

Marsupialization as a treatment option of a large Odontogenic keratocyst: A case report with the review of literature

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Abstract:

The Odontogenic keratocyst (OKC) is classified as a developmental epithelial cyst and comprises approximately 11% of all cysts of the jaws. The most characteristic clinical feature of OKC is the high recurrence rate. It is because of this characteristic that a variety of treatment modalities has been suggested for this cyst. Many of the surgeons prefer a more aggressive treatment, like resection. We have tried a more conservative approach in managing a patient with a large OKC of the mandible and have had an excellent result. We would like to suggest that marsupialization can be a definitive treatment option for large OKC's.

Key Words: Odontogenic keratocyst (OKC), marsupialization.

Introduction:

The word Odontogenic keratocyst (OKC) was coined by Phillippsen in 1956 (Cakur et al, 2008). The OKC is classified as a developmental epithelial cyst and comprises approximately 11% of all cysts of jaws. These cysts are most often seen in the mandibular ramus and angle region (69% - 83%). The radiographic appearance is that of an unilocular or a multilocular lesion with scalloped margins. The most characteristic clinical feature of OKC is the high frequency of recurrence (0% - 60%; Nakamura et al, 2002).

Histologically, the parakeratinized OKC's have higher recurrence rate as compared to the orthokeratinized OKC's (Shear, 2003). It occurs singly or in association with nevoid basal cell carcinoma syndrome (Gorlin Goltz Syndrome). These are more commonly seen in the 2nd and 3rd decades of life and males are more frequently affected than females in the ratio of 2:1 (Shear, 2003).

Common clinical findings are pain, swelling, discharge and occasionally paresthesia of the lower lip or displaced teeth. Many cases are asymptomatic and are discovered accidentally on radiographs. Fifty percent of the cysts when discovered, are on an average 40 mm in size and located in the ramus of the mandible.

Maxillary OKC's tend to be diagnosed early as they are more likely to get infected. Bony expansion may be seen in 60% of the cases (Shear, 2003). Rate

of growth of OKC's is 2 – 14 mm/year (average 7 mm/year). They can penetrate cortical bone and involve surrounding soft tissues. Many authors have reported an aggressive behaviour of OKC's especially when in association with basal cell carcinoma syndrome (Shear, 2003). In 2005, the W.H.O working group considered the parakeratinized variant to be a cystic neoplasm and recommended the descriptive term Keratocystic Odontogenic Tumour (KCOT; Phillippsen, 2005). The orthokeratinized version is not considered as a tumour. Histopathological examination of KCOT is important to decide the appropriate treatment and a long follow up is a must for the KCOT. (Phillippsen, 2005; Gonzalez-Alva et al, 2008).

It has been suggested that recurrences might develop in three different ways: Incomplete removal of the original cyst lining; retention of micro cysts or epithelial islands in the wall of the original cyst; development of new keratocysts from epithelial offshoots of the basal layer of the oral epithelium (Bell & Deirks, 2003; Pitak-Arnop et al, 2010).

Factors responsible for incomplete removal of OKC's are thin and fragile cyst lining, scalloped margins, multilocular variety, perforation of lingual plate of mandible and its location causing difficult access adds to the difficulty in removing the cyst in toto (Shear, 2003).

Immunohistochemistry:

Protein content is less than 4 gm/dl in cystic fluid unless it becomes infected. Protien-53 (P-53) is positive in OKC's in nevoid basal cell carcinoma syndrome. Protien-53 is generally seen in actively proliferating cells such as in neoplasms (Shear, 2003).

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Many researchers, therefore, regard OKC'S as a benign cystic tumour especially when they are part of nevroid basal cell carcinoma syndrome.

Pyridine contacting Triaza (PcTH) gene inactivation occurs in syndromic keratocysts. Overexpression of B-cell lymphoma-2 (Bcl – 2) and cyclin D leads to loss of control of proliferative activity in the lining of both the sporadic and syndromic cysts. B-cell lymphoma-2 protein is found in the cyst lining and protects cells from early death through apoptosis. It is also present in other neoplasms. This protein was found absent from OKC linings after marsupialization (Pogrel & Jordan, 2004). All these findings support the hypothesis that syndromic keratocysts should be regarded as benign cystic neoplasms (Shear, 2003; Shear, 2007). Odontogenic Keratocysts have a high mitotic rate, increased proliferating cell nuclear antigen (PCNA), overexpression of the P-53 protein and cell surface glycoprotein 38 (gp-38). Majority of OKCs have chromosomal abnormalities and harbour an allele loss at the same locus as squamous cell carcinoma. It is not known how the biologic behaviour of the OKC changes after marsupialization but some believe that it is related to inflammation of the cyst lining. The OKC behaves less aggressively when left open to the oral cavity (Tolstunov & Treasure, 2008).

Surgical Treatment options according to Ghali (2003):

1. Marsupialization: Suturing of the cyst lining to the oral mucosa. Decompression relieves the pressure within the cyst and changes the internal environment. Marsupialization should be allowed to proceed until important structures can be preserved (teeth, nerves, sinus and nasal cavity) and bone grafting is not required.
2. Enucleation and Curettage: It denotes scrapping of lesion with inexact thickness of surrounding bone by hand instruments. Recurrence rate is highest with this method (9 – 62%). Adjuncts such as Carnoy's solution or cryotherapy may be used along with it.
3. Enucleation with peripheral osteo-ectomy: Removal of the lesion along with an inexact thickness of surrounding bone by powered rotary instruments. Methylene blue dye can be used to mark the bone.

4. Osseous Resection with or without continuity defect with 1 cm linear margins. This treatment modality has 0% recurrence rate but is associated with the highest morbidity.

Case Report:

A 27 year old male was referred to the department of oral and maxillofacial surgery, with the chief complaint of pain and swelling in the lower anterior part of the jaw for last few days. On extra oral examination, there was a diffuse tender swelling in the mandibular anterior region suggestive of an inflammatory condition. A submental lymph node was enlarged and tender. There was no history of trauma.

Intra oral examination revealed the presence of all the teeth. Oral hygiene was good. Left mandibular canine was mildly tender to percussion. Vitality test was negative for 41, 42, 43, 44, 45, with no associated mobility or displacement. There were no signs of buccal cortical plate expansion. Paresthesia was noted in the left lower lip region.

The patient's general condition was good. There was no relevant past medical history. All hematological tests were within normal limits.

An Orthopantomogram (OPG) revealed a large unilocular, radiolucent lesion with scalloped margins involving the whole body of mandible from 46 to 38 region (Fig. I).

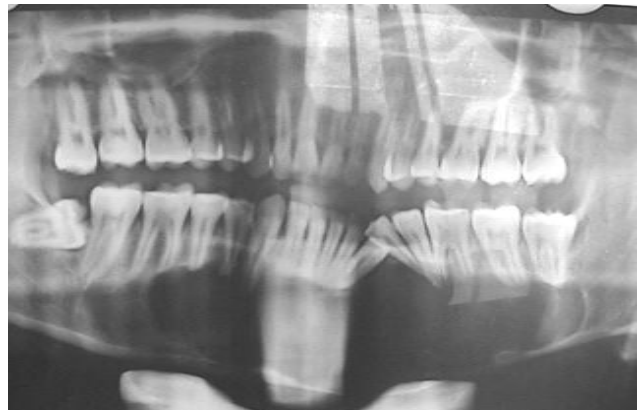


Fig. I: Orthopantomogram showing lesion site Pre-Operatively.

Odontogenic keratocyst, ameloblastoma and central giant cell granuloma were considered in the differential diagnosis. Aspiration of cyst revealed white cheesy material. An incisional biopsy was undertaken under local anesthesia from the 33 region and sent for histopathological examination. It was reported as an odontogenic keratocyst, the lining of which was parakeratinized (Fig. II). Teeth 41 to 45 were non vital and were endodontically treated.

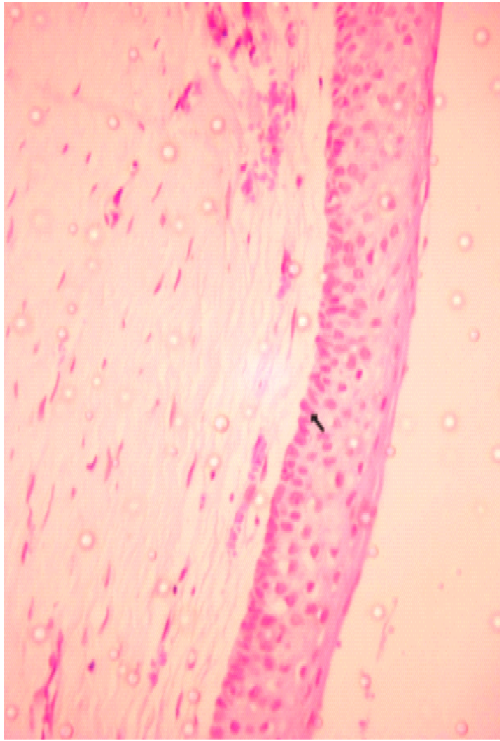


Fig. II: Histological section showing typical pallisading arrangement of basal cells of OKC lining epithelium (H&E Stain, 10X).

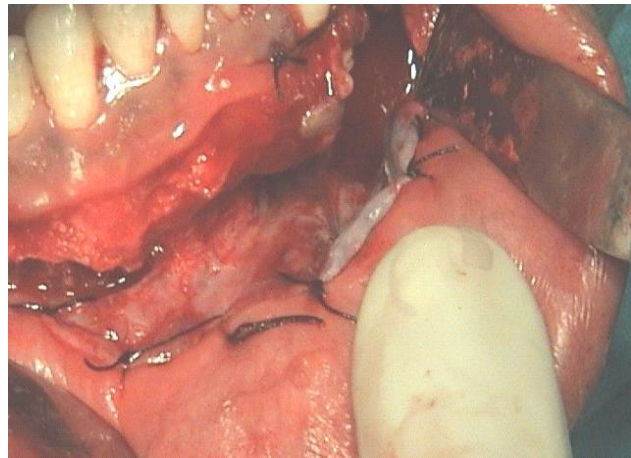


Fig.III: Marsupialization of the lesion.



Fig. IV: Showing Cystic contents.



Fig.V: Histological section showing normal mucosa after 8 months postoperatively (H & E Stain, 10X).



Fig.VI: Orthopantomogram showing bone regeneration after one year.

The patient was hospitalized and under general anesthesia, the lesion was marsupialized by creating a 1 cm wide and 6cm long buccal window extending from 35 to 46 region (Fig. III). The cystic contents were removed, the lining of the cyst was sutured to the surrounding oral mucosa (Fig. IV), the cavity was irrigated with Povidone-iodine and normal saline, then packed with iodoform gauze. The dressing was changed every alternate day for a week and then an obturator was fabricated and placed over the defect. The patient was trained to maintain oral hygiene by himself and was reviewed periodically. A fresh biopsy was taken from the shallow bed of the defect after 8 months, and it was reported as normal oral mucosa i.e. the cystic lining seemed to have changed into normal oral mucosa (Fig.V & Fig. VI). Orthopantomogram was taken at regular 6 monthly intervals and showed good bone regeneration. The patient was followed up for 5 years and showed no recurrence but only a slight buccal depression in the 43-33 region. There have been no fresh complaints (Fig. VII).

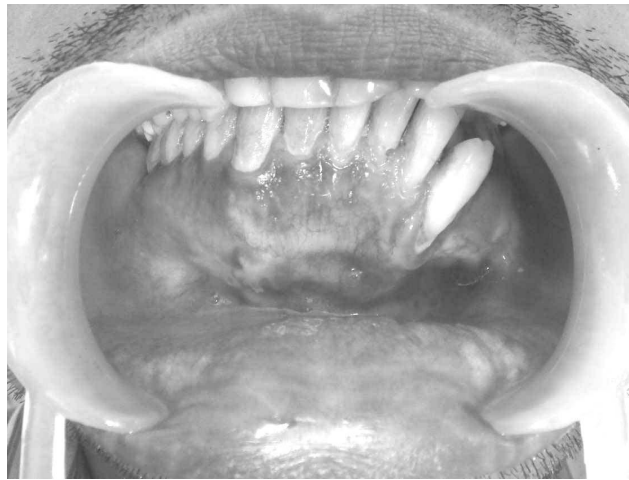


Fig.VII: Intraoral view post operatively after 5 years.

Discussion:

The main goal of all surgeons is to eradicate the lesion with whatever means that might be applicable to the particular lesion according to the site, size & location. There are pros & cons for all the treatment options.

A small unilocular OKC lesion anteriorly placed may be amenable to enucleation with peripheral osteo-ectomy with or without adjunctive treatment of the defect with Carnoy’s solutions or cryotherapy to ensure the complete removal of the cyst lining (Stoelinga, 2005). Large, multilocular lesions located in ramus and angle region may require radical resection with or without continuity defects and then reconstruction with bone grafts.

Decompression & marsupialization relieves the pressure within the cystic cavity and allows the lesion to decrease in size till new bone formation occurs (Giuliani et al, 2006). It has also been noted by other authors, that after decompression & marsupialization, the cyst lining undergoes histologic changes, resulting in eventual replacement of the cyst lining by oral epithelium (Pogrel & Jordan, 2004).

The presence of inflammation (by creating a window) is thought to change the biologic behaviour of the keratocyst to a less aggressive form. Interleukin-1 α is thought to play a crucial role in the expansion of OKC’s. After marsupialization & decompression, interleukin-1 α & cytokeratin 10 disappears from the cyst lining. The advantage of marsupialization, especially in large OKC’s, is that there is less morbidity and preservation of function and esthetics (Shear, 2007).

Recurrence observed with marsupialization ranges from 0-100%. Several studies have found no

difference in recurrence rate when compared to enucleation procedure alone (Voorsmit et al, 1981; Kondell & Wiberg, 1988; Stoelinga & Bronkhorst, 1988; Nakamura et al, 2002; Stoelinga, 2003). Pitak-Arnop et al (2010) reported on 120 OKCs from 1995-2004 treated by enucleation with a recurrence rate of 26%. They obtained a clinically acceptable result because 84% of the patients showed no recurrence. They strongly advocated regular follow up visits because recurrences have to be dealt with more aggressively. Other authors who reported minimal recurrence rates with enucleation alone are: Jensen et al, 1988 (33%); Donoff et al, 1972 (15%); Choung et al, 1982 (18%); Irvine & Bowerman, 1985 (0%); Voorsmit et al, 1981 (13%); Stoelinga & Bronkhorst 1988 (9%); and Kondell & Wiberg, 1988 (24%). Resection has 0% recurrence but is disfiguring and requires further reconstructive surgery to rehabilitate the patient (Bataineh & al Qudah, 1998).

Table I: Depicts various treatment modalities for OKCs(primary & recurrent variety) and thier recurrence rates.

Authors	Treatment	Primary cysts	Recurrent Cysts	Recurrence rate in %	Follow up period
Browne (1970)	Marsupialization	12	3	25	>16 months
	Enucleation	72	17	23.6	
Bradley & Fisher (1975)	Enucleation + Cryotherapy	3	0	0	6 months-1 years
	Enucleation	55	21	38	
Hodgkinson et al (1978)	Curettage	15	4	26.6	To death
	Resection	2	0	0	
	Marsupialization	3	3	100	
	Enucleation	2	6	0	
Patridge & Towers(1987)	Enucleation	30	11	36.7	>5 years
	Curettage	11	1	9.1	
	Resection	2	0	0	
Forssell et al (1988)	Enucleation (1 piece)	28	5	18	5-17 years
	Enucleation (>1 piece)	41	23	56	
	Marsupialization	5	3	60	
Marker et al (1996)	Decompression+ Enucleation	23	2	8.7	1-19 years
	Enucleation + Carnoy’s	1	0	0	
Stoelinga (2003)	Enucleation + Carnoy’s	1	0	0	86 months
Pogrel & Jordan (2004)	Decompression+ Enucleation	13	0	0	33 months
	Enucleation	1	0	0	
Tolstonov & Treasurer (2008)	Decompression+ Enucleation	1	0	0	36 months
Kolokythas et al (2007)	Resection or Enucleation + peripheral osteotomy	11	0	0	24 months
	Decompression+ Enucleation	11	2	18.18	
	Enucleation	1	0	0	
Present study (2011)	marsupialization	1	0	0	5 years

As observed from the above table, earlier studies by Browne (1970) and Hodgkinson et al (1978) reported very high recurrence rate with marsupialisation treatment. Later studies by Partridge & Towers (1987), Pogrel & Jordan (2004), Tolstonov & Treasurer (2008) reported 0% recurrence with the same mode of treatment. Kolokythas et al (2007) reported a higher recurrence of 18% and Marker et al (1996) reported a recurrence of 8.7%, which is reasonable and all these studies support our stand that it is an excellent treatment option for large OKC's. The patient suffers less loss of function, no disfigurement and enjoys a better quality of life. None the less if lesion recurs, we would support a more aggressive management by resection. We advocate a life long follow up of these patients because recurrences have been reported even after 20 years. The table clearly shows that most of the authors support conservative treatment options to manage this entity.

A soft tissue variety of OKC has also been reported, though, this is controversial entity. Ide et al (2010) reported two cases of "Buccal Mucosal Keratocyst" which is an unusual presentation and unconnected to odontogenic tissue origin.

There are some disadvantages of marsupialization for e.g. it requires prolonged patient compliance, fails to eradicate the lesion completely, and there exists a need for subsequent enucleation or resection. The lesion may have an ameloblastomatous or a malignant change elsewhere which may remain undetected and may go undiagnosed. Marsupialization may be technically more difficult due to size and extent of the lesion especially in the ramus region. Its application is more suitable for unilocular lesions in accessible areas. Many authors prefer to resect OKC's located in the mandibular ramus area due to difficult access to this region (Stoelinga, 2005; Giuliani et al, 2006; Pogrel & Jordan, 2004; Nakamura et al, 2002. Batanieh & al Qudah (1998).

Since index case presented with a large unilocular OKC extending from 36 to 48 region (approximately 9 cm), where access was easier, a marsupialization procedure was opted for and performed by opening a large window (1 cm wide x 7cm long) buccally from 35 to 46 region. This allowed direct visualization and removal of the cyst contents with easy maintenance of oral hygiene by the patient. The patient was followed up regularly radiographically and histologically by taking repeated biopsies from the base of the defect. After 3.6 years, the lesion has healed

with no recurrence and has only a slight depression in the anterior region. All his teeth were preserved with no complaint of altered sensation in the anterior region.

Conclusion:

The recommended follow up for OKC's is once in a year for at least 5 years. Radical operations, such as continuity resection may not be warranted always, as conservative management with marsupialization seems to work and preserves function with least morbidity. Many authors are now advocating a more conservative approach in treating the single non syndromic odontogenic keratocyst. Recurring OKC's will require a more radical surgery. Radical procedures such as resection should be reserved for keratocysts that involve vital structures, are recurrent or demonstrate malignant degeneration. Resection is the most predictable modality but involves the greatest morbidity. Until such time that prospective, randomized controlled trials are performed to compare the various treatment strategies, one cannot know for certain if adjunctive measures, such as cryotherapy and chemical fixation, truly make a difference in outcome (Bell, 2003).

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