

# Conservative treatment of keratocyst: A follow-up study

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## ABSTRACT

**Objective:** Odontogenic keratocyst (OKC) is a cyst of tooth origin with an aggressive clinical behavior, including a high recurrence rate. The OKC is well known for its tendency to recur, potential aggressive behavior and defined histopathological feature. The aim of our study is to report the outcome of conservative treatment protocol for OKC. **Materials and Methods:** A retrospective chart review was undertaken of all cases of OKC treated at Department of Oral and Maxillofacial Surgery, KGMU, Lucknow between 2007 and 2009. A total of 35 cases of cystic lesion were identified, which were treated by one group of surgeons. On histopathological examination 17 patients out of 35 were diagnosed as OKC. We have treated all the patients of OKC with surgical curettage followed by iodoform dressing. There was only one recurrence reported, which was further treated by resection. Clinical features and various treatment modalities of OKC are discussed. **Conclusions:** Enucleation followed by open packing can be used as a choice of treatment with low recurrence rate for the large keratocystic lesions. The patient should have periodic radiographic and clinical examination. In the cases of the recurrence, lesion should be treated by resection and reconstruction

## Key words

Curettage, odontogenic keratocyst, recurrence

## INTRODUCTION

The cysts of the oral cavity are very common due to the presence of odontogenic epithelium remnants.<sup>[1]</sup> According to previous studies, periapical cyst is the most common odontogenic cyst (52.3-70.7%) followed by the dentigerous cyst (16.6-21.3%) and odontogenic keratocyst (OKC) (5.4-17.4%).<sup>[2]</sup>

OKC was categorized by the World Health Organization classification as a developmental, non-inflammatory odontogenic cyst<sup>[3]</sup> that arises from cell rests of dental lamina.<sup>[4]</sup> OKCs have distinctive histologic features, which help in distinguishing them from other cysts. It is characterized by a uniform epithelial layer that lacks rete-ridges, corrugated parakeratinized luminal layer and a prominent basal cell layer.

The OKC grow to sizes larger than any other odontogenic cyst. Clinically OKC more often penetrate

the bone rather than expand it and grow in an anterior to posterior direction.<sup>[5]</sup> Despite this aggressive growth, they often remain asymptomatic.<sup>[6]</sup> Recently, intra cystic fluid pressure was found to be involved in OKC growth.<sup>[7]</sup>

The OKC occurs more commonly in 2<sup>nd</sup> and 3<sup>rd</sup> decade of life. It has a predilection for men,<sup>[8,9]</sup> generally shows a distribution of approximately 60% males and 40% females,<sup>[10]</sup> and occurs significantly more in the posterior region of the mandible.<sup>[8,9]</sup> In posterior mandible, OKC mostly occurs in body region of mandible.<sup>[11,12]</sup>

## PATIENTS AND METHODS

A retrospective chart review was undertaken of all cases of OKC treated at Department of Oral and Maxillofacial Surgery, CSMMU, Lucknow between 2007 and 2009. A total of 35 cases of cystic lesion were identified, which were treated by one group of surgeons. On histopathological examination 17 patients out of 35 were diagnosed as OKC. The salient features of these cases are summarized in Table 1. The average age was 35 years with the range of 14-65 years. The majority of cases involve posterior region of mandible. There were slightly more inclination for mandible than maxilla. All lesions were discovered by radiographic images and the diagnoses of OKC were confirmed post-operatively by histopathological report. All patients underwent pre-operative panoramic radiography and computed tomography scanning. Our

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**Table 1: Clinical follow-up of cystic lesions**

Patient	Age/sex	Diagnosis	Treatment given	Remarks
1	3 years/M	Dentigerous cyst	Marsupialisation	No recurrence till date
2	65 years/M	OKC of left mandible	Curettage followed by iodoform dressing	No recurrence till date
3	26 years/M	OKC of left body of mandible	Curettage followed by iodoform dressing	Recurrence, further treated with resection
4	35 years/M	Cystic ameloblastoma	Resection	No recurrence till date
5	14 years/F	Dentigerous cyst of left maxilla	Marsupialisation	No recurrence till date
6	18 years/M	Dentigerous cyst of right maxilla	Marsupialisation	No recurrence till date
7	5 years/M	Dentigerous cyst of right maxilla	Marsupialisation	No recurrence till date
8	16 years/F	Radicular cyst of left mandible	Marsupialisation	No recurrence till date
9	14 years/M	OKC of left maxilla	Curettage followed by iodoform dressing	No recurrence till date
10	43 years/M	OKC of left mandible	Curettage followed by iodoform dressing	No recurrence till date
11	45 years/M	OKC of left mandible	Curettage followed by iodoform dressing	No recurrence till date
12	15 years/M	Dentigerous cyst of right mandible	Enucleation	No recurrence till date
13	15 years/M	Epidermal cyst of right mandible	Enucleation	No recurrence till date
14	17 years/F	Dentigerous cyst of left mandible	Marsupialisation	No recurrence till date
15	15 years/M	Dentigerous cyst of right mandible	Marsupialisation	No recurrence till date
16	15 years/F	OKC of right mandible	Curettage followed by iodoform dressing	No recurrence till date
17	18 years/F	Dentigerous cyst of right maxilla	Marsupialisation	No recurrence till date
18	35 years/F	Dentigerous cyst of right maxilla	Marsupialisation	No recurrence till date
19	21 years/F	Residual cyst of left mandible	Marsupialisation	No recurrence till date
20	22 years/M	Dentigerous cyst of posterior right mandible	Marsupialisation	No recurrence till date
21	26 years/M	OKC of left ramus of mandible	Curettage followed by iodoform dressing	No recurrence till date
22	35 years/M	OKC of left mandible	Curettage followed by iodoform dressing	No recurrence till date
23	26 years/M	OKC of right maxilla	Curettage followed by iodoform dressing	No recurrence till date
24	36 years/M	Radicular cyst of right mandible	Marsupialisation	No recurrence till date
25	38 years/F	OKC of anterior mandible	Curettage followed by iodoform dressing	No recurrence till date
26	42 years/M	OKC of right ramus of mandible	Curettage followed by iodoform dressing	No recurrence till date
27	60/M	OKC right body ramus of the mandible	Curettage followed by iodoform dressing	No recurrence
28	25/M	OKC left body and ramus with impacted molar	Curettage followed by iodoform dressing	No recurrence
29	40/M	OKC left body of mandible	Curettage followed by iodoform dressing	No recurrence
30	39 years M	OKC left ramus	Curettage followed by iodoform dressing	No recurrence
31	25 years M	OKC left ramus of mandible	Curettage followed by iodoform dressing	No recurrence
32	45 years/M	OKC right ramus of mandible	Curettage with iodoform dressing	No recurrence
33	18 years/M	Dentigerous cyst	Marsupialization	No recurrence complete healing of the lesion
34	18 years/F	Dentigerous cyst maxilla right	Marsupialization	No recurrence complete healing of the lesion
35	36 years/F	Dentigerous cyst anterior maxilla	Marsupialization	No recurrence complete healing of the lesion

OKC – Odontogenic keratocyst

treatment protocol for cystic lesions consists of carrying out the initial biopsy and decompression of the lesion on the same day if possible.

Under local anesthesia (2% lignocaine with epinephrine 1:200,000), curettage of lesion was done and opening of an appropriate sized window (average 1.5 cm in diameter) into the cystic cavity was made for further iodoform dressing.

The post-operative care included the use of analgesic and antibiotic via oral route for pain and infection control, and IV route if needed. In addition, daily irrigation of the cystic cavity with saline solution and povidon-iodine was carried out to prevent secondary infection of the cystic cavity. The

irrigation procedure was made with a 20-ml syringe with no needle active point to prevent tissue injury followed by placement of iodoform gauze into bony cavity. Iodoform dressing was carried out 3 times in a week, which was started from the 1<sup>st</sup> post-operative day of the surgery. Careful monitoring was based on monthly panoramic radiographs and clinic visits to determine lesion size regression as an effect of decompression and bone formation.

## CASE STUDY

### Case 1

A 35-year-old male reported to Department of Oral and Maxillofacial Surgery with the complaint of swelling on

left lower jaw for 3 years, there was no facial asymmetry, Intra orally mild swelling was noticed on left body region. The overlying mucosa was appeared normal in color and texture. There was no associated lymphadenopathy.

The patient was evaluated radiographically by panoramic radiograph, The image revealed uni locularcystic lesion extending from left 2<sup>nd</sup> molar to right lateral incisor. Roots of premolars, canine and incisor of the same side were resorbed [Figure 1].

Fine needle aspiration yielded yellowish material and tissue was obtained from the lesion was submitted for the histopathological examination shows cyst lined by wavy corrugated parakeratotic squamous epithelium showing regimentation of the basal layer. Keratinous debris is present within the cystic cavity. The diagnosis was OKC.

Due to the large size of the lesion we decided to treat it with enucleation followed by iodoform dressing. The dressing was changed during recall visits biweekly for 6months, after that reviewed after every 3<sup>rd</sup> month. Dressing was done by the qualified dental surgeon at the patient's home town. The patient was reviewed radiographically every 3months during follow-up periods, at the end of 26 months there was complete obliteration of the cavity, there was no recurrence till 5 years follow-up period [Figure 2].

### Case 2

A 60-year-old male patient reported to the Department of Oral and Maxillofacial Surgery with the complaint of swelling on the right lower jaw for 6 months. The patient's medical history was not significant. Clinical examination revealed diffuse swelling on right side of the face extending from lower border of the mandible up to pre-tragus region. Overlying skin was normal there was no ulceration or pus discharge, no tenderness. Intra oral examination revealed swelling on the right buccal vestibule extending from retro molar region to coronoid process. Overlying mucosa was intact with normal color the buccal cortex was expanded, fine needle aspiration yielded thick yellowish cheesy material, biopsy was taken from the lesion and was consistent with OKC [Figure 3].

The cystic cavity was curetted and resulting cavity was packed with iodoform gauze, which was changed biweekly initially at our center, afterwards patients home town. The patient was recalled every month for follow-up and a radiograph was taken at the 3<sup>rd</sup> month. The radiograph revealed newbone formation.

### Case 3

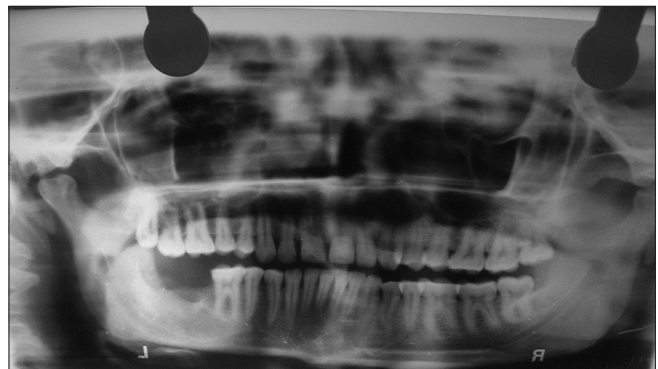
A 25-year-old male reported to the Department of oral and Maxillofacial Surgery with the complaint of pain and swelling in relation to left lower jaw for 3 months. The radiographic examination revealed a lesion involving left



**Figure 1:** Orthopantomogram showing radiolucent lesion with impacted inverted 3<sup>rd</sup> molar extending from left first molar to left ramus of the mandible



**Figure 2:** Three month follow-up orthopantomogram showing evidence of bone formation



**Figure 3:** Six month follow-up orthopantomogram showing complete resolution of the cystic lesion cavity filled with bone formation

angle of the mandible with inverted impacted third molar, which gives an idea about dentigerous cyst but fine needle aspiration cytology revealed thick yellow liquid. Extraction of the impacted tooth was done and cavity was marsupialized and tissue was sent for the biopsy, which showed pieces of the wall of the cystic mass the wall of the cyst consists of fibrous connective tissue and a number of bony trabeculae. The inner surface is lined by keratinizing squamous epithelium. The cyst wall presents inflammatory cell infiltrate. No evidence of malignant changes were found and the final impression was OKC.

The dressing was changed bi-weekly and radiographic

evaluation was done after the interval of 3 months. At the end of one-and-half-year, cavity was completely obliterated there was no sign of recurrence up to 3 years.

## RESULTS

In all cases, the keratocyst completely resolved both clinically and radiographically. The time taken for the cyst to resolve ranged between 10 months and 36 months.

There was recurrence in one case, which manifested as frequent infection and pus discharge. On the basis of these findings, we decided for resection followed by reconstruction with recon plate. Post-operative healing was uneventful in this case.

## DISCUSSION

From this study, it appears that OKCs may resolve completely after curettage followed by iodoform dressing. In addition, the time for resolution of the cyst clinically and radiographically is relatively short, with the longest duration being 36 months. It appears that keratocyst may even respond more rapidly and more predictably to curettage followed by iodoform dressing.

In 1963, Pindborg and Hansen suggested the histological criteria for describing the essential features of OKC and investigators started to discuss the differences between the common parakeratinized type and the rarer orthokeratinized type.<sup>[13,14]</sup>

In 2005, the World Health Organization Working Group considered the OKC parakeratinizing variant to be a cystic neoplasm and recommended the more descriptive term “keratocystic odontogenic tumor” (KCOT). Now, Cystic jaw lesions that are lined by ortho keratinizing epithelium do not form part of the spectrum of KCOT.<sup>[15]</sup>

It was suggested that OKC originates from dental lamina remnants due to its growth capacity and development characteristics related to the mutation of a suppressor tumor gene, it is considered as benign cystic neoplasm.<sup>[14,16,17]</sup>

According to previous literature, incidence rate of OKC is about 12-14% of all odontogeniccysts with two peaks around the ages of 30 and 60. It seems to be more frequent in males (M/F2:1). Usually the most common representation of OKC is a localized asymptomatic swelling; spontaneous drainage of the cyst into the oral cavity and teeth mobility are also seen. Difficulty in breathing, paresthesia, and root resorption are rare symptoms. Some reports underline that OKCs can undergo malignant transformation.<sup>[18,19]</sup>

Most common radiographic presentation of OKC is a unilocular radiolucency with well-developed sclerotic borders. It may also present as a multilocular radiolucent lesion.<sup>[12]</sup>

OKCs have a tendency to occur in any part of the mandible and maxilla, but the majority almost 70%, arise in the body of the mandible.<sup>[11,12]</sup> Body of mandible is an area common to many benign but aggressive odontogenic tumors such as ameloblastoma and also a common location for dentigerous cysts and other odontogenic cysts.<sup>[20]</sup>

The OKC showed greater incidence in body of the mandible followed by posterior maxilla, anterior mandible and ramus of the mandible.

Clinical diagnosis of OKC is difficult due to relative lack of specific clinical and radiographic characteristics.<sup>[21]</sup> Most common differential diagnosis of OKC includes dentigerous cyst due to similar radiographic image and ameloblastoma due to same mean age at diagnosis, mandible predilection, propensity to recur and radiographic appearance.<sup>[22]</sup> Ideally a histopathological examination and accurate clinical, radiographic, trans-surgical observation are essential to determine the most effective treatment in order to avoid recurrence.<sup>[23,24]</sup>

The treatment of the OKC remains controversial. Conservatively it is treated by simple enucleation, with or without curettage, or marsupialization. Aggressive treatment of OKC includes curettage with peripheral osteotomy, curettage plus liquid nitrogen cryotherapy curettage plus application of Carnoy's solution localized en bloc resection and occasionally, mandibular segmental resection. Simple enucleation was associated to a higher recurrence rate, while resection and enucleation with bone curettage presented lower rates.<sup>[25-28]</sup>

OKCs are well known for recurrence. Recurrence rate was found to vary from 0% to 62%, depending on the kind of treatment management and follow-up period. According to some literature, cause of high recurrence include, incomplete removal of the original lesion, remnants of the dental lamina within the jaws, and the presence of 'daughter' or 'satellite' cysts within the epithelial cyst wall. By using carnoy's solution or cryotherapy can eliminate possible satellite cells.<sup>[8,9,21,23,29]</sup>

Treatment by curettage followed by iodoform dressing does require a cooperative patient who will irrigate the cyst on a regular basis and will follow-up regularly. For this reason, only a selected group of patients may be suitable for this treatment. A longer follow-up period is required for these cases to make a determination about associated recurrence with this treatment. Nevertheless, it may be true that in a select group of patients, previous



advice for more aggressive treatment of OKCs may need to be modified, and in fact they may respond to one of the most non-invasive techniques of all, curettage followed by iodoform dressing.

## CONCLUSION

Enucleation followed by open packing can be used as a choice of treatment with low recurrence rate for the large keratocystic lesions. The patient should have periodic radiographic and clinical examination. In the cases of the recurrence, lesion should be treated by resection and reconstruction.

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