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Case Report

Dentigerous cyst exhibiting focal ameloblastomatous transformation: Histopathological insights from an unusual case

Chhavi Saigal[1]*, Kalyani Bhargava[1], Mayura Paul[1], Shivani Bhandari[1], Dinabati Huidrom[1]

[1]Dept. of Oral & Maxillofacial Pathology, Inderprastha Dental College and Hospital, Ghaziabad, Uttar, Pradesh, India.

Abstract

A dentigerous cyst is a type of developing odontogenic cyst that surrounds an unerupted tooth's crown. Dentigerous cysts, which make up 20% of all developmental cysts of the jaws, are the most prevalent in the oral cavity. They are caused by fluid buildup between the tooth crown and reduced enamel epithelium. Hence, it is usually associated with an unerupted or impacted tooth. Ameloblastoma, squamous cell carcinoma, and mucoepidermoid carcinoma are among the neoplastic transformations that can occur in the lining of dentigerous cysts. Ameloblastoma is a type of odontogenic tumour that is aggressive locally and makes up around 10% of all jaw tumours. This report describes a 47-year-old male patient who was diagnosed with ameloblastoma that developed in the dentigerous cyst wall.

Keywords: Ameloblastomatous transformation, Ameloblastoma, Dentigerous cyst, Neoplastic transformation, Odontogenic cyst, Odontogenic tumor

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1. Introduction

Dentigerous cysts (DC), odontogenic keratocysts, calcifying odontogenic cysts, glandular odontogenic cysts, and radicular cysts are among the odontogenic cysts that have the potential to develop into malignancy. The odontogenic keratocyst and dentigerous cyst exhibit the highest rate of neoplastic transformation among the odontogenic cysts.[1]

The crown of an unerupted or embedded tooth, typically the maxillary canine tooth or the mandibular third molar, is invariably linked to the dentigerous cyst, which is not uncommon. It is not a neoplastic entity, but it can become aggressive, causing bone destruction and cortical plate expansion, which may contribute to facial deformities.[2]

Ameloblastomas have been observed to arise from the odontogenic epithelial remnants within the cyst capsules or the cystic lining. Ameloblastoma and other odontogenic or non-odontogenic tumours can develop from the epithelium of dentigerous cysts. 10% of all odontogenic tumours are ameloblastomas, making them the most prevalent type.[3] This is an unusual instance of an ameloblastomatous lesion inside a dentigerous cyst.

2. Case History

A 47 year old, male patient reported to the department complaining of pain and swelling in the mandibular anterior teeth region since 6 months. It had gradually increased in size and there was no history of trauma or pain.

Extra-oral examination revealed facial symmetry with tender on mandibular symphysis region. Oral examination revealed swelling in the mandibular anterior region w.r.t. 33-43. It was pale pink in color and the margins were indistinct. On palpation, the lesion was tender, and no discharge was seen on compression. Orthopantomograph revealed impacted canine w.r.t. 33 and 43 (**Figure 1**).

*Corresponding author: Chhavi Saigal
Email: chhvsgl2@gmail.com

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Figure 1: The radiographic examination revealed impacted canine w.r.t. 33 and 43.

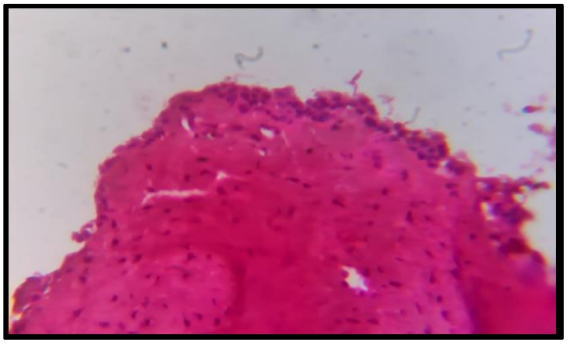

Figure 2: H&E stained section shows non-keratinized stratified squamous epithelial lining overlying a dense fibrocellular connective tissue stroma. (H & E, 40x)

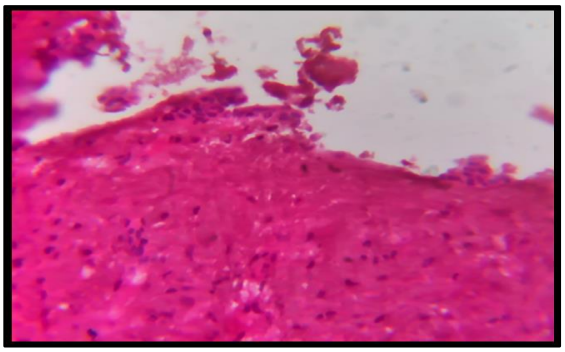

Figure 3: H&E stained section shows 3-4 cell layer thick epithelial lining with cuboidal basal cells and flattened super& E, 40x)ficial cells resembling reduced enamel epithelium. (H

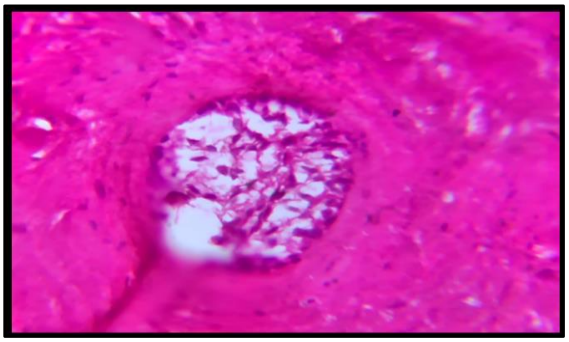

Figure 4; H&E stained section shows a follicle of odontogenic epithelial cells with peripheral cuboidal and central loosely-held stellate reticulum like cells. (H & E, 40x)

Based on the clinical and radiological features, a provisional diagnosis of dentigerous cyst was made. The lesion was enucleated together with the unerupted tooth and the tissue was sent for histopathological examination. The patient was unavailable for follow-up, and no further information could be obtained.

Gross examination of biopsy specimen showed 2 soft tissue specimens, measuring (A1) 15x6x3 mm (A2) 6x3.5x2.5 mm, greyish-brown in color and firm in consistency. The soft-tissue specimens were sectioned, and all the bits were processed following routine tissue processing protocols.

Histopathological examination revealed non-keratinized stratified squamous epithelial lining overlying a dense fibrocellular connective tissue stroma. Collagen fibres were arranged in bundles along with mild inflammatory cell infiltration. Areas of hyalinization and numerous engorged blood vessels were also evident. Areas of calcifications were also seen.

Under high magnification, the epithelium was 3-4 cell layer thick with cuboidal basal cells and flattened superficial cells resembling reduced enamel epithelium (**Figure 2**,**Figure 3**). The connective tissue showed dense collagen bundles associated with spindle shaped fibroblasts. Areas of hyalinization were evident. Mild chronic inflammatory cell infiltration chiefly consists of lymphocytes, plasma cells and few mast cells. Focal area in one section showed a follicle of Odontogenic epithelial cells with peripheral cuboidal and central loosely-held stellate reticulum like cells (**Figure 4**). Numerous Odontogenic rests were also present within the capsule. Areas of calcifications and osseous metaplasia were also seen. Numerous engorged blood vessels were lined by plump cuboidal endothelial cells. The microscopic characteristics together with clinical findings confirmed it to be dentigerous cyst with focal ameloblastomatous changes.

3. Discussion

Dentigerous cysts (DCs) are among the most prevalent kinds of cysts occurring in the jaws. A common clinical presentation for a dentigerous cyst is an asymptomatic unilocular radiolucency that surrounds the crown of an impacted or unerupted tooth. Dentigerous cysts predominantly present throughout the second and third decades of life, with maximal occurrence in adolescence. A dentigerous cyst is usually easy to identify, although even on radiography, a "typical" dentigerous cyst may be mistaken for something else, including a dental follicle, a hyperplastic dental follicle, an odontogenic keratocyst, or a unicystic ameloblastoma based on histological investigation.[4] Therefore, the histopathological diagnosis of these lesions is crucial. The fluid's soluble protein and cholesterol levels indicate the possibility of an ameloblastoma, radicular, dentigerous, or fissural cyst.[5]

In 1965, Gorlin et al. initially reported the prevalence of malignancies arising from odontogenic cysts, describing ameloblastomatous changes of cysts in nevoid basal cell carcinoma syndrome.[6]An ameloblastoma is a locally aggressive benign epithelial odontogenic tumor, commonly arising from the mandible. However, in the present case, lesion was observed in the mandibular anterior region. Ameloblastoma primarily affects people aged 20 to 40, with nearly similar odds of occurrence in both genders. Ameloblastomas are aggressive locally and rarely metastasise. Huang, I. Y et al examined the expression of osteopontin and CD10 in ameloblastoma and dentigerous cysts in order to correlate its expression with neoplastic potentiality. It was determined that elevated expression of osteopontin and CD10 may suggest the neoplastic potential in certain areas.[7]

Shear states that the most probable causes are that an ameloblastoma shares clinical and radiographic characteristics with DC, and the microscopic features indicate that the ameloblastoma is originating from DC. Next reason reveals that a biopsy from an enlarged locule might be an ameloblastoma growing in the epithelial lining of DC. The last explanation states that the cyst wall contains isolated ameloblastomatous epithelium islets or follicles that are situated at a distance from the epithelial lining.[8] In the present case, the development of cystic lining away from the unerupted tooth and neoplastic epithelium indicates that DC is developing into ameloblastoma.

In the connective tissue associated with odontogenic cysts, odontogenic cell nests are commonly observed. Other hallmarks of true ameloblastic differentiation, including basal cell hyperchromatism, polarisation of the basal cell nuclei, or vacuolation of the basal cell cytoplasm, may be absent in some of them, while palisading of basaloid cells at the outer circumference may be present in others.[3] These nests have the potential to multiply and alter the stroma, which is essential to the pathophysiology of odontogenic tumours, according to Jayanandan M et al. Therefore, it indicates that long-term follow-up is advised even in cases of dentigerous cysts.[9]

Varshney A et al. examined the expression of calretinin and observed positive calretinin staining in the lining of unicystic ameloblastoma. It is an immunohistochemical marker specific to the neoplastic ameloblastic epithelium and plays a role in the change from odontogenic cyst epithelial lining to ameloblastomatous epithelium.[10]

Various etiologic factors have been proposed for the ameloblastomas arising from odontogenic cysts, including nonspecific irritational factors (extraction, trauma, infection, inflammation, unerupted tooth), nutritional deficit disorders, and viral infection. Ameloblastoma and other neoplastic tumours, as well as odontogenic cysts, like DC, may arise as a result of increased cell proliferation, according to a number of proliferative studies and immunohistochemically demonstrations of proliferative markers. Oncogene mutations, tumour suppressor gene alterations, or cell cycle disruption can all lead to this increased cell proliferation.[11]

In the present case, it was evident that the lesion was a dentigerous cyst, and histological analysis showed characteristics of a follicular ameloblastoma that originated from the cyst's lining. However, there were no neoplastic cells in the cyst capsule. According to our understanding, this lesion began as a dentigerous cyst and developed into ameloblastoma with the passage of time and in the presence of a definite stimulus.

4. Conclusion

The ameloblastoma that developed from a DC in the present case is an uncommon occurrence that reveals the histogenesis of ameloblastoma. The malignant potential of DCs and the significance of a thorough histological investigation of the entire specimen via multiple sectioning are highlighted in this case. One potential method for diagnosing odontogenic cystic transformation to tumours in the future may be the application of particular immunohistochemistry markers for neoplastic ameloblastic epithelium.

5. Source of Funding

None.

6. Conflict of Interest

None.

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