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Surgical practises for Odontogenic Keratocyt/ KCOT: A survey

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Running title: Surgery for Odontogenic keratocyst

Clinical significance: The various techniques for treatment of Odontogenic keratocyst has been elaborated in this article

ABSTRACT

What is the best treatment for people who have odontogenic keratocysts?The treatment of the OKC has always been challenging in view of the marked recurrence rate. Treatment is either conservative or aggressive due to a high recurrence rate from 5 to 62%.

OKC was a term coined in the mid-1950s by European oral pathologists and the lesion arises from the cell rests of the dental lamina.Multiple cysts are seen as a feature of the nevoid basal cell carcinoma (Gorlin) Syndrome (NBCCS); an autosomal dominant inherited condition.

Aims and Objectives: The aim was tostudy the treatment protocols for the KCOT throughout the world. The objective was to trace the treatment modalities of OKC through the generations and to find an answer to the fairly focused question of whether there could be just one management approach that would be able to treat OKC and provide a a good prognosis for the patient.

Materials and Methods: Data sources; PubMed, Scopus, Cochrane, etc. were searched for articles published in English languageliterature during the past 10 years that reported the treatment of OKCsby the surgeons throughout the world, and whether there have been any reported changes in them since the time "OKC" has become "KCOT." Two reviewers independently appraised articles.

Results: The treatment method for KCOT is still ambiguous and all methods have their own advantages and drawbacks. Treatment protocol is based on the size, site, lesion accessibility and tissue destruction. Maximum number of cases was seen in males (69%) and the mandible was the most affected (84.5%) site. The treatment modality ranged from marsupialisation with decompression and enucleation to simple enucleation or enucleation followed by curettage, or packing it with chemicals such as Carnoy's solution or iodoform guaze. The most preferred method of OKC removal was enucleation (26.8%) whereas marsupialisation either alone or with enucleation (1.4%) was a hardly preferred method of treatment.

Conclusion:OKC commonly recurs following surgery.The majority of recurrence commonly occurs within the first 5 years after treatment. Because of the problematic nature of these cysts, many attempts have been made to minimize the high recurrence rate by attempting to improve the surgical techniques. It has been found in this study, that there is probably no one single treatment modalitythat can be considered as ideal, to treat OKCs, as all the techniques mentioned have tasted success. None of the cases have reported recurrences in the 5 years follow-up period.

INTRODUCTION

OKC isa unique and characteristic developmental odontogenic cyst that requires special attention mainly because of its locally aggressive behaviour and high recurrence rate. WHO has included this highly aggressive cyst, in the classification of odontogenic tumors in the year 2005. They introduced the term "Keratocystic Odontogenic Tumor (KCOT)" for these lesions.Multiple odontogencic cysts are found in the Nevoid Basal cell carcinoma syndrome, which is an autosomal dominant condition[1]

Treatment provided for OKC depends a lot on the training, management viewpoint and expertise of the institutions in different parts of the world. [1]

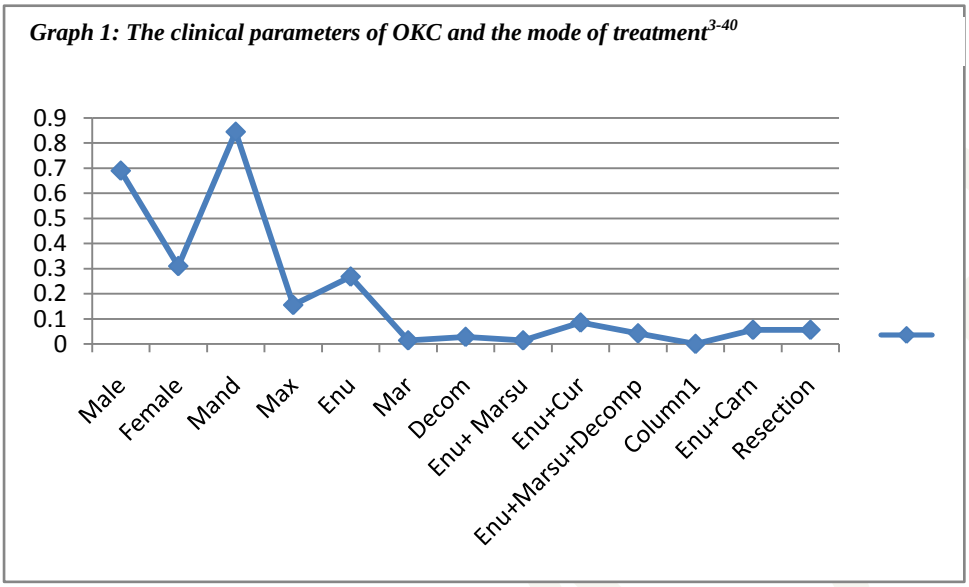
MATERIALS AND METHODS

The search was based on the research question "treatment modalities for OKC" and therefore,databases from the Pubmed interface of the MEDLINE (National Library of Medicine) and other Search Engines wereaccumulated. The MeSH terms used were "treatment for odontogenic keratocyst" and "Keratocystic Odontogenic tumor."

Cases that reported the OKC s but which did not include the treatment modality were excluded from the study. They were tabulated based on their age, sex, site of occurrence and the mode of treatment followed.

RESULTS

Graph 1: The clinical parameters of OKC and the mode of treatment [3-40]



Age: Mean age Mal- Males Fema- Females Mand- Mandible Max-Maxilla Dec-DecompressionEnu- Enucleation Mar-Marupalisation Curr- Currrettage Carn-Carnoy's solution Rese-Resection

Column1	No of cases	Age (Years)	Male	Female	MAND	Max	Enu	Mar	Decom	Enu+ Marsu	Enu+Cur	Enu+Marsu+Decomp	Column2	Enu+Carn	Resection
Total%	71	29	69%	31%	84.50%	15.50%	26.80%	1.40%	2.80%	1.40%	8.50%	4.20%		5.60%	5.60%

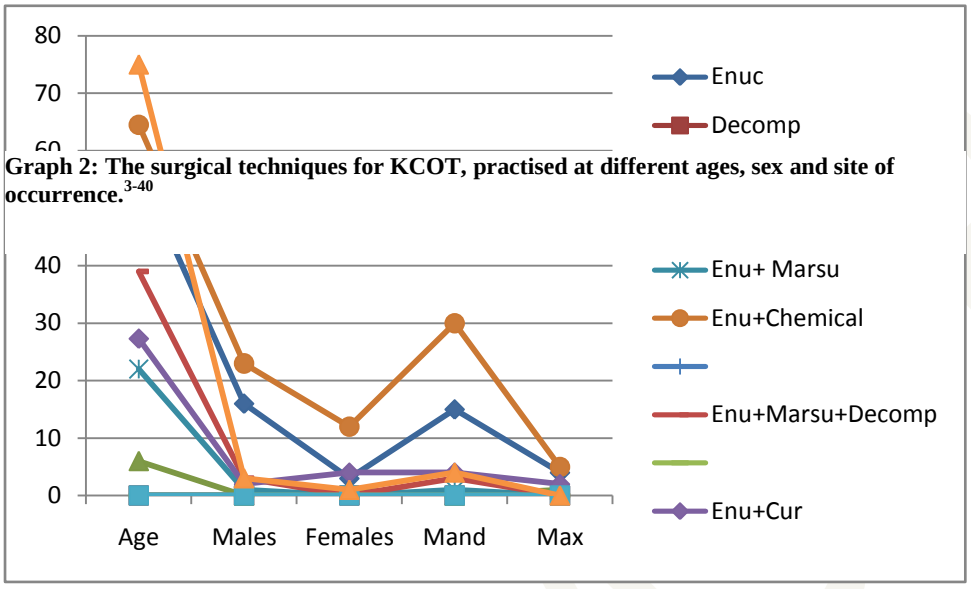
TABLE 1

Table 1: Clinical parameters of OKC and the different treatment modalities [3-40]

Total number of indexed articles selected was 40 of which the total number of cases was 71. These articles reported the features mentioned in the inclusion criteria. Cases other than OKC/ KCOT or articles that did not stress on the treatment of the OKC were excluded from the selection. Of the total number of cases 69% were males and 31% were females. The cases were predominantly found affecting the mandible (84.5%) as compared to the maxilla (11cases). The enucleation (26.8%) was the preferred mode of treatment by majority of the surgeons, enucleation with curettage (8.5%), enucleation with application of a chemical cautery such as Carnoy's solution (5.6%); resection with plate placement was reported in 1 article (1.4%), excision with disarticulation in 1 article (1.4%); one article reported a hemimandibulectomy and 1 (1.4%) case of peripheral ostectomy. Two surgeons treated their cases with decompression followed by enucleation (4.6%) of which one surgeon had performed a decompression followed by placement of the iodoform guaze. One case reported treating the cyst by marsupalisation after decompression. Decompression as the only mode of treatment was

achieved in 2.8% cases and only marsupalisation and marsupalisation with enucleation was the procedure followed in1.4% cases.

Enucleation and cautery by Carnoy's solution was performed at a mean age of 64.5 years, enucleation alone at 56.8 years, enucleation with curettage at 27.3 years, marsupalisation at an average age of 6 years, marsupalisation with enucleation at 22 years and resection at 75 years mean. Twenty two point five % males who had 21% involvement of the mandible underwent enucleation. 32.4% males underwent enucleation with cauterisation and 42.3% cases involved the mandible. Among the males the least opted (1.4%) treatment was enucleation with curettage and most opted was enucleation with cauterisation (32.4%). In females the resection was one of the less opted methods of treatment (1.4%). In the mandible the enucleation with marsupalisation (0) was the least preferred mode of treatment and this treatment was the least favouredeven in cases of the maxillary involvement (0).



Graph 2: The surgical techniques for KCOT, practised at different ages, sex and site of occurrence.[3-40]

DISCUSSION

OKCs/ KCOTsare one of the most aggressive odontogenic lesions that have a high tendency to recur. It requires special care as it is one of the most commonly featured odontogenic entities. The vast number of previously reported cases supports the theory that this is one of the aggressive lesions that penetrates the cortical plates and involves adjacent soft tissues, even sometimes extending to the skull base from the mandible or in some cases to the infratemporal fossa and to the orbit.

Column1	Column2	Column3	Column4	Column5	Column6	Column8	Column9	Column10	Column11	Column12	Column13	Column14
Clinical Para	Enuc	Decomp	Marsupalisation		Enu+ Marsu	Enu+Chemical		Enu+Marsu+Decomp		Enu+Cur		Resection
Age	56.8	0	6		22	64.5		39		41		75
Males	16	0	0		1	23		3		2		3
Females	3	0	1		0	12		0		4		1
Mand	15	0	0		1	30		3		4		4
Max	4	0	1		0	5		0		2		0

TABLE 2

Table 2: The age, sex and site predilection of Keratocystic Odontogenic Cysts and the surgical techniques practised, based on them

In our studyand fromrecent articles searched, a permutation and combination of the conservative and aggressive treatments such as the marsupalisation, marsupalisation with decompression and enucleation together with cauterisation with Carnoy's fixative, was found to have won favour with the surgeons. Enucleation or marsupalidation alone have also been performed as a treatment modality. Resection with bone grafting was done in only a single case. This implies that the surgeons would still prefer a simple and age old procedure like decompression and enucleation; whatever may be the clinical and histologic features;as opposed to the recommended radical and disfiguring surgery. [2] The incidence of male prevalence being higher than females,

Clinical Paran	Enuc	Decomp	Marsupalisation	Enu+ Marsu	Enu+Chemical	Enu+Marsu+Decomp	Enu+Cur	Resection
Age	56.8	0	6	22	64.5	39	27.3(38.5%)	
Males	16 (22.5)	0	0	1(1.4%)	23(32.4%)	3(4.2%)	2(2.8%)	3(4.2%)
Females	3(4.2%)	0	1(1.4%)	0	12(16.9%)	0	4(5.6%)	1(1.4%)
Mand	15(21.1%)	0	0	1(1.4%)	30(42.3%)	3(4.2%)	4(5.6%)	4(5.6%)
Max	4(5.6%)	0	1(1.4%)	0	5(7%)	0	2(2.8%)	0

TABLE 3

Table 3: The age, sex and site predilection of KeratocysticOdontogenicTumor and the surgical treatment practised,in %age, based on the features.

amounting to 69% of the total 71 cases and the maxilla (15.5%) being less affected than mandible (84.5%),did not have any bearing on the mode of treatment practised.

CONCLUSION

No treatment modality can be considered as the ultimate for OKC/ KCOT. In recent years, two authors, Zhang and others have proposed the treatment of KCOT by molecular methods. They have postulated the use of antagonists of SHH signalling factors that has been said to efficiently treat KCOTs. They are of the belief that the intracystic injection of an SMO protein-antagonist has a great promise as a future treatment option, as opposed to the above-mentioned conservative and aggressive surgical modalities.

Footnotes:

Declaration of conflict: No conflict of interest

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