A CLINICOPATHOLOGIC STUDY OF ODONTOGENIC KERATOCYST (OKC) AND THE ROLE OF AgNORs IN CELL PROLIFERATION

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Abstract :

The histologic pattern of OKC is distinct and hence the cyst has potential for more aggressive behaviour than other cysts of the jaws. When inflammation is present within the cyst wall of an OKC, the character of the cyst lining changes from the classical pattern to a non-keratinized stratified squamous lining typical of other inflammatory cysts. This transformation often occurred quite abruptly at the margin of inflammed and non-inflammed tissue. These findings prompted us to investigate the association of inflammation with OKC lining changes and explore its possible relationship to clinical behaviour.

Introduction :

Odontogenic Keratocyst (OKC) is a clinicopathologically distinct form of developmental odontogenic cyst. It is known for its pathognomonic microscopic features, aggressiveness and high recurrence rate. The term 'OKC' was introduced by Philipsen in 1956 . It represents 10% to 12% of odontogenic developmental cysts (Eslami B et al 2003[11]).

OKC occurs over a wide age range with a peak in the second and third decades. It has a marked male predilection. OKC is seen predominantly in the molar and ramus of mandible. Small OKCs may be asymptomatic while larger ones may be associated with pain, swelling and pus discharge. It is associated with naevoid basal cell carcinoma syndrome – Gorlin Goltz sydrome. Radiographically, it usually has well defined radio lucency with

distinct sclerotic margin. They may be unilocular or multilocular and may envelop an unerupted tooth.

The histologic features are distinct, the cyst is lined by orthokeratinised or parakeratinised stratified squamous epithelium which is 4 – 8 cell layers thick, with corrugated surface . Absence of rete pegs is a characteristic feature. The columnar or cuboidal basal cells have polarized and palisaded nucleus. The epithelial lining is weakly attached to fibrous wall and may easily separate. The presence of satellite cysts and odontogenic epithelial islands in the cyst wall is another feature.

Effect of inflammation :

Rodu B et al (1987[17]) reported that the cyst lining changes from classical pattern to a non – keratinized stratified squamous lining typical of other inflammatory cysts. The transformation occurred abruptly at the margin of inflamed and non-inflamed tissue. The epithelial lining of OKC is more active than other odontogenic cysts and hence has an important role in its aggressive behaviour and high recurrence rate. The change in epithelial lining in the presence of inflammation may be accompanied by re-alignment in biologic behaviour which reflects this transformation.

AgNORs :

Nucleolar organizer regions (NORs) are loops of DNA that transcribe genes for ribosomal RNA. AgNORs are NOR associated acidic protein selectively stained by silver methods. They vary in size and shape according to nucleolar transcription and are intimately related to cell cycle. The amount of AgNORs proteins is proportional to proliferative activity of the cell (Egan MJ et al 1992[10]).

Aims and Objectives :

1. To assess the clinical and pathological features of OKC.
2. To compare the clinical and pathological characteristics of inflamed OKCs with the non-inflamed ones.
3. To determine the proliferative capacity of the basal and parabasal layers of both inflamed and non-inflamed OKC lining by counting AgNORs.
4. To compare the AgNOR counts in inflamed and non-inflamed OKC.

Materials and Methods :

The study comprised of 30 cases of histologically proven OKC. The clinical details were noted retrospectively from the files.Two sections were cut from the paraffin blocks of the cases.Haematoxylin and Eosin staining was done and sections were examined for the histopathologic features and divided into two groups namely inflamed and non-inflamed depending upon the presence or absence of inflammatory infiltrates in the cyst wall. Another section was cut from the blocks of inflamed OKCs for silver staining. This was done by silver nitrate method (Ploton et al[2]). The working solution was prepared as follows:

50% Silver nitrate solution – 2 parts
Gelatin Solution (Gelatin 2g, Formic acid 1ml, Distilled water 100ml) – 1 part

The two solutions were mixed immediately before use. The dewaxed sections were hydrated and rinsed in distilled water. The slides were then incubated in freshly prepared working solution for 45 minutes at room temperature, followed by rinsing in distilled water for one minute, dehydrated, cleared and mounted in DPX.

AgNOR sites were seen as intranuclear black dots and the background as pale yellow. The AgNOR's were enumerated using a x100 oil immersion lens. The AgNOR counts in 100 cells were made in the basal and parabasal layers of the epithelium and the results expressed as the mean number of NORs per nucleus.

Observations and Results :

It was noted that OKCs occurred over a wide age range and the peak prevalence was seen in the 2nd and 3rd decades for both inflamed and non-inflamed ones. Males have a marked predilection in both types. Both inflamed and non-inflammed occur more in the mandible than the maxilla. The clinical presentations included swelling, pain and pus discharge. Majority of both types had unilocular radiolucency. 43 % of cysts had associated unerupted teeth and 20% cases had multiple cysts of which an equal number were inflamed and non-inflamed. 16.60% cases reported of previous cyst enucleation and all the cases were of non-inlfamed type. The histologic features were studied under three broad groups

namely; the epithelium, epithelial connective tissue interface and the connective tissue. 90% of cases (equal number of both) showed parakeratinized epithelium. Interestingly, varying thickness of epithelium was found in 23.30 % of the case and all of them were of inflamed type. In these cases, rete peg formation was also noted. The cells in the basal layer was cuboidal in 53.30 % of cases . Majority of the cysts (63.30%) had the typical corrugated surface. Detachment of the epithelium from the connective tissue was seen in 86.60 % cases. Satellite cysts, Islands of odontogenic epithelium were found in more number in inflamed OKCs. The AgNOR counts in the inflamed OKCs were significantly higher compared to the non-inflamed group.

Summary and Conclusion :

A statistically significant association was found between the presence of inflammation in the cyst wall and increase in thickness of the lining, rete peg formation and presence of odontogenic epithelial islands. The AgNOR counts were statistically significant in the inflamed OKCs as compared to non-inflamed OKCs. This study implicates that there is a greater chance of recurrent cyst occurring in inflamed OKCs when compared to the non-inflamed ones. AgNOR counts may be useful as a proliferative marker to differentiate between inflamed and non-inflamed OKCs.

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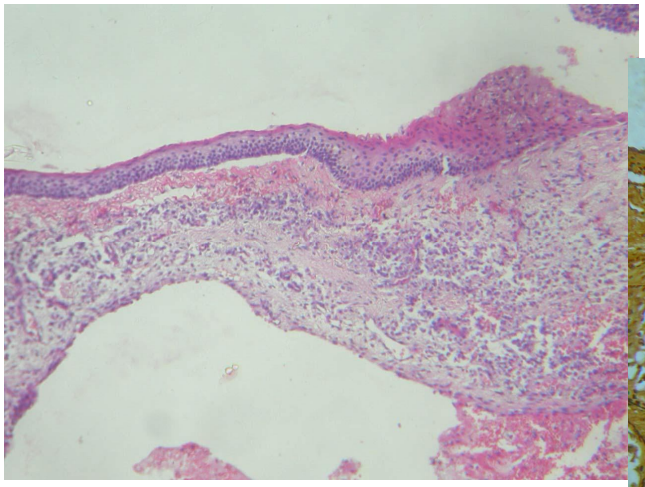
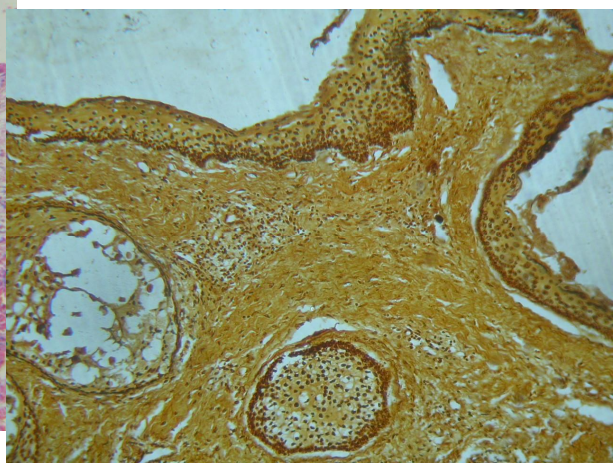


Changes in OKC Epithelium due to inflammation. (H&E, 10X)



Silver stained section showing rete peg formation & satellite cysts (10X)

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