



Recurrence Rate Associated with Various Treatment Modalities in Odontogenic Keratocyst- A Retrospective Study

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ABSTRACT

To evaluate effectiveness of different treatment modalities in management of odontogenic keratocyst by comparing the recurrence rate associated with each treatment modality. A retrospective review was performed on all cases who were diagnosed histopathologically with odontogenic keratocysts at our institution from 2012-2021. Twenty-five patients were included in the final study. The treatment provided for each OKC was recorded and recurrence if any was noted from the follow up data available. The rate of recurrence associated with each treatment modality was then evaluated. Recurrence was found in 6 out of 25 patients. Patients who underwent Enucleation with curettage had the highest recurrence rate at 66.7 % whereas no recurrences were noted in patients where Enucleation and Peripheral ostectomy combined with Carnoy's solution or use of Topical 5-Flurouracil was done. Also, no recurrences were noted in cases wherein radical resection was performed. Enucleation with curettage is associated with highest recurrence rate and should no longer be an accepted treatment modality. Radical resection is associated with minimal recurrence rate but is associated with high morbidity and hence it is usually limited to only those cases with multiple recurrences. Enucleation along with peripheral ostectomy and the use of Modified Carnoy's solution should be the preferred mode of treatment in all cases where diagnosis of Odontogenic Keratocyst is considered.

Keywords: Odontogenic keratocyst, Peripheral ostectomy, Carnoy's solution

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INTRODUCTION

The odontogenic Keratocyst is a distinctive but a relatively common intraosseous, benign developmental cyst of odontogenic accounting for approximately 12-14% of all odontogenic cysts of jaws with most of the lesions occurring in the mandibular body and ramus region [1, 2]. The aggressive behaviour of this cystic lesion is due to its expansion into the surrounding tissues because of the osmotic stress exerted on the lesion's periphery and to the inherent forces from inside the epithelium as a result of the enzymatic activity in the fibrous wall [3]. The high recurrence rate of OKC's is generally postulated to be a result of either incomplete removal of cyst walls and epithelial islands of dental lamina associated with OKC, presence of thin wall or its adherence with soft tissues and presence of daughter cysts within bone (4). Majority of recurrences occur within 5 years of treatment [5]. Treatment of Odontogenic Keratocysts can be classified as conservative and aggressive/radical methods. Conservative treatment generally includes simple enucleation, with or without curettage, using spoon currettes or marsupialization. Adjuvant methods such as peripheral ostectomy, cryotherapy (liquid nitrogen) Carnoy's solution, 5-Flurouracil and resection with or without jaw continuity are considered as aggressive forms of treatment [6]. In this clinical study, the recurrence rates of Odontogenic Keratocysts associated with different surgical modalities has been evaluated so as to develop a definitive protocol for its management.

MATERIAL AND METHODS

A retrospective review was performed on all cases of potential odontogenic keratocysts who came at our institution from 2012-2021. Criteria for inclusion comprised of 1) Patient from age group 18-60 years 2) Patients who underwent surgical management of OKC's. Exclusion criteria included: 1) Patients treated elsewhere with no surgical treatment provided at our institution; 2) Patients with the diagnosis of orthokeratinizing odontogenic cyst 3) Cystic lesions associated with Gorlin-Goltz syndrome; and 4) Patients with less than 6 months of follow-up. Twenty-five patients met the criteria for inclusion. The information that was available about these patients was recorded. Gender and age at diagnosis were

among the demographics recorded. There were two types of initial diagnosis methods recorded. The first group contained OKCs discovered on a routine examination or. OKCs in the second category were those with presenting symptoms such pain, edema, or drainage. The OKCs were classified by their placement in the maxilla or mandible, and then further divided according to specific location. Each OKC's treatment was also documented, as determined by a perusal of the surgical report. Enucleation with or without the use of curettes was characterised as simple enucleation. Peripheral ostectomy was defined as the reduction of peripheral bone after enucleation of the lesion with a powered hand-piece. As an adjuvant to enucleation, Carnoy's solution or 5-FU was utilised. If the operation report confirmed an en-bloc excision of the cyst with a margin of nearby normal tissue, the patient was assigned to the resection group. The length of follow-up was recorded as the total number of months between the time of treatment and the most recent recorded follow-up. Patients were classified as lost to follow-up if they were currently not scheduled for a follow-up appointment at this institution and a follow-up appointment was past due. A recurrence was noted if an OKC, originally treated at our institution, reappeared in the same location. Time to recurrence was recorded from the date of original treatment to the date of the biopsy verifying recurrence.

RESULTS

This study included twenty-five patients ranging in age from 19 to 74 years old. There were 16 males (64%) and 9 females (26%) in the study group (ratio 1.8:1). The majority of the patients (56%) had symptoms (swelling, pain, drainage, and infection), whereas the other 11 (44%) were found accidentally during a routine check. **Table 1** shows the prevalence of these 25 OKCs based on their location.

Table 1 Prevalence Based Location

LOCATION	Number of patients	Percentage
Mandible	19	76
Maxilla	6	24
SPECIFIC LOCATION		
Mandibular Molar	4	16
Mandibular Angle Ramus	11	44
Mandibular Condyle and Coronoid	2	8
Mandibular Incisor and Canine region	2	8
Maxillary Molar and Tuberosity	5	20
Maxillary Premolar Region	1	4

15 out of 25 lesions (60%) were multilocular whereas 10 (40%) were unilocular on radiographic examination. The patients were categorized into six groups on the basis of treatment modality they received as mentioned in **Fig 1**.

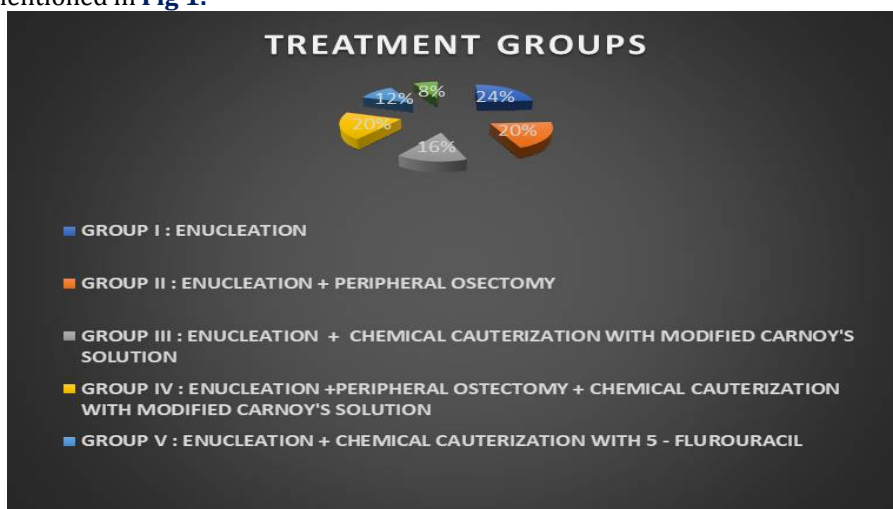


Fig.2 Treatment Groups

Follow-up of the patients ranged from 7 months to 82 months. Only 5 patients were still in active follow up. Fig 2 shows the length of time patients were in active recall before becoming lost to follow-up.

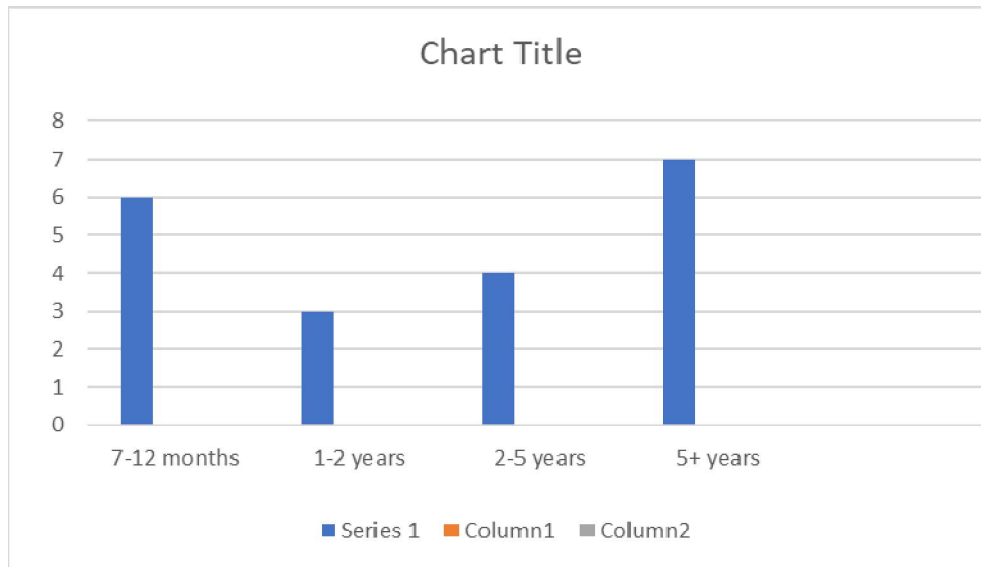


Fig 2: length of time patients were in active recall before becoming lost to follow-up

Recurrence was found in 6 out of 25 patients (24). Four cysts (33.3%) recurred in 5 years or less and two (66.7%) recurred after more than 5 years. Recurrence rate associated with specific site and each treatment has been mentioned in Table 2.

Table 2 Recurrence Rate

TABLE 2 : RECURRENCE RATE		
RECURRENCE BY SITE	Recurrence / No pf patients	% of Recurrence / No. of patients
Posterior Maxilla	1/6	16.7
Posterior Mandible	4/17	23.5
Anterior Mandible	½	50%
RECURRENCE BY TREATMENT		
GROUP I : Enucleation	4/6	66.7%
GROUP II : Enucleation + Peripheral ostectomy	1/5	20%
GROUP III : Enucleation + Modified Carnoy's solution	¼	25%
GROUP IV : Enucleation + Peripheral ostectomy + Modified Carnoy's solution	0/5	0%
GROUP V : Enucleation + 5 Flurouracil	0/3	0%
GROUP VI : Radical Resection	0/2	0%

Patients who underwent Enucleation with curettage had the highest recurrence rate at 66.7 % (4/6) whereas no recurrences were found in patients where Enucleation and Peripheral ostectomy combined with Carnoy's solution or use of Topical 5-Flurouracil was done. Also no recurrences were noted in cases wherein Radical Resection was performed

DISCUSSION

Management of Odontogenic keracyst remains a highly debatable topic owing to it's high rate of recurrence. Even though numerous systemic studies have been carried out to establish the best treatment option to reduce it's recurrence, no definitive treatment protocol for it's management has been established as yet. This was a retrospective study carried out to compare and evaluate the various available treatment modalities and the rate of recurrence associated with it.

OKCs predominantly affect the mandible especially posterior mandible including body, angle and ramus region[7,8]. This is similar to results of our study in which mandible was involved in 78 % cases

Brannon has, suggested 3 mechanisms for recurrence of OKC.(i) Incomplete removal of cyst walls or epithelial islands of dental lamina associated with OKC (ii) Cortical perforation and adherence with soft tissues and presence of daughter cysts within bone (iii) Cystic change in dental lamina initially not associated with cyst [9].

Recurrence rate of 24% was found in our study which conforms recurrence of 22.5% as mentioned by Morgan [10]and Bande CR [11]. Since patients with less than 6 months of follow-up were excluded from this study, the rate of recurrence was slightly elevated.

The formulation used of Modified Carnoy's solution consisted of 95% ethanol (9 cc), glacial acetic acid (3 cc), and ferric chloride (1 g) Chlorofrom was not used due to it's reported caustic effects [10]. It has been reported to be as effective as Conventional Carnoy's solution in preventing recurrence of Odontogenic Keratocyst [1] Leddehroff [13] introduced use of Topical 5-Flurouracil based on the understanding of molecular genetics of OKC. In our study 3 patients underwent treatment with topical 5-Flurouracil following enucleation of the cystic lesion (Group V) , none of which reported recurrence. This was possibly due to short duration of follow up and a small sample size.

Of the six cases of recurrence, four cases were reported after more than five years of follow up whereas the remaining two cases were reported within less than 5 years of follow up suggesting that longer periods of follow up are required to evaluate any significant relationship between recurrence rates and their association with treatment modalities. Also, in our study higher recurrence rate was noted in posterior maxillary and mandibular region. Hence more aggressive form of treatment may be required in this region ensuring the safety of vital structures around it [14].

Thus, according to our study enucleation alone is associated with highest recurrence rate and should no longer be an accepted treatment modality whereas enucleation along with peripheral ostectomy and/or Carnoy's solution is associated with significantly lower recurrence rates. Even though Radical resection is associated with minimal recurrence rate, this radical treatment modality is associated with high morbidity and hence it is usually limited to only those cases with multiple recurrences. Enucleation along with peripheral ostectomy and the use of Modified Carnoy's solution should be the preferred mode of treatment in all cases where diagnosis of Odontogenic Keratocyst is considered. Also, the use of 5-Flurouracil has showed promising results. However, studies with larger sample size are required to make any inferences regarding it's effectiveness in reducing the rate of recurrence. It may be preferred over Modified Carnoy's solution in cases where lesion approximates the vital anatomic structures.

The drawback of this study is it's sample size and period of follow up. Hence further studies on a larger scale with longer periods of follow up are required to evaluate an association between treatment modalities and the rate of recurrence of odontogenic keratocysts.

CONCLUSION

Various surgical treatment modalities used for management of Odontogenic Keratocysts were compared to evaluate the most effective mode of treatment and recurrence rates associated with them. Following inferences can be made from our study:

- 1) Enucleation alone is associated with highest rate of recurrence and should no longer be a preferred treatment modality.
- 2) Enucleation along with peripheral ostectomy and modified Carnoy;s solution should be preferred in all cases to reduce the rate of recurrence unless limited by anatomic structures.
- 3) Use of 5-FU has shown promising results and further studies with larger samples sizes are required to make any inferences regarding it's effectiveness.
- 4) Radical resection should be carried out only in cases with multiple recurrences.

- 5) Longer periods of follow up for at least 5 years and larger sample sizes are required to make any inferences regarding the rate of recurrence and evaluate the effectiveness of treatment modalities associated with OKC.

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