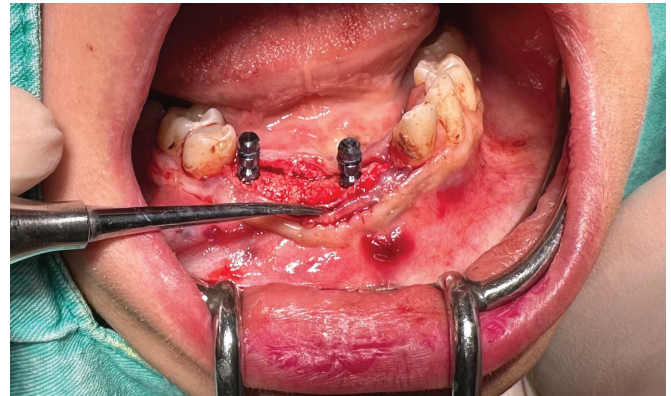
**Figure 2b.** Postoperative panoramic radiograph.

the graft material was inserted from holes of the titanium membrane to the defect area. A 30x40 mm Botis-Cerabone resorbable collagen membrane was placed over the titanium mesh to cover it and secured with four membrane fixation pins. The periosteum was incised, and the flap was stretched and sutured without tension.

An infection was observed in the patient during a one-month follow-up. The mesial region of the flap was exposed, and pus formation was seen. To achieve appropriate bone volume, extraction of titanium mesh was delayed until bone formation was completed. 1 mg amoxicillin-clavulanate was prescribed. The infection was followed twice a week during the healing process by washing it with saline and rifamycin solution.

After a two-month follow-up, the titanium membrane was removed under local anesthesia. Before closing the flap, a PRF membrane was placed in the operation area to support healing.

It was observed that the infection healed after the membrane had been removed. Two Straumann implants were placed in areas of 41 and 44 numbered teeth (Figure 3). After osteointegration was provided, the patient was referred to the prosthesis department for crowns (Figure 4).



**Figure 3.** implant placement 9 months after bone augmentation with custom-made titanium mesh membrane and iliac crest bone graft



**Figure 4.** Prosthetic Rehabilitation



# EurAsian Journal of Oral and Maxillofacial Surgery

Official publication of AÇBİD  
(Association of Oral and Maxillofacial Surgery Society)

EurAsian Journal of  
Oral and Maxillofacial Surgery



## DISCUSSION

Three mechanisms may be responsible for the recurrence of OKC. Firstly, remnants of dental lamina within the jaws can be accountable for forming new cysts. Secondly, incomplete removal of the original cyst can occur due to the thin and fragile lining of OKCs, leading to cortical perforation and adherence to adjacent soft tissue. Thirdly, the remaining rest of dental lamina and satellite cysts after enucleation can cause recurrence.<sup>6</sup>

A progressive treatment approach may be needed for recurrent bone and tooth loss. Resorbable membranes are effective for horizontal bone insufficiency while space-preserving barriers are required for vertical defects. Vertical bone augmentation can be achieved using a titanium mesh covered by a resorbable membrane.<sup>7</sup>

Titanium mesh has high strength, stiffness, stability, and elasticity, making it ideal for bone support, graft volume maintenance, and reduced oral mucosa pressure. Its good plasticity allows for shaping to fit various bone defects, making it perfect for GBR, achieving stable osteogenesis and simultaneous bone augmentation.<sup>8</sup> Titanium mesh causes exposed gingival areas more than resorbable membranes because its rigid structure may irritate the soft tissue. Nevertheless, the formation of a pseudo-periosteum layer directly underneath the exposed site sometimes protects the underlying bone graft from infection.

## CONCLUSION

This report aims to show severe bone defects caused by multiple recurrences of OKC. This type of defect requires a progressive approach to provide dentition and reduce patient morbidity. With GBR using a custom-titanium-mesh membrane, practitioners may gain adequate vertical and horizontal bone to achieve ideal implantation.

## ACKNOWLEDGEMENTS

The patient provided informed consent for the use of photographs and recordings for scientific purposes.

## REFERENCES

1. Singh A, Kasrija R, Mittal A, Gupta A, Kaur H. Odontogenic Keratocyst of the Maxilla With Fungal Sinusitis: A Rare Case. *Cureus*. 2024;16(8):e67038.
2. Pylkkö J, Willberg J, Suominen A, Laine HK, Rautava J. Appearance and recurrence of odontogenic keratocysts. *Clinical and Experimental Dental Research*. 2023;9(5):894-898.
3. Lund VJ. Odontogenic keratocyst of the maxilla: a case report. *British journal of oral and maxillofacial surgery*. 1985;23(3):210-215.
4. Giragosyan K, Chenchev I, Ivanova V. Linear bone gain and healing complication rate comparative outcomes following ridge augmentation with custom 3D printed titanium mesh vs Ti-reinforced dPTFE. A randomized clinical trial. *Folia Medica*. 2024;66(4):505-514.
5. Urban IA, Montero E, Amerio E, Palombo D, Monje A. Techniques on vertical ridge augmentation: Indications and effectiveness. *Periodontology 2000*. 2023;93(1):153-182.
6. Stoelinga P. The odontogenic keratocyst revisited. *International journal of oral and maxillofacial surgery*. 2022;51(11):1420-1423.
7. Abu-Mostafa NA, Alotaibi YN, Alkahtani RN, Almutairi FK, Alfaifi AA, Alshahrani OD. The Outcomes of Vertical Alveolar Bone Augmentation by Guided Bone Regeneration with Titanium Mesh: A Systematic Review. *J Contemp Dent Pract*. 2022;23(12):1280-1288.
8. Poomprakobsri K, Kan JY, Rungcharassaeng K, Lozada J, Oyoyo U. Exposure of barriers used in guided bone regeneration: Rate, timing, management, and effect on grafted bone—A retrospective analysis. *Journal of Oral Implantology*. 2022;48(1):27-36.