

Glandular Odontogenic Cyst: A Rare Histopathological Entity with An Unpredictable Recurrence Pattern

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Abstract: Background: Glandular odontogenic cyst (GOC) is a rare developmental odontogenic cyst characterized by distinctive yet diagnostically challenging histopathological features and a recognized propensity for recurrence. Histopathological examination in the present case revealed non-keratinized hyperplastic epithelium with extensive mucous goblet cells, hobnail cells, and mucin-filled duct-like structures, with Alcian blue confirming the mucinous component. Although these features supported the diagnosis, the literature emphasizes that individual histological characteristics do not reliably predict recurrence. The lesion's potential for persistent and late recurrence underscores the importance of adequate treatment and prolonged clinical and radiographic follow-up. Material and Methods: For the given specimen H & E and alcian blue stain s were used. Result: Mucous cells were identified by using alcian blue as a special stain. Conclusion: As per histopathological finding the lesion was diagnosed as GOC. [Sheth H Natl J Integr Res Med, 2026; 17(1): 45-50, Published on Dated: 07/07/2026]

Keywords: GOC, Reoccurrence, Histopathology Features

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Introduction: Glandular odontogenic cyst (GOC) is a rare developmental odontogenic cyst characterized by distinctive yet diagnostically challenging histopathological features and a recognized propensity for recurrence.

Material and Methods: The sections were stained with haematoxylin & eosin stains for the routine diagnosis. Eventually the finding of mucous cells leads us to the confirmatory staining with alcian blue stain as per the availability of stains.

Case Study: A 66-year-old male patient presented with a chief complaint of pain in the lower right back teeth region for 3 days. The patient had undergone root canal treatment on 46 & root piece of 45 was present. On extraoral examination, there were no signs of asymmetry, swelling, or paraesthesia on the right side of the mandible. On intraoral examination, root piece of 45 & grossly decayed 46 were noticed. Although 46 had already been treated with root canal treatment earlier. Tender on percussion was absent with both 45 & 46. Along with this grade I mobility was noticed.

On soft tissue examination there was mild vestibular tenderness present in relation with 45

& 46 on buccal aspect. On palpation clear watery discharge was found in 46 region. Pus or blood discharge were not found. On radiograph multilocular radiolucency was noticed.

The radiolucency present with 45 & mesial root of 46 were noticed with ill-defined borders, whereas the radiolucency that was associated with the distal root of 46 was present with clearly defined borders. On histopathological examination, the given H & E-stained section & alcian blue stained section showed presence of mucous goblet cells throughout on the non-keratinized hyperplastic epithelium. Hobnail pattern was seen. Mucin filled duct like structures were also present. Basal cells were hyperchromatic, cuboidal & arranged in palisaded pattern. Very few inflammatory cells in connective tissue were noticed (Figure 1, 2, 3, 4).

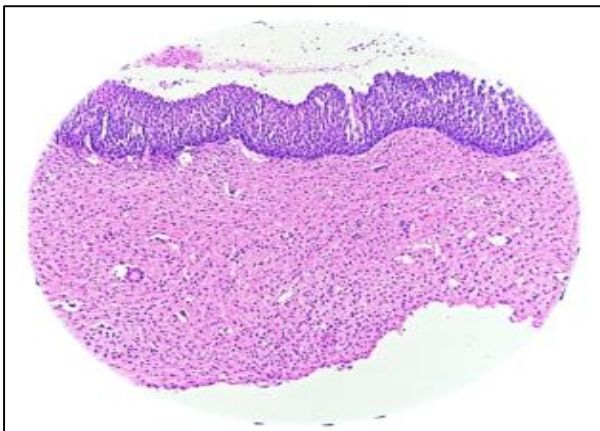
Discussion: Glandular odontogenic cyst (GOC) is an uncommon developmental odontogenic cyst, accounting for less than 0.5% of odontogenic cysts. Despite its benign classification, it is recognized for its locally aggressive potential and propensity for recurrence. The principal diagnostic challenge lies in its considerable histopathological overlap with other odontogenic cysts, particularly lateral periodontal and botryoid odontogenic

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cysts, as well as central mucoepidermoid carcinoma (CMEC). Consequently, histopathological examination remains the definitive means of establishing the diagnosis^{1,2,3,4}.

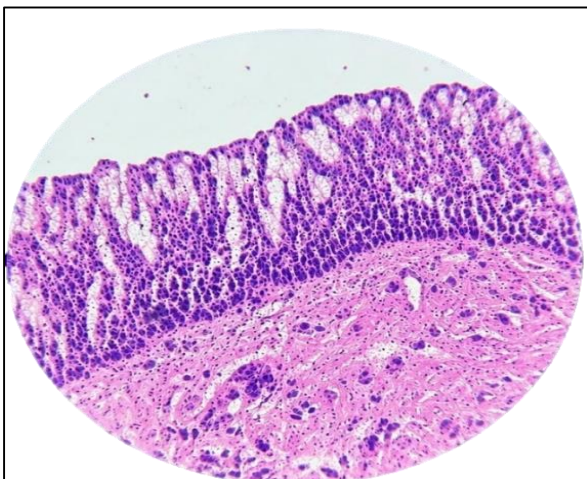
The microscopic appearance of GOC is characteristically heterogeneous, with the diagnostic features not necessarily distributed uniformly throughout the cyst lining. The recent series by Slezak et al. emphasized that the characteristic microscopic findings may be focal and that diagnostic confidence increases with the number of characteristic features identified.

Figure 1: Scanner View of H & E- Stained Section



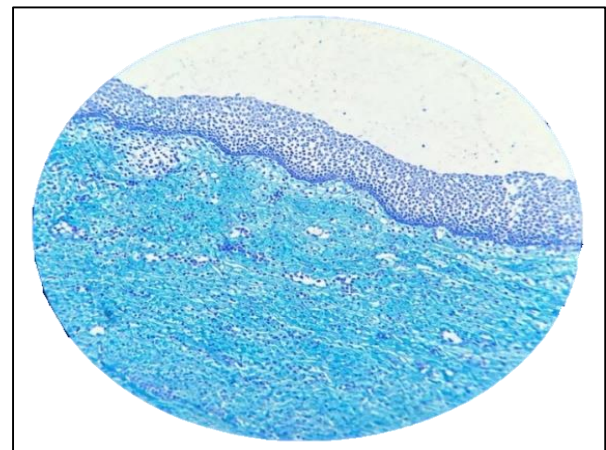
These include variable epithelial thickness, focal epithelial thickenings, superficial cuboidal to low-columnar cells with a hobnail appearance, intraepithelial microcysts, mucous-producing cells, papillary proliferations and ciliated cells. This heterogeneous distribution is important in the interpretation of biopsy material, as limited sampling may fail to demonstrate the complete morphological spectrum of the lesion^{5,6,18}.

Figure 2: Hobnail Appearance In Epithelium



In the present case, histopathological examination demonstrated a non-keratinized hyperplastic epithelial lining with conspicuous mucous goblet cells throughout the epithelium, a hobnail pattern, and mucin-filled duct-like structures. The mucous component was further demonstrated by Alcian blue staining. The coexistence of these features provides substantial morphological support for GOC and is consistent with the characteristic epithelial spectrum described in recent literature. Kwon et al. specifically highlighted mucin-filled cystic spaces, gland-like or duct-like structures, intraepithelial microcysts and eosinophilic cuboidal or hobnail cells among the key histopathological features of GOC^{6,10}.

Figure 3: Scanner View- Alcian Blue Stain Section



The presence of hobnail cells in the present specimen is particularly significant. Hobnail cells constitute one of the classical major microscopic criteria described by Kaplan et al. and have subsequently been regarded as one of the most characteristic features of GOC. However, the literature cautions against considering hobnail cells in isolation as pathognomonic.

Fowler et al., in their analysis of 46 cases, demonstrated that a reliable diagnosis is better achieved through recognition of a combination of histological parameters rather than dependence upon an individual feature. In particular, the coexistence of hobnail cells with intraepithelial microcysts, clear cells, epithelial spheres, variable epithelial thickness and multiple compartments was considered more useful in distinguishing GOC from histological mimics^{5,18}.

The mucin-producing goblet cells and mucin-filled duct-like structures observed in the present case

further strengthen the diagnosis. GOC is characterized by glandular or pseudo glandular differentiation within an otherwise odontogenic epithelial lining, and mucous cells may occur singly, in clusters, or lining microcystic or duct-like spaces. The demonstration of mucin by Alcian blue in the present case provides histochemical corroboration of the mucous nature of these cells and of the intraluminal material.

Importantly, however, the presence of mucous cells alone should not be regarded as diagnostic, since mucous metaplasia can occur in other odontogenic cysts. The diagnostic significance in the present case arises from their occurrence in combination with hobnail cells and mucin-containing duct-like structures, producing a characteristic constellation rather than an isolated mucous-cell change^{5,6,15}.

This distinction is relevant to the longstanding diagnostic difficulty between GOC and CMEC. Both lesions may exhibit mucous cells, cystic or gland-like structures and variable epithelial morphology.

Several of the reviewed articles emphasize that the distinction cannot be based simply on the presence of mucous or glandular differentiation.

Gorgis et al. further discussed the reported morphological overlap between GOC and CMEC and noted that CMEC-like epithelial islands have occasionally been identified in otherwise typical GOCs. More recent literature emphasizes assessment for an infiltrative epithelial component and cytological atypia when considering CMEC in the differential diagnosis.

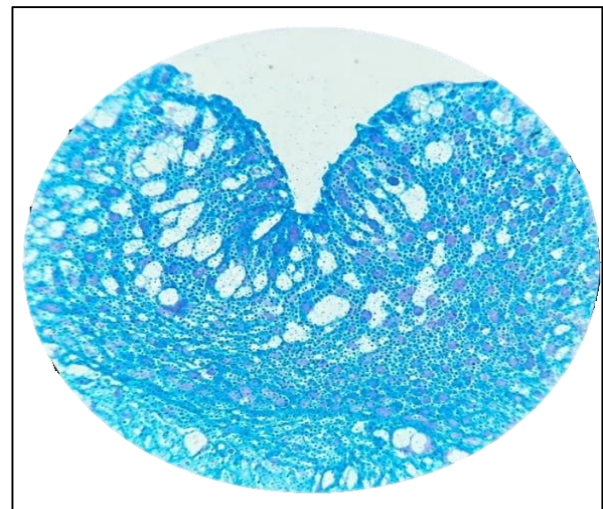
In the present specimen, the described findings were confined to the cystic epithelial lining, without a reported infiltrative malignant component, thereby favouring GOC in the appropriate clinicopathological setting^{7,8}.

An additional finding in the present specimen was the presence of hyperchromatic cuboidal basal cells arranged in a palisaded pattern.

This observation deserves cautious interpretation because it does not correspond directly with the classical Kaplan criterion describing a squamous epithelial lining with a flat epithelial-connective tissue interface and absence of basal palisading.

Therefore, basal palisading should not be considered a defining feature of GOC in this case. Rather, its presence illustrates the morphological variability that may be encountered within GOC and reinforces the importance of evaluating the epithelial lining as a whole. The diagnosis in the present case is supported principally by the combined presence of mucous goblet cells, hobnail cells and mucin-filled duct-like structures rather than by the basal-cell arrangement alone^{18,6}. The minimal inflammatory infiltrate within the connective tissue wall is also of note.

Figure 4: Alcian Blue- Identifying Mucous Cells



Inflammatory and regressive changes have been described in GOCs, particularly in the larger series, but inflammation is not considered a defining diagnostic characteristic. Slezak et al. reported secondary inflammatory and regressive changes in many of their cases, illustrating that such alterations may accompany GOC but are not responsible for its characteristic epithelial morphology. In the present case, the very sparse inflammatory component, together with the prominent epithelial alterations, further supports interpretation of the mucous and duct-like changes as intrinsic components of the lesion rather than merely reactive changes secondary to inflammation⁶.

The recurrence potential of GOC remains an important consideration despite its benign histological classification. Earlier reports have documented recurrence rates ranging from approximately 21.6% to 50%, with differences between studies partly reflecting variation in treatment modality and duration of follow-up.

Gorgis et al. reported recurrence rates of 50% in the series of Fowler et al., 29.2% in the series of Kaplan et al., and 21.6% in the review by Chrcanovic et al. More recent data from Kwon et al. identified recurrence in 7 of 48 cases (14.6%) with available follow-up, with a mean interval to recurrence of approximately 30 months, although the authors acknowledged variability in follow-up duration. These differences indicate that the reported recurrence rate should be interpreted in the context of the length and completeness of follow-up^{9,4,11}.

The relationship between the histopathological appearance of GOC and its recurrence potential is, however, less straightforward. Earlier literature has suggested that the presence of microcysts and a delicate cyst wall may contribute to recurrence by facilitating epithelial remnants after conservative removal. Other proposed mechanisms include the multicystic architecture of the lesion, detachment of the epithelial lining from the connective tissue wall and extension of the cyst through cancellous bone. Nevertheless, the more recent literature does not establish any individual microscopic characteristic as a reliable predictor of recurrence.

Thus, although the prominent mucous cells, hobnail cells and duct-like structures in the present case are highly relevant to diagnosis, they should not independently be interpreted as indicators of increased recurrence risk^{9,11,12,13}.

This distinction between diagnostic significance and prognostic significance is particularly important in the present case. The histological findings demonstrate several characteristic features of GOC, but the available evidence does not support assigning a recurrence risk solely on the basis of these microscopic findings. Instead, lesion size, locularity, cortical involvement, completeness of surgical removal and duration of follow-up appear to be more clinically relevant considerations. Gorgis et al. reported that larger lesions, multilocularity and compromised cortical integrity were associated with increased recurrence, while recurrence was more frequently observed following conservative procedures such as enucleation and curettage^{9,4,11,14}.

The possibility of recurrence is further complicated by its potential to occur after

prolonged intervals. Recurrences have been documented several years after initial treatment, and Gorgis et al. reported recurrence at approximately three, eight and ten years in previously published cases. Their review therefore advocated prolonged surveillance, preferably extending to seven years. The recent series by Slezak et al. provides further evidence of the potential for repeated recurrence, with histologically confirmed recurrence occurring at 14 months and again 11 months after the second procedure in one patient. These observations emphasize that an apparently satisfactory early postoperative outcome should not be considered sufficient to exclude later recurrence^{4,11,12,14}.

The choice of treatment consequently remains a balance between local control and surgical morbidity. Conservative treatment with enucleation or curettage is frequently employed, particularly for smaller and well-circumscribed lesions, whereas peripheral osteotomy or marginal/segmental resection has historically been advocated for larger, multilocular or cortically perforating lesions. The more recent literature, however, does not support an indiscriminate radical approach to every GOC.

Rather, treatment should be individualized according to the extent and architecture of the lesion and the feasibility of achieving complete removal^{11,12,13,19}.

The present case is therefore histo-pathologically significant because the diagnosis is supported by the convergence of multiple characteristic features: non-keratinized hyperplastic epithelium, widespread mucous goblet cells demonstrated on H&E and supported by Alcian blue staining, a superficial hobnail pattern, and mucin-filled duct-like structures.

Although basal hyperchromatic cuboidal cells with palisading were also observed, this feature is not regarded as a defining criterion and was interpreted in conjunction with the remainder of the epithelial morphology.

Such an approach is consistent with the current understanding that GOC should be diagnosed from the overall histopathological pattern rather than from fulfilment of an isolated microscopic criterion^{5,6,10}.

Overall, the present case reinforces the importance of meticulous histopathological examination in GOC, particularly because the characteristic features may occur in varying combinations and may overlap with other odontogenic lesions and CMEC.

The abundant mucous component and duct-like structures in the present specimen could potentially create diagnostic uncertainty if interpreted in isolation; however, their association with hobnail cells and the absence of a reported infiltrative malignant component favour GOC. At the same time, the recurrence literature indicates that the microscopic features responsible for establishing the diagnosis should not automatically be regarded as predictors of biological behaviour.

Long-term clinical and radiographic surveillance therefore remains essential, irrespective of the apparent adequacy of initial treatment^{6,9,14,18}.

Conclusion: As per histopathological finding the lesion was diagnosed as GOC.

References:

1. Padayachee A, Van Wyk CW. Two cystic lesions with features of both the botryoid odontogenic cyst and the central mucoepidermoid tumour: sialo-odontogenic cyst? *J Oral Pathol.* 1987; 16(9):499-504. doi:10.1111/j.1600-0714.1987.tb00680.x.
2. Gardner DG, Kessler HP, Morency R, Schaffner DL. The glandular odontogenic cyst: an apparent entity. *J Oral Pathol.* 1988; 17(8):359-366. doi:10.1111/j.1600-0714.1988.tb01298.x.
3. MacDonald-Jankowski DS. Glandular odontogenic cyst: systematic review. *Dentomaxillofac Radiol.* 2010; 39(3):127-139. doi:10.1259/dmfr/30943934.
4. Chrcanovic BR, Gomez RS. Glandular odontogenic cyst: an updated analysis of 169 cases reported in the literature. *Oral Dis.* 2018; 24(5):717-724. doi:10.1111/odi.12719.
5. Fowler CB, Brannon RB, Kessler HP, Castle JT, Kahn MA. Glandular odontogenic cyst: analysis of 46 cases with special emphasis on microscopic criteria for diagnosis. *Head Neck Pathol.* 2011; 5(4):364-375. doi: 10.1007/s12105-011-0298-3.
6. Heiliczer S, Shmuly T, Avishai G, Zlotogorski-Hurvitz A, Vered M, Mamber L, et al. Histopathological and histomorphometric analysis of glandular odontogenic cyst-A diagnostic aid. *Oral Dis.* 2023; 29(8):3306-3312. doi:10.1111/odi.14415.
7. Kaplan I, Anavi Y, Manor R, Sulkes J, Calderon S. The use of molecular markers as an aid in the diagnosis of glandular odontogenic cyst. *Oral Oncol.* 2005; 41(9):895-902. doi:10.1016/j.oraloncology.2005.04.015.
8. Vered M, Allon I, Buchner A, Dayan D. Is maspin immunolocalization a tool to differentiate central low-grade mucoepidermoid carcinoma from glandular odontogenic cyst? *Acta Histochem.* 2010; 112(2):161-168. doi:10.1016/j.acthis.2008.10.006.
9. Peraza Labrador A, Shrestha A, Gonzalez M, Gonzalez Marin NR, Villacis M, Kesterke M, et al. Recurrence of glandular odontogenic cysts: a systematic review. *Head Neck Pathol.* 2024; 18(1):31. doi:10.1007/s12105-024-01637-2.
10. Kwon YE, Choi SY, Kim M, An CH, An SY. Glandular odontogenic cyst: a ten-case series and literature review with emphasis on radiological diagnostic challenges. *BMC Oral Health.* 2025; 25(1):1989. doi: 10.1186/s12903-025-07296-1.
11. Kaplan I, Gal G, Anavi Y, Manor R, Calderon S. Glandular odontogenic cyst: treatment and recurrence. *J Oral Maxillofac Surg.* 2005; 63(4):435-441. doi:10.1016/j.joms.2004.08.007.
12. Thor A, Warfvinge G, Fernandes R. The course of a long-standing glandular odontogenic cyst: marginal resection and reconstruction with particulated bone graft, platelet-rich plasma, and additional vertical alveolar distraction. *J Oral Maxillofac Surg.* 2006; 64(7):1121-1128. doi:10.1016/j.joms.2006.03.042.
13. Boffano P, Cassarino E, Zavattero E, Campisi P, Garzino-Demo P. Surgical treatment of glandular odontogenic cysts. *J Craniofac Surg.* 2010; 21(3):776-780. doi:10.1097/SCS.0b013e3181d7a3e6.
14. Slezak R, Laco J, Mottl R, Tuček L, Duška J, Abou Assaf W. Glandular odontogenic cyst: a retrospective clinical study of 10 cases. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2026; 142(3):e1-e10. doi:10.1016/j.oooo.2026.04.009.
15. Krishnamurthy A, Sherlin HJ, Ramalingam K, Natesan A, Premkumar P, Ramani P, et al. Glandular odontogenic cyst: report of two cases and review of literature. *Head Neck*

- Pathol. 2009; 3(2):153-158. doi: 10.1007/s12105-009-0117-2.
16. Magnusson B, Göransson L, Odesjö B, Gröndahl K, Hirsch JM. Glandular odontogenic cyst. Report of seven cases. Dentomaxillofac Radiol. 1997; 26(1):26-31. doi: 10.1038/sj.dmfr.4600205.
 17. Koppang HS, Johannessen S, Haugen LK, Haanæs HR, Solheim T, Donath K. Glandular odontogenic cyst (sialo-odontogenic cyst): report of two cases and literature review of 45 previously reported cases. J Oral Pathol Med. 1998; 27(9):455-462. doi:10.1111/j.1600-0714.1998.tb01984.x.
 18. Soluk-Tekkesin M, Wright JM. The World Health Organization classification of odontogenic lesions: a summary of the changes of the 2022 (5th) edition. Turk Patoloji Derg. 2023; 39(1):1-14.
 19. Martins-Chaves RR, Granucci M, Gomez RS, Henriques de Castro W. Glandular odontogenic cyst—a case series. J Oral Maxillofac Surg. 2021; 79(5):1062-1068. doi: 10.1016/j.joms.2020.10.030.

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