

Radiographic evidence of new bone formation in Odontogenic keratocyst cases post operatively within 6 months: Case Series

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Abstract:

Odontogenic keratocyst (OKC) is a locally aggressive odontogenic cyst and it has a high recurrence rate, because of its diverse presentation and high recurrence rate, odontogenic keratocyst (OKC) deserves special attention in the field of oral and maxillofacial surgery. The presence of Bcl-2, cytokeratin 10, and interleukins in the basal and suprabasal layers inhibited surface epithelial apoptosis, resulting in a high rate of recurrence. various treatment options are considered in the management, in this study we discussed a total of three cases of odontogenic keratocyst diagnose by Histopathological examination (HPE) of the biopsy specimen. The contents of the cyst were aspirated during the biopsy to allow decompression, and then enucleation of cystic contents and cauterisation with Carnoy's solution was done as a secondary surgery. We got the best result had evidence of new bone formation within 6 months postoperatively with the records of Orthopantomogram(OPG) radiographs. we propose this procedure of decompression followed by enucleation and application of Carnoy's solution as a better option for the management of OKC.

Key words: Odontogenic keratocyst, Orthopantomogram, enucleation, Carnoy's solution.

I. Introduction:

The Odontogenic Keratocyst (OKC) has a special role in Tumours of the Head and Neck region. The OKC stands out because of its aggressive nature. This is attributed due to the presence of Bcl-2(B-cell lymphoma 2), cytokeratin 10, and interleukins in the basal and suprabasal layers inhibited surface epithelial apoptosis. Another reason for high recurrence is the high mitotic index of the epithelial cyst lining. Emerson, et al. described It has the feature of locally invasiveness and extension to mediastinum, neck, the base of the skull, temporalis muscle and masseter muscle(1).

One of the most contentious procedures among oral and maxillofacial surgeons is the treatment of odontogenic keratocyst (OKC). Treatment options for OKC range from simple enucleation for lesions less than 1 cm in diameter to substantial resection for cysts extending into the skeletal basis.

The classification of odontogenic tumours given by Broca et al, in 1869 and later in 1946, Thoma and Goldman et al, classified odontogenic tumours into either ectodermal, mesodermal, or mixed depending on their origin (2). In 1971, the first World Health Organization (WHO) classification of the tumours, named it as a keratocystic odontogenic tumour. Again, in 2017, the WHO renamed to odontogenic keratocyst depending on the clinical, radiological and biological features. And a high rate of recurrence (3).

Decompression followed by enucleation of the cyst and the implicated overlying mucosa, in addition to the use of Carnoy's solution, is used to cope with the cyst's aggressive nature and got better results. There is clear evidence of bone formation in orthopantomogram (OPG) postoperatively after 6 months period.

II. Case Presentation

In this study total of 3 cases of odontogenic keratocyst are presented. each lesion had extensive involvement of mandible, they had anterior-posterior expansion but were treated conservatively. A biopsy was done to confirm the diagnosis histopathologically and decompress the lesion done. Following this, the cystic cavity was enucleated, and the lining epithelial fragments, as well as the overlying mucosa, were carefully removed. The areas were then cauterised using Carnoy's solution.

Case 1:

A 47-year-old male patient presented with a chief complaint of mild, continuous pain in the entire lower jaw and swelling from left angle to right angle of the mandible. Pain is increased in the past two weeks, no trismus was observed, food intake has been reduced due to chewing difficulty for one month. An orthopantomogram (OPG) was taken followed by a computerized tomography (CT) scan to confirmed the extensions of the lesion, cheese-like creamy material was obtained in aspiration, and aspirate was sent for HPE.

The result of histopathological examination confirms the diagnosis as Odontogenic keratocyst, following, cyst enucleation done under general anaesthesia, the cystic cavity was completely enucleated, the inferior alveolar nerve was secured, and the lesion cauterized with the application of freshly prepared Carnoy's solution for two minutes. Flap approximated and interrupted suturing done with 3' 0 silk, postoperative recovery was good.

The patient recalled for every two months and sequential OPGs were taken and OPGs revealed a good prognosis and new bone formation at the sites of operative areas (Figures 1 and 2).

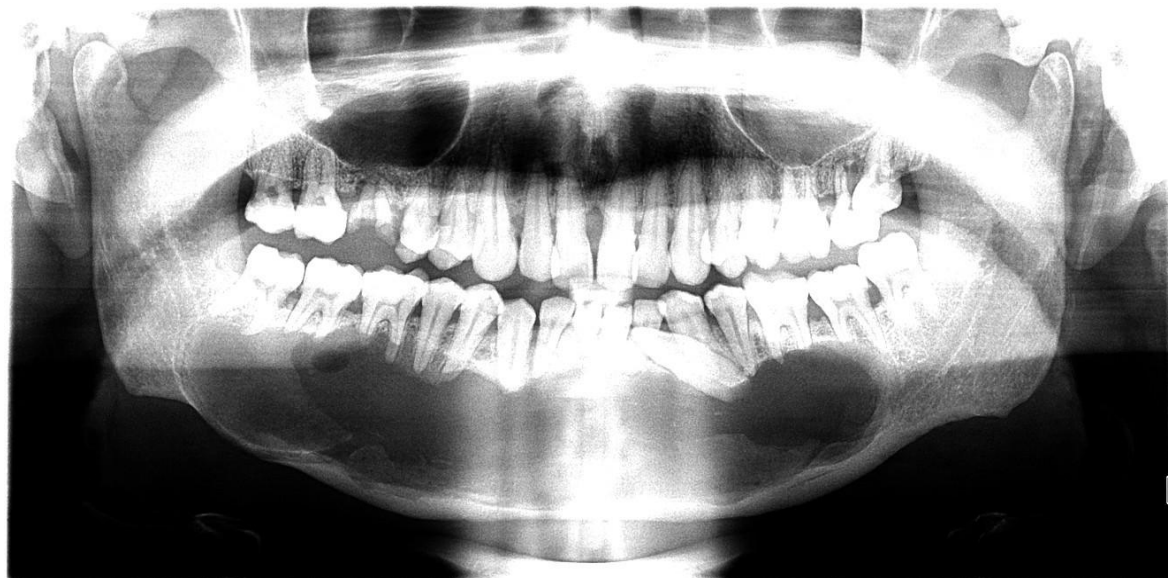


Figure 1: Preoperative OPG showing lesion extended from 37 to 48 region.



Figure 2: Postoperative OPG showing clear evidence of new bone formation within 6 months.

Case 2:

The second patient was a 12-year-old female child who came with a chief complaint of mild pain and swelling that seemed to increase in size recently, complains of teeth pain generalised, teeth were subsiding with medication previously, present teeth pain not subsiding with medication, and occasionally pus draining from lower back teeth.

An OPG revealed a huge cystic lesion extending from the left angle of the mandible to the right angle, impacted 33,34,35,43,35, and supernumerary tooth. A cone-beam computed tomography scan was done to correctly assess the location of the impacted teeth and to assess the relation of the mental foramen, cyst and the impacted teeth.

Aspiration was done at the apical region of 34 and 44 where the cortical bone was soft in consistency and fluctuant. Following, under general anaesthesia, the cystic lesion was enucleated and removed 33,34,35,43,35,62,63,64,65 and one supernumerary tooth, cauterisation done with the application of freshly prepared Carnoy's solution for two minutes. Flap approximated and interrupted suturing done with 3' 0 silk, haemostasis achieved and post-operative recovery was good. The patient recalled for every month and OPGs were taken, OPGs showed evidence of new bone formation at the sites of the lesion (Figures 3 and 4).

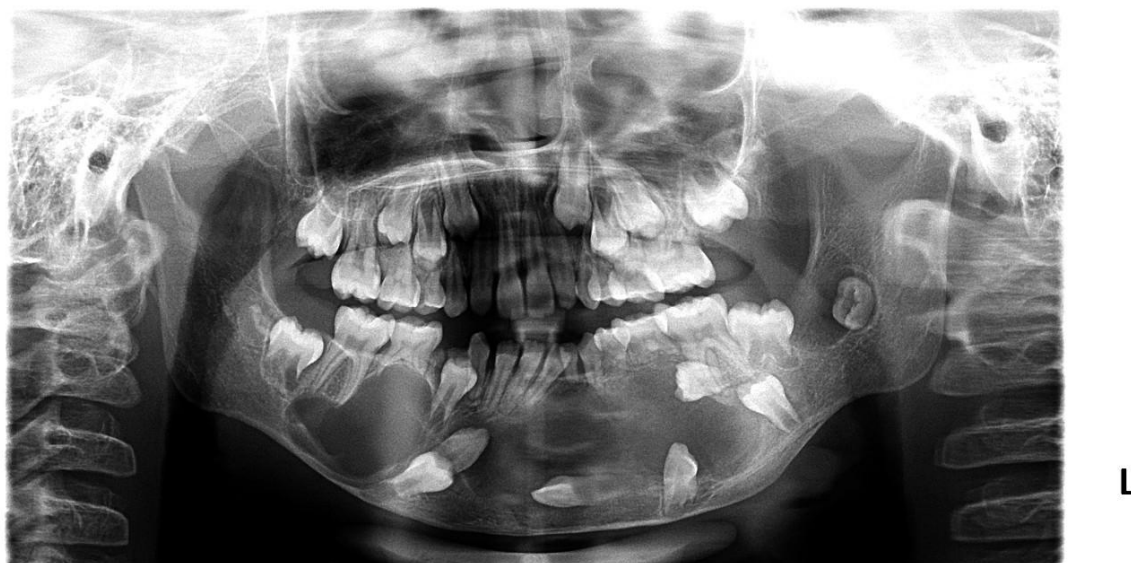


Figure 3: Preoperative OPG showing lesion extended from 36 to 46 region.

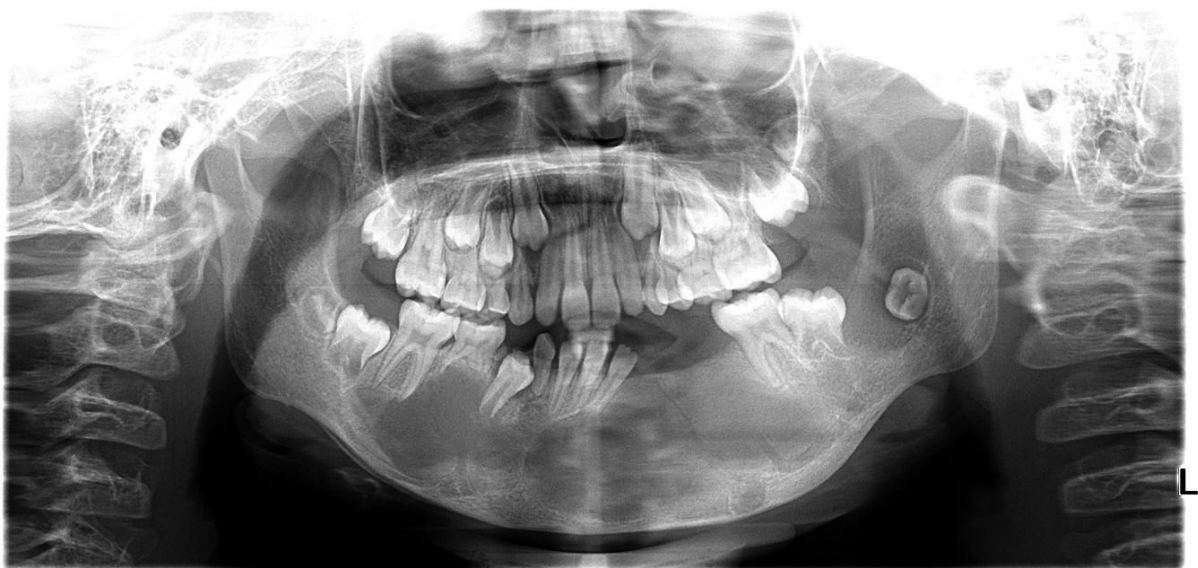


Figure 4: Postoperative OPG showing clear evidence of new bone formation within 6 months at the sites of the lesion.

Case 3:

The third patient was a 27-year-old female patient with a complaint of halitosis and fluid leaking intraorally from the right angle of the mandible. She had an impacted 48 surgically removed by a local dentist. OPG revealed a well-differentiated radiolucent lesion extending from the condylar neck and base of the ramus to the lower border of the mandible. Biopsy aspirate confirmed odontogenic keratocyst histopathologically and planned for enucleation of the cyst with chemical cauterization under general anaesthesia. Debrided cystic contents meticulously, cauterisation is done with the application of freshly prepared Carnoy's solution for two minutes. Flap approximated and interrupted suturing done with 3' 0 silk, pressure bandage given and haemostasis achieved.

The patient recalled for every month and serial OPGs taken, and there is clear evidence of new bone formation observed in the post-operative OPGs (Figures 5 and 6).



Figure 5: Preoperative OPG showing lesion extended from condylar neck and base of the ramus to the lower border of the mandible.



Figure 6: Postoperative OPG showing the new bone formation within 9 months at the sites of the lesion.

III. Discussion:

In this study, all three cases involved the mandible. The lesions are large and extended from a right side angle of the mandible to the left side of the angle except in one case, in that case, the left side entire ramus is involved. All cases showed intraoral swelling and extraoral swelling, sinus openings, complaint of teeth pain and fluid or pus drainage intraorally. The OPGs revealed radiolucent lesions with well-defined scalloped margins in all cases, to know the relations of the involved teeth roots with the cyst and mandibular nerve position CTs with 3D reconstruction were taken. Buccal and lingual cortical plates perforations were noted in two cases, but an intact lower border of the mandible was observed with all three cases.

The aspirate of all lesions contained a creamy cheese-like material. The intraoral sinus presents a most mesial region of the lesions, and the angle of the mandible is intact. The biopsy was performed near the sinus opening to allow the drainage of the cystic contents. Histopathological examination of specimens confirmed the lesions as odontogenic keratocyst. The biopsy procedure was done under local anaesthesia in the outpatient area.

Case discussion is done and cases posted to the operation theatre, planned second procedure under general anaesthesia, a full-thickness mucoperiosteal flap was elevated in concerned areas of the lesion. Window created near to the sinus opening points, meticulous enucleation of the cystic lining and cystic contents was done, the inferior alveolar nerve was secured while doing the procedure, following freshly prepared Carnoy's solution was applied for two minutes (4).

Precautionary measures were taken to protect the lower border of the mandible from pathological fractures. The treatment options would be different from case to case. Large lesions are dealt aggressively with enucleation and resection. The recurrence and aggressive nature of OKC due to the presence of matrix metalloproteins, interleukin-1 alpha and parathyroid hormone-related protein, and presence of Bcl-2 and cytokeratin 10 and it also has a high mitotic index of epithelial cyst lining(5).

Resection of the mandible associated with psychological trauma, increase in morbidity and compromise in the quality of life. To minimise these effects enucleation is one of the best treatment options (6).

Studies by Schmidt BL et al, suggested Enucleation followed by cryotherapy, that is liquid nitrogen is applied in the cystic cavity for 1 minute, this procedure will freeze remaining epithelial cells and epithelial cell nests which causes the recurrence. this procedure has some limitations with the thin mandibular bone cases where there is the tendency of pathological fracture(7).

Other options like Excision of the overlying mucosa, Enucleation followed by peripheral ostectomy, Marsupialization alone and marsupialization and delayed enucleation are also indicated (8,9,10).

The studies of de Castro MS et al, has proven that enucleation followed by application of Carnoy's solution has no recurrence rate(11,12), Stoeltinga et al, argued that removing the roof of the cystic cavity, the overlying alveolar mucosa, prevents the presence of daughter cysts between the cyst lining and the alveolar mucosa (13).

Dammer et al. in their study concluded small cysts that are less than 1 cm have a good prognosis with enucleation alone, but larger cysts required some aggressive treatment protocols(14).

IV. Conclusions:

Odontogenic keratocyst (OKC) has its notorious name because of its recurrence and destructive nature, so many treatment options are practised from enucleation alone to radical resection. In our study with the south Indian population, complete enucleation and cauterization with freshly prepared Carnoy's solution are proved to be a promising and better treatment protocol for OKC management. Radiographic evidence with consecutive Orthopantomograms showed new bone formation and excellent healing with the above procedure.

Abbreviations:

Bcl-2 - B-cell lymphoma 2, CT - Computerized tomography, HPE- Histopathological examination, OKC - Odontogenic keratocyst, OPG-Orthopantomogram, World Health Organization (WHO)

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