

# Surgical and Endodontic Treatment of Parakeratotic Keratocyst

## Parakeratotik Keratokistin Cerrahi ve Endodontik Tedavisi

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**ABSTRACT** Odontogenic keratocyst (OKC) is categorized as developmental, noninflammatory cyst that derives from residuals of dental lamina. In this article, a case of OKC in the mandibular region is introduced. A 41-year-old female patient with complaints of repeated swelling and pain between the right and left mandibular second molars at the mandible was admitted to endodontics clinic. Initial clinical examination revealed swelling of the vestibular sulcus. The subsequent radiographic examination showed a uni-locular radiolucency at the mandible. The electrical pulp test was negative. Root canal treatment followed by radical curettage was performed surgically on the lesion region. Histopathological examination showed that the lesion was a parakeratotic type of OKC. The patient was recalled after one year and there was no recurrence. However, at the end of 19 months, a new radiolucency was observed on the left mandibular region which needs further surgical curettage. Long-term (4.5 years) controls revealed bone formation in the operation field. Periodic follow-ups of the patient continued.

**Keywords:** Odontogenic keratocyst; endodontic treatment; surgical curettage; cone beam computed tomography

**ÖZET** Odontojenik keratokist (OKC), diş lamina kalıntılarından kaynaklanan gelişimsel, inflamatuvar olmayan kist olarak kategorize edilir. Bu olgu raporunda, mandibular bölgede görülen bir OKC olgusu anlatılmaktadır. Alt çenede sağ ve sol mandibular 2. büyük azı dişlerinin olduğu bölge arasında tekrarlayan şişlik ve ağrı şikâyeti ile 41 yaşında kadın hasta endodonti kliniğine başvurdu. İlk klinik muayenede vestibüler sulkusta şişlik görüldü. Sonraki radyografik incelemede mandibulada tek loküler bir radyolüseni görüldü. Elektrik pulpa testine negatif sonuç veren dişlere kök kanal tedavisi ve ardından lezyon bölgesine cerrahi olarak radikal küretaj uygulandı. Histopatolojik inceleme lezyonun parakeratotik bir OKC tipi olduğunu gösterdi. Hasta 1 yıl sonra geri çağırıldı ve nüks olmadığı görüldü. Ancak 19 ayın sonunda sol mandibular bölgede daha ileri cerrahi küretaj gerektiren yeni radyolüseni görüldü. Uzun dönem (4,5 yıllık) kontroller, mandibular bölgenin büyük bir kısmında kemik oluşumunu ortaya çıkardı. Hastanın periyodik takiplerine devam edilmektedir.

**Anahtar Kelimeler:** Odontojenik keratokist; endodontik tedavi; cerrahi küretaj; konik ışınli bilgisayarlı tomografi

Odontogenic keratocyst (OKC), a benign neoplasm of odontogenic source was first described by Philipsen in 1956.<sup>1</sup> An OKC is defined as a uni-or multi-cystic intraosseous benign tumor of odontogenic source, with a characteristic covering of parakeratinized laminar squamous epithelium and possible for aggressive, infiltrative attitude.<sup>2</sup> The therapy of OKCs ruins contentious with a variety of therapy modalities from easy enucleation to marsupialization

or resection.<sup>3</sup> In 2005, the World Health Organization (WHO) re-classified odontogenic neoformations, changing the past description of OKC with keratocystic odontogenic tumor (KCOT).<sup>2</sup> The term OKC has been renewed by the WHO Working Group 2017 and is now the preferred term, replacing KCOT.<sup>4</sup> Although OKCs can be seen in both jaws, they are usually localized in the mandible. They are usually diagnosed in the second and third decades of life;

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56.9% are found in men, and they form 7.8% of all jaw cysts.<sup>5</sup> The main clinical features of OKCs are as follows: local destructive behavior, multiplicity and high recurrence rate.<sup>3</sup>

In this case report, treatment and follow-up of a mandibular keratocyst is described.

## CASE REPORT

A 41-year-old female patient with complaints of swelling and pain on the mandibular surface was admitted to endodontics clinic. Detailed medical history of the patient revealed no systemic disease. Radiographic evaluation revealed radiolucent areas on the entire mandibular surface and a well-defined uni-locular radiolucency (Figure 1). Panoramic radiography showed that the border of the lesion was located between mesial of tooth number 38 and mesial of tooth number 47. The size of the radiolucent area was determined by using computed tomography (CT) as bucco-lingual 14 mm, superior-inferior 22.5 mm. Teeth numbers 34, 36 and 45 were responded negatively to the electrical pulp test when compared to the control teeth. Morgan et al. identified surgical therapy way for KCOT as conservative or aggressive. Conservative therapy method contains enucleation with or without curettage, or marsupialization.<sup>6</sup> Its advance is protection of anatomical constructions and teeth which is preferred because KCOTs mostly available in younger patients. Aggressive therapy

method contains peripheral osteotomy, chemical curettage with Carnoy's solution or en bloc resection.<sup>7</sup> Aggressive and conservative treatment methods for KCOT treatment were explained to the patient in detail. The patient chose the method of conservative treatment, since she was young and did not want to lose her tooth. The following treatment steps are planned: conservative treatment process including root canal treatment to the teeth number 34, 36 and 45, which were negatively respond to the electric pulp test followed by enucleation of the cyst. After getting the patients approval, an informed consent form was obtained.

Access cavity was prepared and the root canals were prepared with rotary system files S1, S2, SX, F1, F2, F3, F4 and F5 (Dentsply Maillefer, Ballaigues, Switzerland) respectively. Two mL of 2.5% NaOCl was used for irrigation prior to each file change. The canals were finally irrigated with 5 mL of 17% EDTA, 5 mL of 5.25% NaOCl followed by 3 mL of saline. Since there were no acute symptoms, root canal treatments were completed in the same session. The patient was re-called for surgery with a keratocyst pre-diagnosis. The surgically opened region was thoroughly curetted and washed with saline (Figure 2). The root ends of the teeth that had previously been endodontically treated were resected during the surgery and an apical plug was performed with mineral trioxide aggregate.

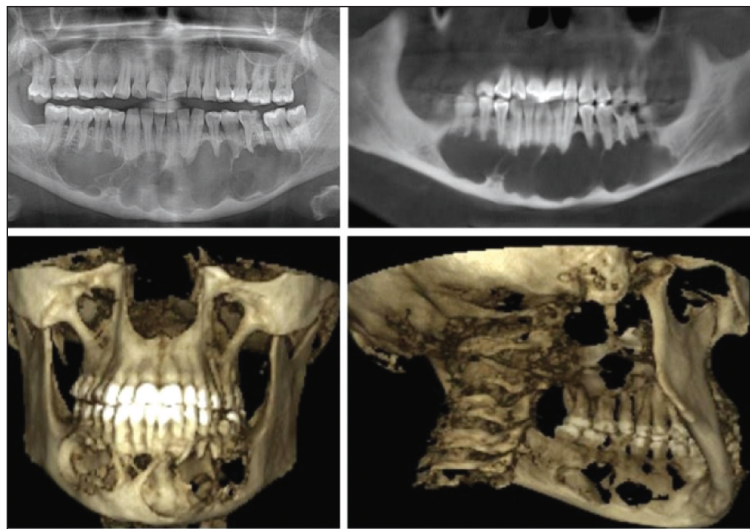


FIGURE 1: Initial panoramic radiography and computed tomography scans of the patient.



FIGURE 2: Intraoral image of mandibular area after flap removal.

The removed lesion was placed in 10% formalin to be sent for histopathological examination. The patient was prescribed antibiotics (1,000 mg of penicillin and clavulanic acid) and chlorhexidine mouthwash after surgery. One week later, sutures were removed. During the post-operative healing period, the patient did not encounter any problems (percussion and palpation pain, swelling, paresthesia, erythema). Histopathologic exam revealed that the lesion was parakeratotic OKC and the patient received periodic follow-ups at 6 months' intervals. At the end of 6 month, it was observed that teeth 42, 43, 44, 33 and 35 replied negatively to the electrical pulp test and root canal treatment was applied to each tooth.

At the end of one-year, it was recorded that the swelling in the vestibular sulcus had completely recovered. A significant bone formation was confirmed between the right and left mandibular molar teeth via radiographic examination (Figure 3). However, the radiographic examination at 18 months showed re-

currence of OKC in the left first mandibular molar region. This recurrence was smaller than the initial lesion and the borders of the lesion was limited to the left first molar region (Figure 4).

The patient accepted to have a second operation thus underwent a surgical re-curettage. The results of the biopsy evaluation showed that the lesion was a re-occurred keratocyst. Twelve months after the second operation, a panoramic radiograph was taken. The area of the lesion was significantly reduced. In the control radiography taken at the end of 3.5 years, recurrence was observed near number 36 (Figure 5). Due to the patient's complaints of pain and swelling, tooth number 36 was extracted. A significant bone formation was observed at the operation area at the end of 4.5 years (Figure 6). The follow-up of the patient continues.

## DISCUSSION

Simiyu et al. noticed a whole of approved states of OKC, 68.2% of which occurred in the mandible, 27.3% of which occurred in the maxilla and 4.5% of which occurred in both jaws and were united with Gorline-Goltz syndrome.<sup>8</sup>

There are many treatment methods for OKC. Among these methods, the most effective method to prevent recurrence is reported as resection. Five investigators found 0% recurrence after resection while these investigators did not mention how many years of follow-up they included.<sup>9</sup>

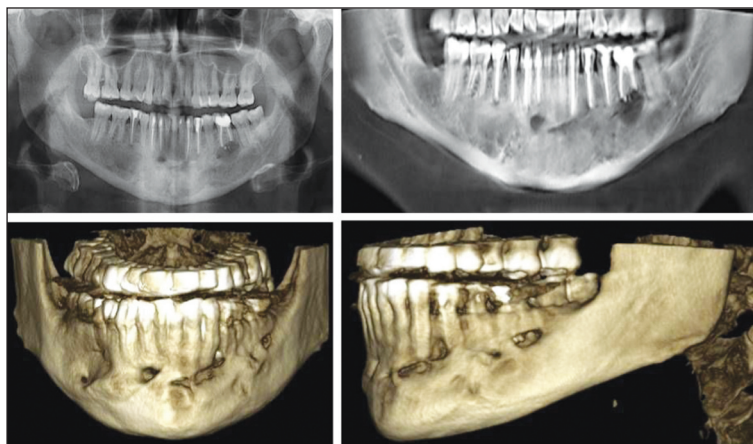


FIGURE 3: Panoramic radiograph and computed tomography scans after 1 year follow-up of the patient.

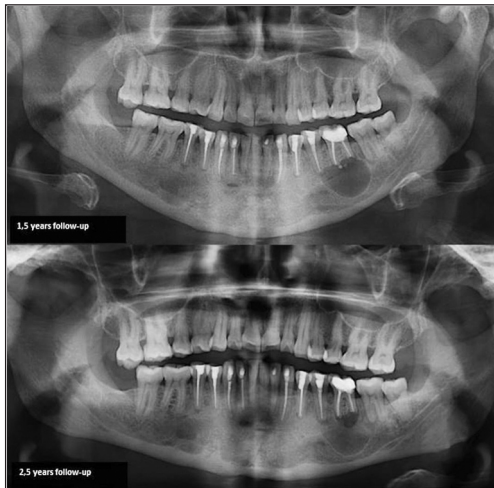


FIGURE 4: Panoramic radiography of the patient after 1.5 and 2.5 years follow-up.



FIGURE 5: Panoramic radiography of the patient after 3.5 years follow-up.



FIGURE 6: Panoramic radiography of the patient after 4.5 years follow-up.

Stoelinga underlined that all cases of OKC have epithelial islands and/or microcysts within the overlying attached mucosa and therefore stressed the importance of placement and complete removal of the attached mucosa at the top.<sup>10</sup> According to the literature, the recurrence rates of the cases ranging from 0% to 60% depending on the treatment modality.<sup>10-12</sup> Woolgar et al. reported that similar recurrence risk

could be related to deficient suspension of the cyst covering, of a novel OKC enlargement from minor satellite cysts, or to an odontogenic epithelial ruins left throughout surgical therapy.<sup>13</sup>

Forsell et al. reported that keratocysts should be followed for at least 5 years after the surgery.<sup>6</sup> There are different rates when there is no long-time pursuit on recurrence of keratocysts. This rate changes from 3% to 62%.<sup>6</sup> A systematic review by Kaczmarzyk et al. recommends a general repetition ratio of 23.15% based on retrospective collections meeting the review standards.<sup>12</sup> This systematic review did not assess the repetition ratio of particular treatment methods. The most important factor is the inadequacy of treatment after follow-up; though the plurality of OKC do not recur in the initial five years following therapy, recurrence could occur after ten years or longer. There is a variety of treatment methods used for OKC therapy.<sup>9,11</sup> In this case, radiographic examination showed recurrence of OKC in the left first mandibular molar region one and a half years after the surgical operation. Follow-up controls of the patient is still going on.

OKCs may be seen as minor, circle or oval, multi-lobulated lesions with well-defined edges and a radiolucent region on CT scans.<sup>14</sup> The size of the radiolucent area was determined in our study as 14 mm from buccal to lingual and 22.5 mm from superior to inferior. Bone erosions and multi-lobulated lesions with well-defined margins and a radiolucent region were also observed on CT scans confirming the previous case reports. The ideal method for reducing recurrence is to take a sample from all cysts and perform a histopathological examination before definitive treatment. Biopsy of the lesion should be taken and definitive treatment should be applied according to the results.<sup>14</sup>

This case report was verbally approved by all participants in our study. The patient was informed about the procedure before the operation. Our case report is in agreement with the reported data concerning the clinical and histological properties of odontogenic parakeratotic cysts in the literature. Further long-term follow-up is required to define whether repetition of the OKC in this patient has been successfully prohibited. Conservative treatment of

our patient indicated well treatment effect with nominal risk of repetition.

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### Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or mem-

bers of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

### Authorship Contributions

**Idea/Concept:** Öznur Küçük, Sema Belli; **Design:** Öznur Küçük, Sema Belli, Gülperi Koçer; **Control/Supervision:** Öznur Küçük, Sema Belli; **Data Collection and/or Processing:** Öznur Küçük; **Analysis and/or Interpretation:** Öznur Küçük, Sema Belli, Gülperi Koçer; **Literature Review:** Öznur Küçük; **Writing the Article:** Öznur Küçük, Sema Belli; **Critical Review:** Öznur Küçük, Sema Belli; **References and Fundings:** Öznur Küçük, Sema Belli, Gülperi Koçer; **Materials:** Öznur Küçük, Sema Belli, Gülperi Koçer.

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