

Diagnostic Challenges in Desmoplastic and Granular Cell Ameloblastomas: A Case Series with Clinicopathologic Correlation

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Case Report

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Abstract

Background:

Desmoplastic and granular cell ameloblastomas are uncommon histologic variants of ameloblastoma that present distinct diagnostic and therapeutic challenges. Their atypical microscopic architecture and radiologic overlap with other maxillofacial lesions may complicate accurate diagnosis and management planning.

Case presentation:

We report three cases—one desmoplastic and two granular cell ameloblastomas—diagnosed at a tertiary care centre. Detailed clinicoradiologic and histopathologic features were analysed to highlight distinguishing characteristics and potential diagnostic pitfalls. The desmoplastic ameloblastoma occurred in the anterior maxilla and demonstrated dense stromal collagenization, compressed epithelial islands, and focal osseous metaplasia, radiologically mimicking fibro-osseous pathology. The two granular cell ameloblastomas involved the posterior mandible and exhibited classical granular cytoplasmic transformation of stellate reticulum-like cells with peripheral palisading and reverse nuclear polarity. In all cases, definitive diagnosis required careful histopathologic evaluation with clinicoradiologic correlation.

Conclusion:

Recognition of these rare variants is critical due to their infiltrative growth pattern, increased risk of recurrence, and potential for diagnostic misinterpretation. Accurate classification facilitates appropriate surgical management and long-term surveillance.

BACKGROUND

Ameloblastoma is a benign but locally aggressive odontogenic epithelial neoplasm that accounts for approximately 10–15% of all odontogenic tumours. [1] Although histologically diverse, most cases belong to the follicular or plexiform patterns. Rare variants, such as desmoplastic and granular cell ameloblastomas, constitute a small proportion of cases but demonstrate distinctive clinicopathologic features with important diagnostic and prognostic implications. [2–4]

Desmoplastic ameloblastoma is characterised by extensive stromal collagenization with compressed epithelial islands and may radiologically resemble fibro-osseous lesions. Granular cell ameloblastoma demonstrates cytoplasmic lysosomal accumulation within stellate reticulum-like cells and is associated with higher recurrence rates than conventional subtypes. [5–7]

Given their rarity and potential for diagnostic confusion, documentation of such cases remains clinically relevant. We present a tertiary care experience of three cases to emphasise distinguishing features and management considerations.

CASE PRESENTATIONS

Case 1: Desmoplastic Ameloblastoma

A 23-year-old female presented with a one-year history of progressive swelling in the left anterior maxilla. Clinical examination revealed a firm bony swelling without lymphadenopathy.

Radiologic findings:

CT imaging demonstrated a well-defined unilocular expansile lytic lesion measuring 40 × 35 mm, extending into the nasal cavity and maxillary sinus. Radiologic differentials included ameloblastoma and odontogenic myxoma.

Histopathology:

An incisional biopsy specimen, measuring 3.5 × 3.0 cm, was submitted for histological analysis. Microscopy revealed predominantly fibrous stroma, creating a diagnostic dilemma. However, careful evaluation revealed a few small, compressed epithelial islands with peripheral palisading of columnar cells and reverse nuclear polarity. The surrounding stroma exhibited abundant dense fibrous tissue, accompanied by foci of metaplastic bone formation and squamous metaplasia (Fig. 1a–d). It was important to note that the cellular islands were scant, and the most important morphological feature was reverse palisading. At this point, we found that the remaining features, such as metaplastic bone formation and squamous metaplasia, were also frequent in desmoplastic ameloblastoma, as seen.

Diagnosis: Desmoplastic ameloblastoma. At the two-year follow-up, the patient has not developed a recurrence.

Case 2: Granular Cell Ameloblastoma

A 37-year-old male presented with a progressively enlarging swelling in the left mandibular region of four months' duration. The swelling was painless but had gradually increased in size. The patient reported a history of tobacco chewing for the past year. Based on clinical evaluation, the provisional differential diagnoses included odontogenic keratocyst and dentigerous cyst.

Histopathology:

An incisional biopsy was obtained for evaluation. Microscopic examination revealed predominantly a cystic pattern enclosing stellate reticulum-like areas, intermingled with sheets of polygonal to round cells containing abundant coarse, granular, eosinophilic cytoplasm. The presence of these granular cells raised the possibility of alternate odontogenic neoplasms; however, on careful observation, lobules of odontogenic epithelium with peripheral columnar cells exhibiting reverse nuclear polarity, hyperchromatic nuclei, and subnuclear vacuolization favoured the diagnosis of ameloblastoma (Fig. 2a–d). The granular transformation was diffuse and consistent across sections.

Diagnosis: Granular cell ameloblastoma.

Case 3: Granular Cell Ameloblastoma

A 53-year-old female presented with a painful swelling in the left mandible of six months' duration.

Histopathology:

Microscopic examination revealed an odontogenic neoplasm composed of anastomosing sheets, a follicular pattern and islands of columnar epithelial cells. The peripheral tumour cells demonstrated palisading with reverse nuclear polarity. The cytoplasm of the tumour cells was abundant, granular, and eosinophilic, while the nuclei exhibited bland chromatin without atypia. These features were consistent across multiple sections (Fig. 3a–d).

Diagnosis: Granular cell ameloblastoma.

All patients underwent surgical resection with clear margins. At two-year follow-up, no recurrence has been observed.

DISCUSSION AND CONCLUSIONS

Ameloblastomas are known for local aggressiveness and a high rate of recurrence when treated conservatively. While conventional variants predominantly involve the posterior mandible, desmoplastic ameloblastoma shows a predilection for anterior jaws, particularly the maxilla, as demonstrated in our series. [1, 8]

Diagnostic Considerations

Desmoplastic variant:

First described as a distinct entity by Eversole in 1984, it is characterised by compressed epithelial islands in a densely collagenized stroma, often accompanied by squamous metaplasia and metaplastic bone [9]. The dense stromal collagenization, with compressed epithelial islands, may obscure classical ameloblastic features, increasing the risk of misdiagnosis as a fibro-osseous lesion or an odontogenic fibroma. Radiologic mixed-density patterns further contribute to confusion. [5, 7] Identification of peripheral palisading and reverse polarity remains critical for diagnosis.

Granular cell variant:

First reported by Krompecher in 1918, it is an uncommon histological variant characterised by stellate reticulum-like cells with abundant coarse, eosinophilic, granular cytoplasm due to lysosomal accumulation [10]. The granular cytoplasmic change represents lysosomal accumulation within neoplastic cells. Differential diagnoses include granular cell tumour, granular odontogenic tumour, and congenital epulis. [11–13] Recognition of ameloblastic architecture with peripheral palisading is essential to avoid misclassification.

Biological Behavior

Granular cell ameloblastoma has been reported to demonstrate higher recurrence rates and rare metastasis compared to other subtypes. [6, 10, 14] Desmoplastic ameloblastoma may exhibit ill-defined margins, particularly in the maxilla, increasing the risk of incomplete excision. The clinical, histopathological and prognostic features of subtypes of ameloblastomas are summarised in Table 1.

Table 1
Comparison of Ameloblastoma Subtypes: Clinical, Histopathological, and Prognostic Features

Subtype	Frequency (%)	Common Site	Histological Features	Biological Behavior	Recurrence Risk
Follicular	32–35	Posterior mandible	Islands of odontogenic epithelium, peripheral palisading, reverse polarity	Locally invasive	Moderate
Plexiform	25–30	Posterior mandible	Interconnecting strands and cords of odontogenic epithelium	Locally invasive	Moderate
Acanthomatous	10–15	Posterior mandible	Squamous metaplasia within stellate reticulum-like cells	Similar to follicular	Moderate
Basaloid	< 5	Posterior mandible	Basaloid epithelial cells in nests with scant cytoplasm	Rare, may mimic basal cell carcinoma	Limited data
Granular cell	3–5	Posterior mandible	Stellate reticulum-like cells with coarse eosinophilic granular cytoplasm (lysosomal)	Aggressive, locally recurrent, rare metastasis	High (≈ 33%)
Desmoplastic	4–13	Anterior maxilla	Compressed epithelial islands in densely collagenized stroma ± metaplastic bone	Infiltrative, radiographic mimicry of fibro-osseous lesions	High

Management Implications

Given their infiltrative nature, radical surgical resection with adequate margins remains the preferred treatment. Conservative procedures such as curettage are associated with significantly higher recurrence rates. Long-term follow-up is mandatory irrespective of histologic subtype. [6, 13].

Literature Review

Our series contributes to the limited Indian literature on rare subtypes of ameloblastoma [7, 11, 13]. Reporting such cases is crucial not only to raise awareness of their diagnostic complexity but also to emphasise their aggressive potential. Reported cases in the literature of these variants have been summarised in Table 2. [15–20] In reported cases, desmoplastic ameloblastoma demonstrates a clear predilection for the anterior maxilla, with mixed radiographic density and infiltrative margins, which can contribute to diagnostic confusion with fibro-osseous lesions. Granular cell ameloblastoma predominantly affects the posterior mandible and is associated with a higher reported recurrence rate and rare metastatic potential. Surgical resection with adequate margins remains the most consistent management strategy across studies. Accurate diagnosis based on clinical, radiological, and histopathological correlation is essential for guiding management and minimising recurrence.

Table 2

Comparative Analysis of Demographic, Radiologic, Therapeutic, and Prognostic Features in Reported Recent Cases of Desmoplastic and Granular Cell Ameloblastoma.

Author (Year)	Country	Variant	No. of Cases	Age Range	Site Predominance	Radiologic Pattern	Treatment	Follow-up	Recurrence / Metastasis
Philipsen et al. (2001) [15]	Denmark	Desmoplastic	45	18–72 yrs	Anterior maxilla	Mixed radiolucent–radiopaque	Resection	Variable	Higher recurrence trend
Sivapathasundharam et al. (2007) [7]	India	Desmoplastic	5	28–60 yrs	Maxilla	Mixed density lesion	Resection	2 yrs	1 recurrence
Manikandan et al. (2023) [5]	India	Desmoplastic	1	36 yrs	Maxilla	Ill-defined mixed lesion	Resection	1 yr	No
Aher et al. (2015) [16]	India	Desmoplastic	1	42 yrs	Anterior maxilla	Mixed radiopacity	Enucleation	18 mo	Yes
Angadi et al. (2011) [17]	India	Hybrid desmoplastic	1	48 yrs	Maxilla	Mixed lesion	Resection	2 yrs	No
Cadavid et al. (2018) [18]	Colombia	Granular cell	8	29–65 yrs	Posterior mandible	Multilocular radiolucency	Resection	4 yrs	No
Bansal et al. (2012) [6]	India	Granular cell	1	41 yrs	Mandible	Expansile radiolucency	Resection	1 yr	Lung metastasis
Kulkarni et al. (2018) [12]	India	Granular cell	1	37 yrs	Mandible	Multilocular lesion	Resection	3 yrs	No
Mathew et al. (2020) [19]	India	Granular cell	1	52 yrs	Mandible	Multilocular radiolucency	Resection	2 yrs	No
Sukumaran et al. (2022) [14]	India	Granular cell	1	55 yrs	Mandible	Radiolucent lesion	Resection	1 yr	No
Varshney et al. (2025) [20]	India	Granular cell	1	46 yrs	Mandible	Aggressive radiolucency	Resection	18 mo	Rapid recurrence

Desmoplastic and granular cell ameloblastomas represent uncommon but clinically significant histologic variants. Their atypical morphology and radiologic overlap with other jaw lesions may complicate diagnosis. Careful clinicopathologic correlation is essential for accurate classification and appropriate surgical management. Increased awareness of these variants can reduce diagnostic errors and improve long-term outcomes.

Declarations

Ethical Approval and Consent to Participate:

1. This case report was conducted in accordance with the ethical principles applicable to case reports and the institutional requirements of the authors' institution. Ethical approval was not required for this single-case report. Written informed consent was obtained from the patient prior to manuscript preparation. No image or text has been included that could directly identify the patient.

Consent for Publication:

2. Written informed consent was obtained from the patient for publication of the case report and any accompanying clinical information/images.

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Author Contribution

Conceptualisation-Preeti Agarwal, Methodology and Software-Krachi Agarwal, Harshit Jain, Ram Pravesh Mishra, Muskan Mahawar, Validation-Preeti Agarwal and Atin Singhai, Formal analysis-Krachi Agarwal, Investigation- Krachi Agarwal, Harshit Jain, Muskan Mahawar , Ram Pravesh Mishra, Resources- Dr. Atin Singhai, Data Curation- Dr. Atin Singhai, Writing - Original Draft- Krachi Agarwal , Preeti Agarwal, Writing - Review & Editing, Visualization, Supervision, - Preeti Agarwal, Funding- None

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Data availability:

All data generated or analysed during this study are included in this article. Further enquiries can be directed to the corresponding author.

3. Competing interests: Nil

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Figures

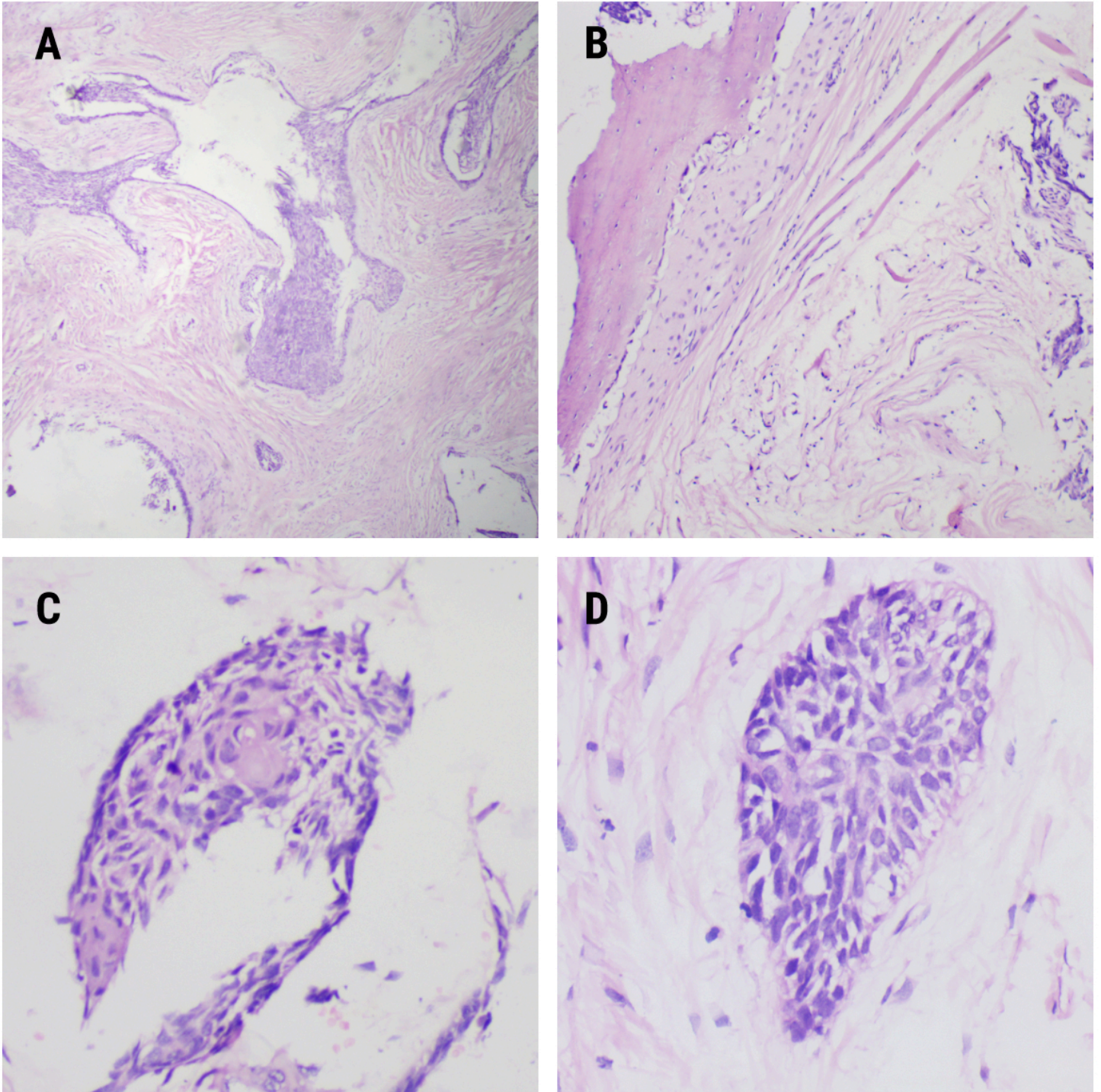


Figure 1

Sections from the case of desmoplastic ameloblastoma show large areas of fibrosis enclosing islands of epithelial cells in A (H&E x 40), and in B, osteoid formation is seen (H&E x 100). In C, focal squamous metaplasia is seen, and in D, reverse polarity is seen among (C and D; H&E x 400)

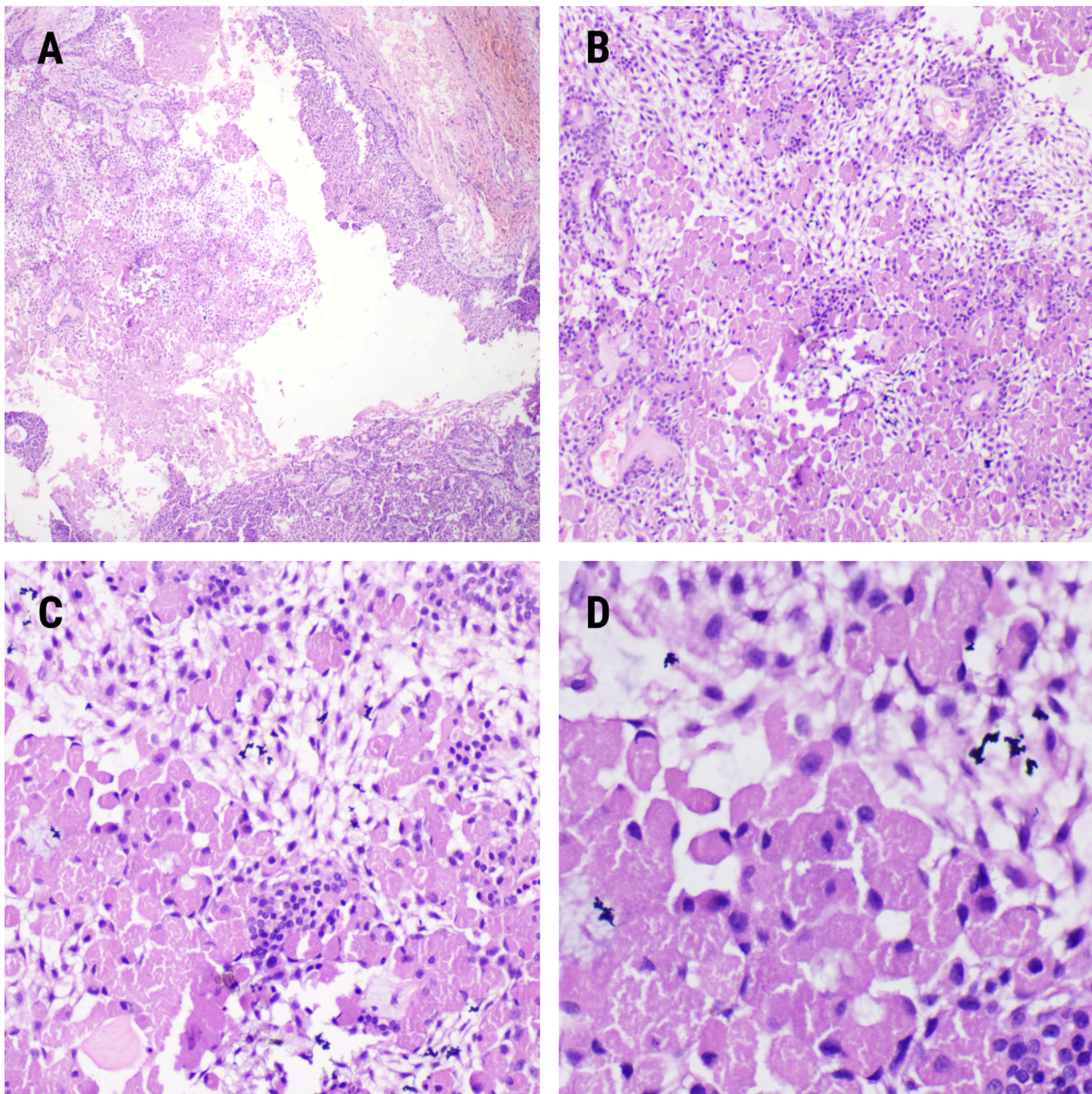


Figure 2

Sections from case one of granular ameloblastoma show large cystic areas (A; H&E x40) enclosing predominantly epithelioid cells intermixed with stellate reticulum cells (B; H&E x100). In 2C and D, we can appreciate that these cells have a large amount of dense granular eosinophilic cytoplasm (C; H&E x200; D; H&E x400).

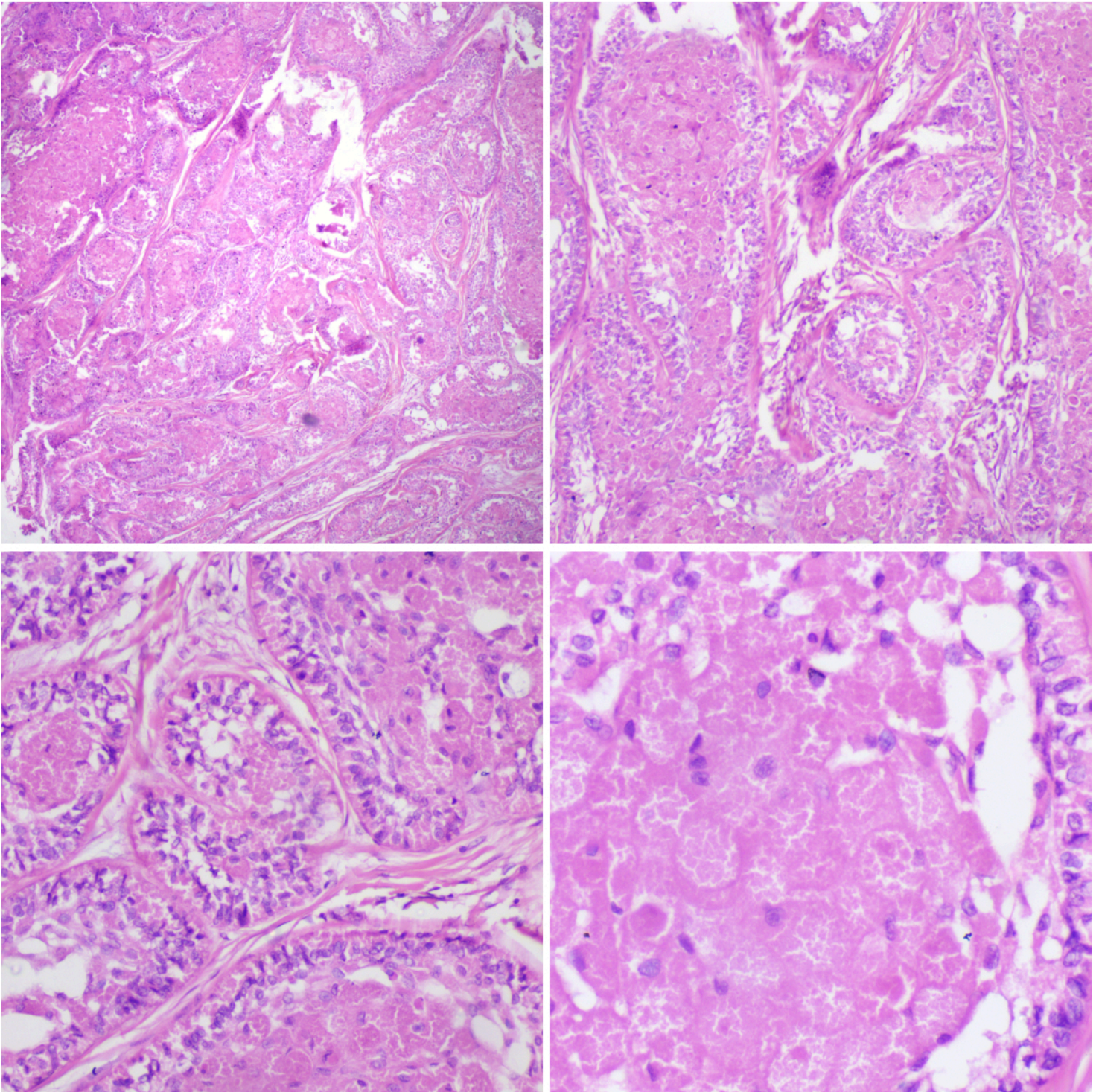


Figure 3

Sections from case two of granular ameloblastoma were composed of predominantly follicular architecture (A; H&E x40; B; H&E x100). In 3C and D, we can appreciate that follicles display classic columnar lining with reverse polarity and the centre of follicles is occupied by cells with granular eosinophilic cytoplasm (C; H&E x200; D; H&E x400).

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Table1new.docx](#)
- [Table2.docx](#)