A STEP TOWARDS REPHRASING ON ODONTOGENIC KERATOCYST : A REVIEW ARTICLE

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Abstract
Odontogenic keratocyst (OKC) is quite unique among Odontogenic cysts in its specific clinical characteristics, histological features and aggressive biological behaviour. OKC is known for its rapid growth and its tendency to invade the adjacent tissues including bone. Harring et al. best characterized this cysts by stating that "after thirty years of study, questions related to this histogenesis, pathogenesis, histology, high recurrence rate, and neoplastic potential of the OKC are still being debated. This review intends to summarize the nature and advances in the terminology of OKC.
Keywords: OKC, Cysts or Neoplasm.

Introduction

Odontogenic Keratocyst (OKC) is the third most common cyst occurring in the oral cavity. (5.4- 17.4 percent of all odontogenic cysts)[1]. It exhibits aggressive behaviour and varied clinicopathological nature subject researchers from last many years to named it as a simple cyst or a benign neoplasm[2,3]. It long term interest, because of its potential for local destructive behavior, its recurrence rate and its tendency for multiplicity particularly when associated with nevoid basal cell *carcinoma* syndrome [3,4,5].

Terminiologies

Mikulicz in 1876, first described Odontogenic keratocyst (OKC) as a developmental cyst, affecting the jaws. In 1926 it was first termed as a "cholesteatoma" which means a cystic or "open" mass of keratin squames with a living "matrix"[4]. Robinson[6] in 1945 gave the concept of "Primordial cyst" as it was believed that they arose from remnants of the dental lamina or the enamel organs before enamel formation has had taken place. "Odontogenic keratocyst" was first designated by Philipsen in 1956 as this cyst have keratinization of its epithelial lining. In 2002 Reichart and Philipsen reclassified the term and renamed OKC as keratinizing cystic odontogenic tumor (KCOT) [7].

Clinical Features

It occur at any age from very young to very elderly and commonly seen in males than females in second & third decades. Mandible is involved more often than maxilla. In common site in mandible is at angle which extend into ascending ramus & towards the body.In maxilla, most common site is third molar area followed by cuspid region[8,9,10].

Clinical presentation of OKC clinically presents with pain and swelling or discharge with seldom, numbness of lower lip. Dislocation of teeth can also be noted with enlarging cyst [9,10,11]. Maxillary and Mandibular cysts caused buccal extension, but uncommon appearance of palatal and one third lingual expansion. Frequency of multiple OKC are frequently associated with Naevoid basal cell carcinoma syndrome (NBCCS)[5].

Authors also reported the cases of soft tissue lesion on gingiva giving clinical presentation of gingival cyst of adults but histological uniqueness of typical keratocyst. Those cysts suggested the term "peripheral odontogenic keratocyst" [12].

Syndrome association

OKC is associated with the naevoid basal cell carcinoma syndrome. Syndrome present with innate as a set of autosomal dominant characteristics with strong penetrance. Syndrome includes possible abnormalities: Cutaneous, Sexual, Dental & osseous, Opthalmologic, Neurological[5,10].

Radiological presentation

OKCs show as small, round or ovoid, unilocular well defined radiolucent areas with smooth periphery (Figure 1.a)[5,9,10]. Sporadically, Multilocular radiolucent are observed. Periphery of cyst also shoed scalloped margins proposing the unequal growth activity of cyst lining .periapical OKCs may occur giving appearance of a radicular cyst[5] .

Main (1970) has referred to the four variety of OKC[2,13].

1. Envelopmental- Adjacent unerupted teeth
2. Replacement- Those cysts which form in position of normal tooth of succession
3. Extraneous- Those cysts arising in ascending ramus of mandible lying away from teeth
4. Collateral -Adjacent to the roots of teeth

Histopathological features

The linings of small cysts are hardly ever received intact.OKC shows keratinisation exclusively parakeratotic but is sometimes orthokeratotic or both types of keratin can be observed.Lining epithelium is highly characteristics & is composed of: (Figure 1.b)[2,5,9,10]

- Parakeratinized surface which is typically corrugated, rippled or wrinkled.
- significant uniformity of thickness of epithelium, ranging from 6-10 cells thick
- A prominent palisaded cells of basal layer giving a "picket fence" or "tomb-stone" appearance.

- The parakeratin layer is often corrugated.
- Desquamated keratin is present in many of the cavities.
- Frequently mitotic figures are found in the suprabasal layer

In some cases, the lining epithelium of these cyst are very frequently shows folds and islands of epithelium & small satellite or daughter cysts actually represent ends of folds of lining epithelium of main cystic cavity which have been cut in cross-section,. Cells of suprabasal layer are polyhedral in shape & often exhibit intracellular oedema[5]. In many areas of the specimen shows separation between epithelium & c.t capsule due to weak attachment. In presence of intense inflammatory process, adjacent epithelium loses its keratinized surface, may thicken & develop rete processes or may ulcerate. Okc capsule removed from the older patients sometimes shows hyalinization[5].

Pathogenesis

Authors stated that the two main sources of epithelium from which cyst is derived:

- Dental lamina or its remnants
- Extensions of basal cells from overlying oral epithelium

The single or multiple cyst form may be arising either from an enamel organ of a single tooth or from anomalous remnants of dental lamina which become cystic[5, 14]. Although authors considered remnants of dental lamina in tooth-bearing area as a prominent source for development of cysts in that region, even strained on remnants located in gingiva & that gingival adhesions of these cysts may consequently be expected[14].

Authours believe that the okcs in ascending ramus area may begin from basal cell offshoots from overlying oral mucosa, induced by the residual ectomesenchymal influence in tooth-bearing areas of the jaws, as they have no relationship with the tooth follicle or dental lamina[15].

Enlargement - Rate of growth

Browne (1971) suggested that growth pattern of okcs are more rapid than the other developmental jaw cysts. Whereas, Toller's (1967), suggested analogous rate to other epithelial cysts of the jaws. Workers suggested okcs take about a time period of 6 years to achieve a clinically visible size of 1 cm[16].

The active growth of c.t wall resulted into invasive growth of keratocysts. But was unable to answer whether c.t & epithelium proliferate independently of each other or whether proliferating epithelium induces proliferation of adjacent fibroblasts in ectomesenchymal interaction[5].

Authors considered that due to normal metabolic turnover & inflammatory degradation there is release of glycosaminoglycans & proteoglycans in cyst fluids which is basically from ground substance of connective tissue capsule. Due to accumulation of luminal fluid contribute to increase in osmotic & hydrostatic pressures and also leads to expansile growth of odontogenic cyst[5,17] .

The exert effect on the collagenase activity of cystic fluid control the expansion of cysts within bone [18]. Workers also analysed the nature of collagen fibres in okc & assessed the colour of observed the collagen fibers using picrosirius stain under polarized microscopy (hirshberg *et al*., 1999) and concluded that colour of both thin & thick fibres in okcs is green to greenish-yellow inference that that collagen of wall was loosely packed & might be composed of procollagens or pathological collagen[19].

Genetics

P53 considered to be a tumour suppressor protein in humans which is encoded by the tp53 gene. In okc, the positivity towards the expression of p53 suggesting their neoplastic nature (Figure1 d)[4,17]. Proliferating cell nuclear antigen (PCNA) is a maker of cell replication and a strong positivity was observed in KCOT (Figure 1.c). These findings supports to explain the aggressive behavior of okc[4,20].

Cyst or Neoplasm

It's always a controversy to call it a cyst or a neoplasm. The WHO in 2005 renamed odontogenic keratocyst (okc) as a neoplasm and suggested keratocystic odontogenic tumor (kcot) as the new term. As, the authors stressed on ''aggressive'' behaviour, recurrence, the occasional occurrence of a ''solid'' variant, and mutations in the PTCH gene[4]. According to workers, PTCH mutations is more common in syndromic(85%) then in nonsyndromic(30%) okcs[21] .

There are studies which shows that most okcs and dentigerous cysts both produce PTCH 1 mutation but this expression may be lost by decompression[17]. Considering this makes it unclear whether the authors should call kcot for all okcs or only those that show the mutation. According to the literature, Authors believe reclassifying okcs as neoplastic was premature as understood the concept of neoplasia and found a solution to reclassifying them. Therefore authors recommend reverting to the previous terminology of odontogenic keratocyst[22].

Recurrence Rate

Authors' reported recurrence rates ranging from 3 to 60%. Higher recurrence rate is noted in the younger individuals. The majority of the recurrence is noted in the first 5 years after treatment[2, 23]. Ahlfor et.al suggested that none of the histological features can be used to predict recurrence[24].

Treatment and progonosis

Eyre and Zakrezewska in 1985, have stated the following treatment modalities for OKC/KOT-

1. Enucleation carried out by primary closure, packing, chemical fixation (Carnoy's solution) and cryosurgery
2. Marsupialization followed by enucleation
3. Resection

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