

Acanthomatous ameloblastoma in a female Spitz dog with rare atypical histomorphology: A case study

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Abstract

A 6 year old female Spitz dog was admitted to Teaching Veterinary Hospital at Chittagong Veterinary and Animal Sciences University with the history of inappetence and asymmetric lower jaw. Oral inspection revealed a pair of pale enlarged lobulated mass around the third molar tooth of the left mandible. The dog was clinically diagnosed with epulis and successfully cured by surgical excision. Histopathological section of the excised masses revealed characteristic features of acanthomatous ameloblastoma with some atypical lesions. Multifocal areas of ameloblastic islands were found in the dense sheet of proliferating epithelial layer protruding towards the sub epithelial connective tissue stroma. These islands were characterized with irregular epithelial stratification at the basal layer. Besides, presence of ghost cells was the unusual findings for such case. Prominent intercellular bridging and nuclear polymorphism in odontogenic cells were other decisive characters of the lesion. Based on the histomorphological appearance, the gingival tumor was designated as canine acanthomatous ameloblastoma (CAA) with atypical histomorphology.

Keywords: ameloblastoma, canine acanthomatous ameloblastoma, histomorphology

Introduction

Canine acanthomatous ameloblastoma (CAA); previously known as acanthomatous epulis is an aggressive tumor of the jaw characterized by the presence of irregular verrucous masses adjacent to the tooth [1-2]. Alike other types of epulis they are clinically indistinguishable exophytic growth on gingiva. Although most clinical cases of epulides are not characterized histologically; some reports of acanthomatous epulis have been published [3-4]. The word "ameloblastoma" relates to the enamel producing odontogenic epithelial cells, and "acanthomatous" refers to the spiny shape of epithelial cells within these tumors [5]. These tumors show diverse histomorphologic features which are easily confusing with other neoplasms; often mimicking with variants of ameloblastomas observed in humans. Typically, the microscopic features of CAAs are characterized by islands and cords of proliferating odontogenic cells in gingival mucosa bordered by a row of characteristic ameloblastic cells. But these histological features may not be consistent in every case and therefore may create difficulty in diagnosis. They are histologically benign tumor but often show local invasiveness which may attributes in recurrences following surgical excision [6]. The present report has concentrated on the histomorphological features of a non recurring CAA in a Spitz dog housed in Chittagong city, Bangladesh. To the best of our knowledge this is the first report of its kind in Bangladesh.

Case report

A six (6) years old female spitz dog of 10 kg body weight was admitted to the SA Quadery Teaching Veterinary Hospital (SAQTVH), Chittagong Veterinary and Animal Sciences University, Bangladesh. The dog had a clinical history of excessive salivation, bad breath, inappetence and asymmetric lower jaw for several days. Close inspection of the oral cavity revealed a firm growth (gingival mass) measuring $2.0 \times 0.4 \times 0.6$ cm diameter protruding from the left mandibular gingiva around third molar tooth. The growth was paired, pale pink in color, smooth surfaced and attached with the gum by a stalk-like structure, pressing and misaligning the adjacent teeth (fig.1). The dog was premedicated and subjected to general anesthesia for surgical intervention. Clean surgical excision was made following standard procedure which involved excision of 1cm healthy tissue around the gingival mass (fig. 2). Post operative care and medication was properly maintained and follow up observation was conducted in following three months for any evidence of recurrence. The excised masses were fixed in 10% neutral buffer formalin and processed accordingly for histopathology at the Department of Pathology and Parasitology. Paraffin embedded tissue sections of 5 μ thickness was stained with Hematoxyline and Eosin (H and E) and examined under low and high power microscope. The gingival lesion completely healed following surgery and did not recur in three month observation period.



Figure-1. Pre-operative appearance of the gingival mass; pale, blunt and multilobulated oral mass around the lower 3rd molar tooth of the mandible.



Figure-2. Post operative appearance of the jaw after clean surgical excision of the mass.

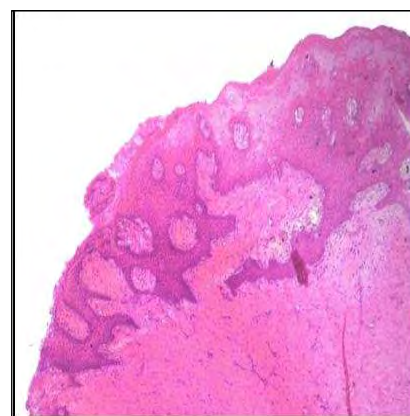


Figure-3. Thickening of the stratum spinosum (acanthosis) and formation of anastomosing reti-ridges in the connective tissue stroma [Hemataoxylin and Eosin, x 3000].

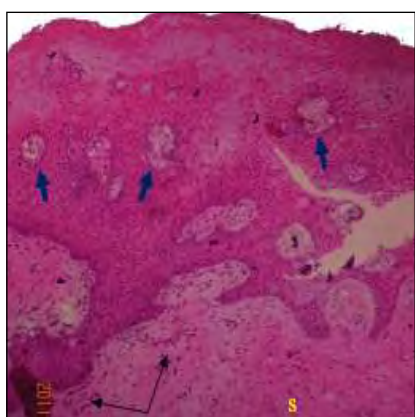


Figure-4. Sheets of ameloblastic epithelial cells forming a cord like structure (light arrow). Ameloblastomatous islands formed within the epithelial overgrowth (blue arrowhead). Sub epithelial connective tissue (s) comprised of stellate shaped cells with oval to elongated nuclei [Hemataoxylin and Eosin, x 500].

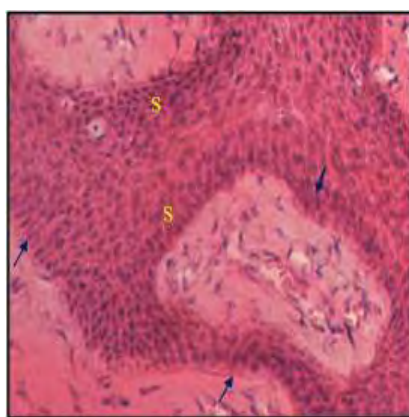


Figure-5. Acanthomatous ameloblastoma with evident atypical features showing Irregular epithelial stratification (S) at the periphery of ameloblastomatous islands. Reverse nuclear polarity of the columnar cells visible at the border of connective tissue stroma (arrowhead) [Hemataoxylin and Eosin, x 3000].

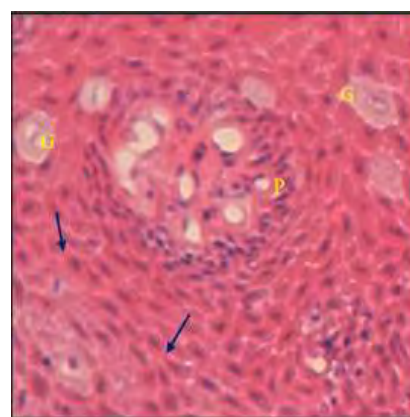


Figure-6. Sheets of ameloblastic epithelium showing prominent intercellular bridges (arrow) and Ghost cells (G) with nuclear vacuolation. Polyhedral type cells are invading the capillary walls of the epithelial sheet (P) [Hemataoxylin and Eosin, x 4000].

The microscopic section of the gingival mass was visualized as thickening (acanthosis) of the stratum spinosum and anastomosing reti-ridges in the hyperplastic epithelial layer protruding deep into the connective tissue stroma (fig. 3). Distinct sheets and cords were formed by the proliferation of squamous type epithelial cells (fig.4). Multifocal islands formed by ameloblastic cells were visible within the epithelial overgrowth whereas sub epithelial connective tissue stroma comprised of stellate shaped cells with oval to elongated nuclei (fig.4). The epithelial islands were bordered by multiple layers of columnar to polyhedral type cells which are palisaded and showed reverse nuclear polarity; i.e. the nuclei of the cells were in the opposite end of the basal layer (fig.5). Distinct intercellular bridging between the odontogenic epithelial cells was visible as an evidence of extensive cellular proliferation (fig.6). At the center of the cellular mass some cells were visible with nuclear vacuolation leaving a pale eosinophilic granular cytoplasm and remnants of nuclear membrane, therefore appearing as “ghost cells” (fig.6). High degree of vasculariation was noticeable within the epithelial

overgrowth where numerous polyhedral cells invaded the capillary walls (fig.6).

Discussion

Even though, epulides are considered as common oral neoplasms in dogs, the term epulis does not always represent tumors; rather simply refers to localized gingival enlargement of either non-neoplastic reactive or neoplastic origin [7-9]. Reactive epulides such as fibrous hyperplasia, pyogenic granuloma, peripheral giant cell granuloma, reactive exostosis have been reported in many species. On the contrary, fibroammatous, ossifying and acanthomatous ameloblastoma are the examples of neoplastic epulis of canines [10-11]. Recently clinical research has been focused on specific diagnosis of such tumors based on histomorphological characters [12].

In the present study, although most of the gross and microscopic features of the tumorous growth came in agreement with the existing references [12] of canine acanthomatous ameloblastoma (CAA), some histomorphic traits seem atypical. Classically CAA is an aggressive tumor of the canine jaw where prolifera-

ting ameloblastic cells invades the deep sub mucosa of the gingiva [12]. The microscopic section of the gingival mass studied here demonstrates a thickened epithelial layer forming distinct cord like projections. Similar histomorphologic features have been discussed previously by many authors [13-14].

In this case, instead of typical single layer tall columnar cells (ameloblasts), unusual multilayered cells were found in the border of ameloblastic islands. The nuclei of these columnar cells remain in opposite direction of basement membrane; a characteristic feature referred as reverse nuclear polarity [15-16]. The multilayered basal cells observed in this case might be expressed as "irregular epithelial stratification". Such distinction in epithelial layer resembles to some reports of ameloblastomas [17]. Intercellular bridging in the proliferating ameloblasts with nuclear polymorphism, higher nuclear-cytoplasmic ratio and hyper chromatic nuclei were other microscopic features in this case. These lesions are quite similar to the finding of previous researchers [17].

At higher magnification, the center of the epithelial mass revealed some enlarged, ovoid to ellipsoid cells with nuclear vacuolation and pale eosinophilic granular cytoplasm. These peculiar cells are considered as "ghost cells" which is unlikely for CAAs but common in dentinogenic ghost cell tumors (DGCT) of human [18]. Ghost cells are thought to be transformed odontogenic epithelial cells, but the mechanism of its transformation is yet unknown [19]. Sometimes ghost cells contain nuclear remnants in various stages of degeneration which was also seen in this case. Ultra structurally these ghost cells carry fine calcium granules which originate from dystrophic calcification [20].

The histological features of CAAs can be easily confused with fibromatous epulis of periodontal ligament origin (FEPL); but FEPLs can be distinguished by presence of proliferating mesenchymal tissue with dense population of fibroblasts in the thickened collagen matrix where in CAA the proliferating cells are ameloblasts [21]. Besides, presence of periodontal ligament stroma is the differentiating character of FELP with CAA.

With some exceptions, histomorphological characters of the gingival mass in the present case resembles with canine acanthomatous ameloblastoma (CAA). However varying amount of ghost cells and irregular epithelial stratification were the outstanding atypical features. This might be an indication of newer variants of ameloblastoma in dogs. Yet, any suggestion to this regard requires special histochemical approaches to explore the biochemical nature of these changes. The biochemical nature of the "ghost cells" has been explored in dentinogenic ghost cell tumors (DGCT) in human [22], but no studies have been conducted yet to clarify about the irregular epithelial stratification in ameloblastic follicles whether it is an inductive effect or a metaplastic change.

Histochemical study of a classical ameloblastoma with similar microscopic lesion have demonstrated strong positive reaction to epithelial marker (cytokeratin) compared to connective tissue marker (vimentin) and conclusively proved that such proliferation was epithelial origin [23]. Therefore, based on histological attributes, the gingival lesions in the above studied case can be designated as canine acanthomatous ameloblastoma (CAA) and the unusual features can be described as atypical histomorphology for the time being.

Postoperative observation over three month period showed no evidence of recurrence and thus indicates favorable outcome. Recurrences usually happen due to deeper invasion of neoplastic tissue in bone or following marginal surgical excision [23]. These recurrent tumors are more aggressive and anaplastic and their biological behaviors are similar to that of squamous cell carcinoma [24]. Hence wider surgical excision (with bone removal) is considered the fastest and most curative treatment for acanthomatous ameloblastoma [24]. Radiation therapy has also been reported effective in treating CAAs. Intralesional (IL) chemotherapy is another option for treating and bleomycin has been proved as an effective IL chemotherapeutic agent for such case [25].

Conclusion

The case described above is the first of its kind in Bangladesh, besides it might contribute to a paradigm shift of knowledge in describing such tumors in dogs. Further study is required on histochemical basis to explore any newer variation among CAAs. Alternative treatment procedures like chemotherapy or irradiation should be explored for reducing health hazard of surgery with actively considering efficacy and cost requirements.

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