CASE REPORT

Inflammation inciting an ameloblastoma: an insight

Karen Boaz, Mohan J. Baliga, Srikant N, Junaid Ahmed

Abstract

Persistent inflammation has long been considered as an etiologic factor in the development of neoplasm. This report is an attempt to shed light on the likelihood of chronic periapical inflammation inciting ameloblastomatous transformation of odontogenic epithelial rests in the region of the mandibular molars.

Keywords: inflammation-induced ameloblastoma

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Introduction

Ameloblastoma of the oral maxillofacial region is known to be a persistent and destructive lesion that despite aggressive treatment is known to recur, resulting in morbidity. Potential epithelial sources for the ameloblastoma include the enamel organ, odontogenic rests (rests of Malassez, rests of Serres), reduced enamel epithelium, and the epithelial lining of odontogenic cysts, especially dentigerous cysts(1, 2). While the stimulus for the neoplastic transformation of these epithelial residues is not known, the present case suggests inflammation as a possible trigger.

Case Report

A 25 year old female presented with a prominent, fluctuant expansion of buccal plate and lower border of the left side of the mandible. She reported a history of extraction of 38 due to dental caries two months prior. OPG exhibited the presence of a large unilocular radiolucency with scalloped margins in the region of the extracted tooth (Figure 1). The thinning down and discontinuity of the buccal cortical plate that was also appreciated in a CT scan (Figure 2) warranted the differential diagnoses of odontogenic keratocyst and ameloblastoma and an excisional biopsy was performed.

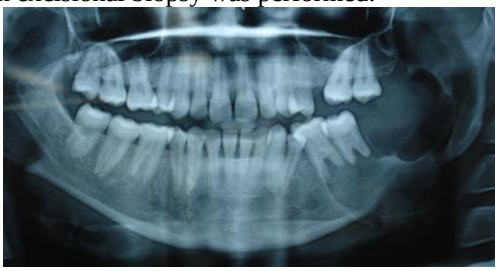

Figure 1OPG showing lesion in the Left angle

Gross examination of the hemi sectioned left mandible revealed a fracture at the site of swelling in relation to 37 and 38 that provided a view of a single cystic cavity lined by a white to brown glistening surface. The resected portion of the mandible was extensively sampled for histopathological examination.

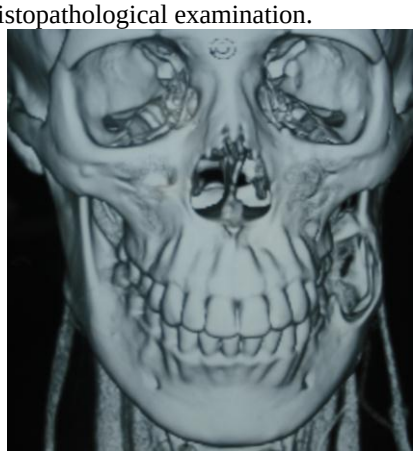

Figure 2 CT Showing the Lesion

The predominant microscopic picture was that of an inflamed cystic capsule with only focal areas of epithelium exhibiting characteristics of Unicystic ameloblastoma, confirmed by the presence of basal cuboidal to columnar cells with hyperchromatic nuclei and superficial stellate reticulum-like cells.

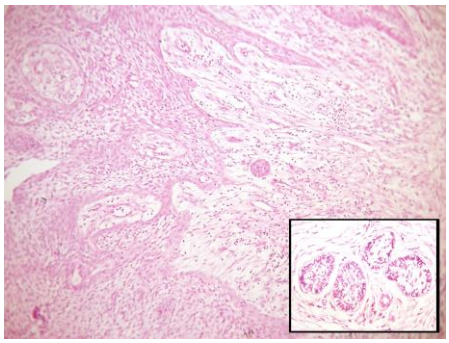

Figure 3 Hyperplastic epithelium showing budding into connective tissue. Inset: the deeper connective tissue showed the conversion of the buds to an ameloblastic follicle.

Other areas of the cyst showed a partially detached hyperplastic epithelial lining with arcading pattern of growth and prominent exocytosis of mixed inflammatory cell infiltrate. The cystic capsule was moderately fibrous, with a juxta luminal zone of moderately dense mixed inflammatory cell infiltrate and deeper areas exhibiting few eosinophils. There were also areas exhibiting amalgamation of the above mentioned two variations of cystic lining with basal hyperchromatic cells, central zone of stellate reticulum-like cells and surface cells showing acanthomatous change (resembling hyperplastic epithelium). Tissue from the extraction socket and the retromolar trigon showed a hyperplastic surface epithelium showing budding of the basal cells which progressively in the deeper tissue transformed into an ameloblastic follicle (Figure3) suggestive of "basal cell hamartia" being the cells of origin in the present case of ameloblastoma.

Discussion

It is known that recurrent episodes of inflammation may induce, promote, or influence susceptibility to carcinogenesis by causing DNA damage, inciting tissue reparative potential, and/or creating a stromal 'soil' that is enriched with cytokines, chemokine and growth factors that interact with specific cell surface receptors that signal target genes involved in cell proliferation(3).

Inflammatory cytokines are known to effect dormant epithelial rests and this is best explained by the pathogenesis of the radicular cyst, an inflammation-stimulated cyst. The cyst epithelium originates from dormant cell rests of Malassez. Toxins and metabolites associated with pulpal infection and necrosis spill out into the periapical tissues, inciting an inflammatory response. The inflammatory cells secrete lymphokines that attempt to neutralize and degrade bacteria(4). However, these inflammatory cells can also elaborate and secrete factors that can function as epithelial growth factors that stimulate the proliferation of the otherwise dormant rests of Malassez.

Various etiologies have been proposed for cystic ameloblastomas that arise from dentigerous cysts that include nonspecific irritational factors such as extraction, caries, trauma, infection, inflammation, or tooth eruption(5). Benn A and Altini M (1996) favored the mechanism of inflammatory exudate as being contributory to the formation of the dentigerous cyst in a series of 15 cases reviewed by them(6). By the same corollary, and extending the fundamental influence of inflammation on cell proliferation as extensively studied in neoplasia, it is indeed possible that the ameloblastoma can arise as a result of inflammation inciting the dormant cell rests within an innocuous lesion like a periapical cyst or stimulating the basal cell hamartia to proliferate. Ameloblastoma exhibit certain key molecular features in common with persistent inflammation, mainly the overexpression of TNF alpha, interface proteins like FGF and MMPs, and interleukin (IL)-6, and IL-1β. The role of advanced glycation end-products needs to be studied in ameloblastoma to draw parallels with their promoting role in neoplasia(7).

Siar CH et al reported a case of mandibular ameloblastoma that presented over duration of two years and commented on its possible occurrence as "a collision phenomenon with a radicular cyst." They also hypothesized their case as being that of "an ameloblastoma arising from a result of neoplastic transformation of the lining epithelium in an inflammatory odontogenic (radicular) cyst(8)."

Siar et al had the opportunity to track the progress of the lesion over a period of 2 years and had the benefit of radiographs and biopsy from the site to confirm the correlation between the radiographic and histopathological diagnosis. The present case, while lacking the evidence of a pre-existent periapical lesion, however, reinforces the views expressed by Siar et al(8) in the presence of compelling histological evidence as detailed earlier.

In the present case, the unicystic ameloblastoma may have originated from one of two possible scenarios. Firstly, the extraction of the infected carious tooth may have aggravated the progression of a preexistent ameloblastoma that seemingly arose from basal cell hamartias. Alternatively, it may have arisen as a result of activation of dormant basal cell hamartias / odontogenic islands by the stimuli of the infected tooth. This latter supposition, in support of the hypothesis by Siar et al asks for a detailed evaluation of similarly occurring cases of unicystic ameloblastoma that may have been reported as "Inflamed unicystic ameloblastoma". If the hypothesis of Siar et al (8)is proved to be valid, then it merits a closer look into the management of chronically inflamed periapical lesions to prevent the rare chance of a probable neoplastic transformation.

Further studies on the interplay of

immune factors and their interactions with the host environment in chronic inflammatory processes like periapical and periodontal pathologies may promote an understanding of the pathogenesis of ameloblastomas. This may potentially provide a sound basis for selective interventional chemoprevention.

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