

Diagnosis and treatment of gastric bronchogenic cyst: a case report and literature review

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Case Report

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Abstract

Background: Gastric bronchogenic cyst (GBC) is a rare congenital foregut anomaly, typically located near the gastric fundus or cardia. Due to its nonspecific clinical and imaging features, preoperative diagnosis is challenging, and it is often misdiagnosed as a gastrointestinal stromal tumor (GIST) or other submucosal lesions, especially when imaging reveals a solid-appearing or atypical cystic mass.

Case presentation: A 42-year-old asymptomatic woman was incidentally found to have a cystic mass adjacent to the gastric cardia. Enhanced CT and MRI revealed a well-defined, approximately 3.0 cm × 2.2 cm lesion with no significant enhancement. Endoscopy showed a smooth-surfaced submucosal elevation. The patient underwent successful laparoscopic complete resection, with careful dissection to preserve the gastric muscular layer and maintain cyst integrity. Histopathological examination confirmed the diagnosis of GBC, characterized by a cyst wall lined with pseudostratified ciliated columnar epithelium. The postoperative course was uneventful, and the patient recovered well with no recurrence at the 3-month follow-up.

Conclusion: GBC should be considered in the differential diagnosis of a well-defined, non-enhancing cystic mass near the gastric cardia, particularly when it mimics a GIST. Laparoscopic complete resection is a safe and effective approach that enables both definitive diagnosis and curative treatment, with favorable short-term outcomes.

Introduction

Bronchogenic cyst (BC) is a rare congenital developmental anomaly of the foregut, typically occurring in the mediastinum or lung, while ectopic occurrence is even rarer.[1–3] Gastric bronchogenic cyst (GBC) is an extremely rare subtype of ectopic BC. Since its first report by Dewing et al. in 1956, the relevant literature has remained dominated by case reports and small case series.[4, 5] Because of its unusual anatomical location and nonspecific clinical manifestations, preoperative diagnosis of GBC is difficult, and it often must be differentiated from gastrointestinal stromal tumors, cystic degeneration of schwannomas, gastric wall pseudocysts, and other space-occupying lesions of the gastric wall or perigastric region.

At present, the occurrence of GBC is thought to be associated with the detachment of abnormal embryonic bronchial buds and their ectopic migration along the esophagogastric pathway into the abdominal cavity.[6] The lesions are mostly located near the gastric fundus or cardia. Most patients are asymptomatic in the early stage, and the lesion is often discovered incidentally on imaging performed during physical examination or for other reasons. When the cyst enlarges or is complicated by infection, hemorrhage, compression, or other conditions, patients may develop abdominal discomfort, nausea, vomiting, gastrointestinal obstruction, or gastrointestinal bleeding.[7, 8] Although CT, MRI, and gastroscopy are helpful in assessing the location and morphology of the lesion and its relationship with the gastric wall and surrounding structures, the imaging findings of GBC are usually nonspecific, and the definitive diagnosis still depends mainly on histopathological examination after surgical resection.[9]

In this case, the patient was admitted after a cystic lesion adjacent to the cardia was incidentally found during physical examination. Preoperative imaging suggested a possible benign cystic lesion, but a gastrointestinal stromal tumor or cystic degeneration of a schwannoma could not be excluded. The patient ultimately underwent complete laparoscopic resection of the lesion, and postoperative pathology confirmed a gastric bronchogenic cyst. The patient recovered well, and no recurrence was observed during short-term follow-up. The clinical value of this case lies in highlighting that for well-circumscribed cystic or cystic-like lesions located in the gastric fundus or adjacent to the cardia with no obvious enhancement, GBC should be included in the differential diagnosis. When surgical risk is manageable, complete laparoscopic resection not only helps establish the diagnosis but also serves as a safe and effective treatment. This article reports the clinical manifestations, imaging features, laparoscopic surgical management, and pathological findings of this case, and summarizes the diagnostic and therapeutic key points of GBC in conjunction with the relevant literature.

Case presentation

A 42-year-old woman was admitted to our hospital with a 2-week history of an abdominal mass incidentally detected during physical examination. Two weeks earlier, abdominal ultrasonography performed at a local hospital had suggested an upper abdominal mass, but no written report was available. She was usually asymptomatic and reported no nausea, vomiting, chills, fever, abdominal distension, diarrhea, or urinary frequency, urgency, or dysuria. Her past medical history was unremarkable, and she denied any history of tumors or trauma.

Physical examination on admission revealed a temperature of 36.4°C, a heart rate of 88 beats/min, a respiratory rate of 20 breaths/min, and a blood pressure of 118/85 mmHg; height 155 cm, weight 54 kg, and BMI 22.48 kg/m². The abdomen was flat, with no visible intestinal patterns, gastrointestinal peristaltic waves, or abdominal wall varices; abdominal breathing was present. The entire abdomen was soft, without tenderness, rebound tenderness, or muscle guarding. Murphy's sign was negative. Neither the liver nor the spleen was palpable below the costal margin. Percussion tenderness over the hepatic, splenic, and bilateral renal regions was negative. Shifting dullness was negative, and bowel sounds were normal.

Upper abdominal CT revealed a soft-tissue-density mass measuring approximately 3.0 cm × 2.2 cm adjacent to the gastric cardia, with a CT attenuation value of approximately 27 HU; no obvious enhancement was observed in any phase of contrast-enhanced scanning (Fig. 1). Upper abdominal MRI showed a nodular abnormal signal adjacent to the gastric cardia with well-defined margins, appearing hypointense on T1-weighted images and hyperintense on T2-weighted images, with no obvious enhancement on contrast-enhanced T1-weighted images (Fig. 2). Imaging suggested a cystic lesion adjacent to the gastric cardia, favoring a benign lesion; the differential diagnosis included cyst, cystic degeneration of a schwannoma, and cystic degeneration of a gastrointestinal stromal tumor. Gastroscopy revealed a protruding lesion with a smooth surface in the lower esophagus near the cardia

(Fig. 3). Laboratory tests and tumor markers showed no significant abnormalities: CEA 1.94 ng/mL, CA19-9 25.76 U/mL, CA125 5.40 U/mL, CA15-3 9.30 U/mL, and AFP 3.00 ng/mL.

After multidisciplinary team discussion, considering the lesion location, imaging findings, and preoperative differential diagnosis, it was decided to perform laparoscopic resection of the mass adjacent to the gastric cardia. The patient was placed in the supine position and underwent surgery under general anesthesia. After routine disinfection and draping, pneumoperitoneum was established, and trocars were placed using a five-port technique. Intraoperative exploration revealed no obvious abnormalities in the liver, abdominal wall, pelvic cavity, greater omentum, or mesentery. A mass measuring approximately 3.0 cm × 4.0 cm was observed adjacent to the gastric cardia, with an intact capsule and exophytic growth. The surgeon used an ultrasonic scalpel to open the hepatogastric ligament, mobilize the gastric cardia region, and adequately expose the mass. Because the mass was tightly adherent to the cardia, blunt and sharp dissection was performed stepwise along the capsule, with care taken to protect the gastric wall muscular layer and maintain cyst integrity, thereby avoiding rupture of the cyst wall and spillage of cyst contents into the abdominal cavity. After complete resection of the mass, the muscular layer at the dissection site of the cardia was reinforced and sutured with 3 – 0 barbed suture. An abdominal drainage tube was placed and removed on postoperative day 5.

Postoperative histopathological examination revealed that the cyst wall was lined with pseudostratified ciliated columnar epithelium with good cellular differentiation; the cyst wall was mainly composed of fibrous tissue, with a small amount of inflammatory cell infiltration in the surrounding area, consistent with the diagnosis of bronchogenic cyst (Fig. 4). The incision sutures were removed on postoperative day 11. The patient started a liquid diet on postoperative day 2, and gastrointestinal function recovered well. No obvious perioperative complications occurred. The patient was discharged on postoperative day 7 and continued follow-up in our outpatient clinic. CT reexamination 3 months after surgery showed that the lesion had been completely resected, with no obvious signs of residual disease or recurrence, and the patient had returned to normal daily activities.

Discussion

Bronchogenic cyst is a congenital benign lesion arising from abnormal development of the embryonic foregut,[3, 10] with approximately 90% of cases occurring in the mediastinum and lungs;[11] gastric involvement is extremely rare. During the fourth week of embryonic development, the primitive foregut gradually differentiates to form the ventral respiratory diverticulum and the dorsal esophageal structure. If abnormal bronchial buds detach and undergo ectopic migration before fusion of the diaphragm, ectopic bronchogenic cysts may form at atypical sites such as the gastric wall, esophagus, heart, diaphragm, retroperitoneum, peritoneal cavity, gallbladder, or spleen. The mechanism underlying the formation of GBC has not been fully elucidated.[12] At present, it is widely believed that it may be related to the migration of abnormal bronchial buds along the esophagogastric pathway into the abdominal cavity and their retention in the gastric fundus or cardia region.

GBC is a rare ectopic congenital lesion. Current evidence is mainly derived from case reports and small case series, and large-sample studies systematically analyzing its clinical manifestations, imaging features, pathological characteristics, and treatment strategies are still lacking. Most patients with GBC lack specific symptoms; smaller lesions are often discovered incidentally during physical examination or imaging performed for other diseases. When the cyst gradually enlarges or compresses surrounding structures, abdominal discomfort, nausea, vomiting, anorexia, gastrointestinal obstruction, or bleeding may occur. Because GBC is mostly located in the gastric fundus or cardia region and its clinical manifestations are insidious, preoperative diagnosis is often challenging, and it is easily misdiagnosed as gastrointestinal stromal tumors, neurogenic tumors, gastric wall pseudocysts, or other space-occupying lesions of the gastric wall.[13, 14]

Previous literature suggests that GBC may be more common in women and predominantly occurs in the gastric fundus and cardia region. In a review of 48 GBC cases, Yao et al. found a male-to-female ratio of approximately 1:1.67 and a mean age of 47.54 ± 15.83 years.[1] Studies have observed higher estrogen receptor (ER) expression in female patients with mediastinal cysts and branchial cleft cysts, and it has been proposed that enhanced ER α expression during pregnancy may promote cyst growth.[15] This estrogen-dependent hypothesis may partly explain the sex disparity in GBC; however, current evidence is still mainly derived from small-sample studies and case summaries, and further validation in larger-scale studies is needed.

Imaging examination is an important modality for preoperative evaluation of GBC, but its diagnostic specificity is limited. Ultrasound can suggest the size and location of the mass, but it is usually difficult to clarify the origin of the lesion.[16] On CT, GBC most often appears as a solitary, well-circumscribed, relatively homogeneous, hypodense mass without obvious enhancement; in some cases, the CT attenuation value of the cyst fluid may be below 20 HU. However, when the protein content of the cyst fluid is high, or when hemorrhage, infection, or calcification is present, the CT attenuation value may increase, thereby complicating the diagnosis.[5, 16] On MRI, GBC typically appears hypointense or isointense on T1-weighted images and hyperintense on T2-weighted images, with no obvious enhancement on contrast-enhanced scanning.[17] Although CT and MRI are helpful in determining the location, morphology, and cystic versus solid characteristics of the lesion and its relationship with surrounding structures, imaging alone remains insufficient for a definitive diagnosis. The final diagnosis usually depends on histopathological examination after complete resection.[9, 18]

Endoscopic ultrasound-guided fine-needle aspiration (EUS-FNA) can provide preoperative pathological evidence for some cystic or submucosal lesions of the gastric wall.[5, 19, 20] Previous studies have shown that the diagnostic sensitivity of EUS-FNA for such lesions can reach 93%–95%, with a diagnostic accuracy of 82%–86% and an incidence of adverse events of approximately 1%–3%. However, for GBC, whether EUS-FNA should be routinely performed still requires careful evaluation. On the one hand, GBC is often located in the gastric fundus or cardia, adjacent to important structures and blood vessels, and improper puncture may lead to bleeding, infection, leakage of cyst fluid, or injury to adjacent blood vessels. On the other hand, for lesions that are small, have a thin cyst wall, or contain viscous cyst

contents, insufficient sampling may lead to false-negative results.[2, 21] Therefore, EUS-FNA is more suitable for selected cases in which the imaging diagnosis is unclear, the surgical risk is high, or the treatment decision depends on preoperative pathological results.

In this case, gastrointestinal stromal tumor was considered preoperatively, highlighting the particular importance of differentiating GBC from other space-occupying lesions of the gastric wall.[22] Gastrointestinal stromal tumors may undergo cystic degeneration, hemorrhage, necrosis, or calcification, and the cyst wall is often uneven in thickness, with varying degrees of enhancement on contrast-enhanced scanning. Neurogenic tumors with cystic degeneration may also present as well-circumscribed gastric wall or perigastric space-occupying lesions, with imaging findings that overlap with those of GBC. Gastric wall pseudocysts, in particular, need to be differentiated from pancreatic pseudocysts, which often have a history of pancreatitis, and the cyst wall may be thickened, calcified, or mildly enhanced, with the density of cyst contents often being inhomogeneous. In contrast, GBC most often presents as a well-circumscribed cystic or cystic-like lesion with no obvious enhancement; however, this feature is not specific. Therefore, for cystic lesions located in the gastric fundus or adjacent to the cardia, especially those that appear benign on imaging but whose origin cannot be clearly identified, GBC should be included in the differential diagnosis.

Surgical resection is an important modality for both confirming the diagnosis of GBC and treating the disease;[11, 23, 24] however, the surgical indications for asymptomatic patients remain somewhat controversial. For patients with clinical symptoms, imaging findings suggestive of possible malignancy, or complications such as infection, rupture, hemorrhage, or compression, active surgical intervention is generally recommended. For asymptomatic lesions, given the difficulty of establishing a preoperative diagnosis of GBC, the potential for lesion enlargement to cause related complications, and isolated reports of malignant transformation in the literature,[25] complete resection of the cyst wall may help establish the diagnosis, mitigate potential risks, and reduce the likelihood of recurrence, provided that the patient's general condition permits and surgical risk is manageable. In this case, complete laparoscopic resection was performed, with intraoperative care taken to protect the gastric wall muscular layer and avoid cyst wall rupture. The patient recovered smoothly after surgery, and short-term follow-up showed no residual disease or recurrence. This case suggests that for well-circumscribed cystic lesions adjacent to the cardia without obvious enhancement, complete laparoscopic resection can achieve effective treatment while establishing the diagnosis, and represents a feasible and safe management approach.

This case still has certain limitations. First, this study is a single case report, and its conclusions are mainly intended to provide clinical diagnostic and therapeutic experience and cannot replace evidence from large-sample studies. Second, the patient did not undergo preoperative EUS-FNA; therefore, preoperative pathological evidence was not obtained. However, given that the lesion was located adjacent to the cardia and closely related to surrounding structures, direct complete laparoscopic resection offered both diagnostic and therapeutic value. Finally, only short-term follow-up has been completed for this case, and further follow-up is still needed to evaluate the long-term prognosis.

Conclusion

Gastric bronchogenic cyst is a rare congenital ectopic bronchogenic cyst. Both its clinical manifestations and imaging features are nonspecific, and it is easily confused preoperatively with lesions such as gastrointestinal stromal tumors, neurogenic tumors, and gastric wall pseudocysts. CT, MRI, and endoscopy are helpful in evaluating the location and morphology of the lesion and its relationship with surrounding structures, but the diagnosis still relies on histopathological examination. For cystic or cystic-like lesions located in the gastric fundus or adjacent to the cardia that are well-circumscribed and show no obvious enhancement, GBC should be included in the differential diagnosis. When surgical risk is manageable, complete laparoscopic resection can simultaneously achieve a definitive diagnosis and effective treatment, and the patient prognosis is generally good.

Declarations

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publications

Written informed consent was obtained from the patient for publication of this case report. A copy of written consent is available for review by the Editor-in-chief of this journal.

Competing interests

The authors declare that they have no competing interests.

Authors' information (optional)

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Author Contribution

J.L.D and L.Y.G designed the report, reviewed the literature, and wrote the paper. J.L.D, C.A.L, and J.S.L performed the surgery. X.L.W and J.P collected the patient's clinical data. J.L.D and C.A.L revised the paper. All authors have read and approved the final version of this manuscript.

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Availability of data and materials

The dataset during current study is available from the corresponding author on reasonable request.

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Figures



Figure 1

Contrast-enhanced upper abdominal CT findings of gastric bronchogenic cyst. (A) Venous phase showing a soft-tissue density mass adjacent to the gastric cardia, measuring approximately 3.0×2.2 cm with a CT value of about 27 HU. (B) No significant enhancement in the arterial phase. (C) No significant enhancement in the delayed phase.

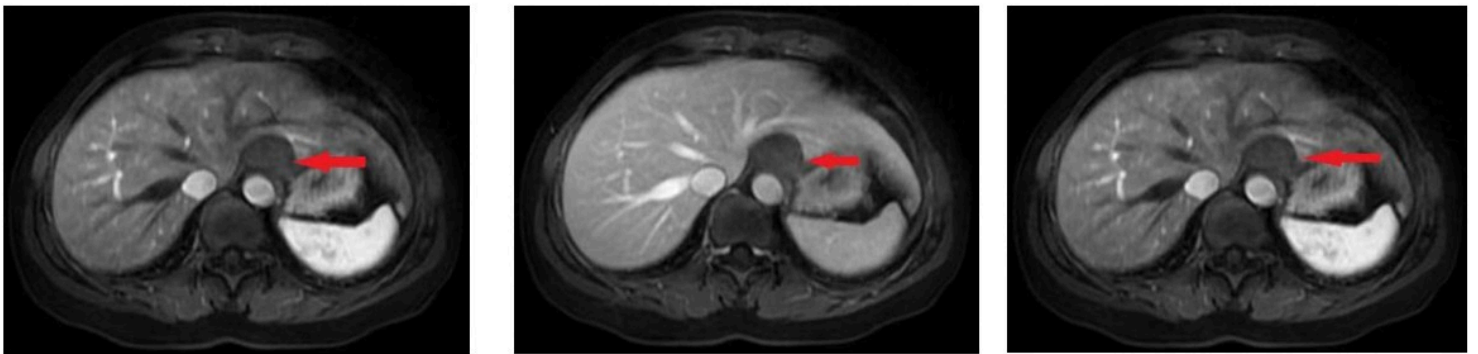


Figure 2

Upper abdominal MRI findings. A well-circumscribed nodular abnormal signal adjacent to the gastric cardia, hypointense on T1-weighted imaging and hyperintense on T2-weighted imaging, without significant enhancement on contrast-enhanced T1-weighted imaging.

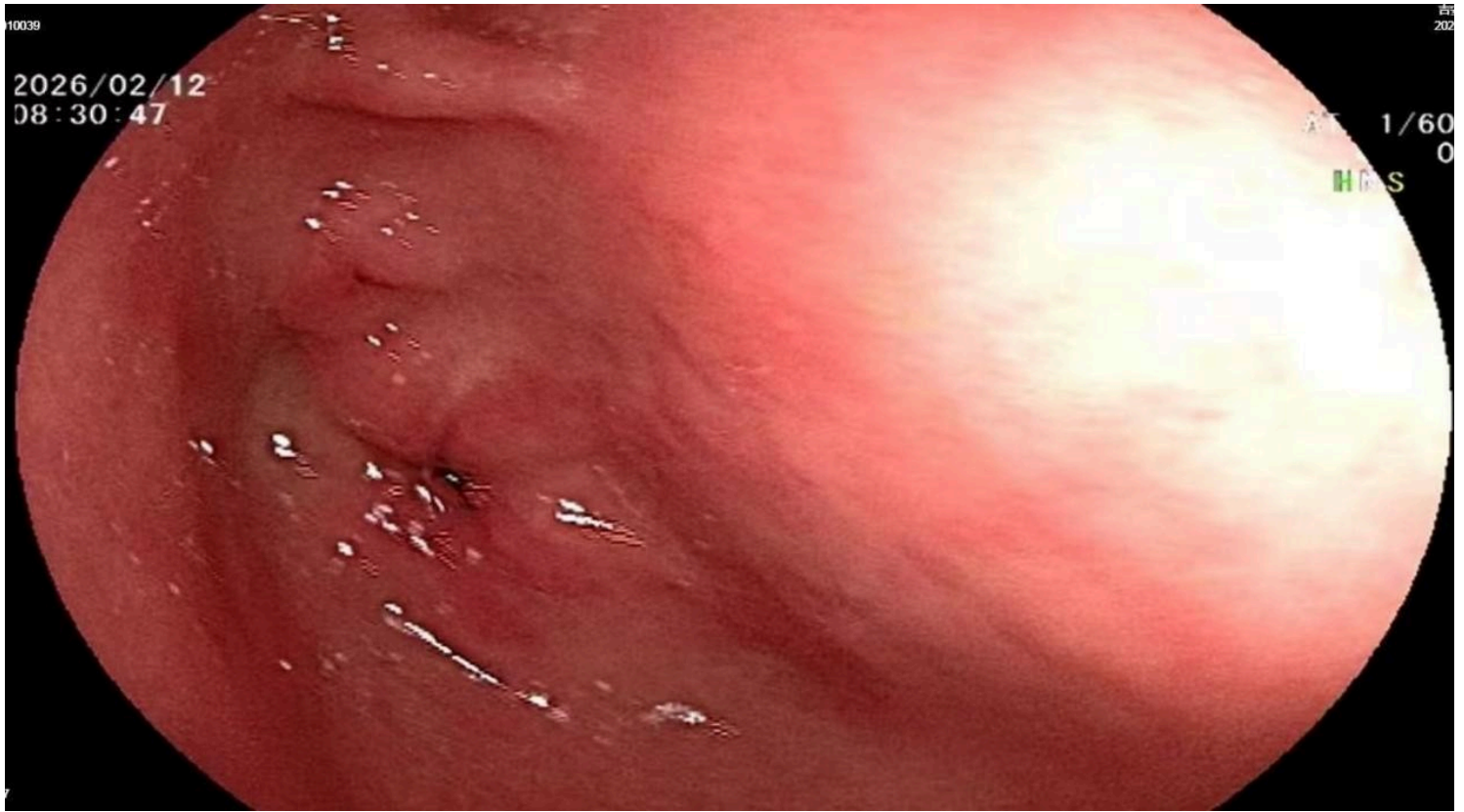


Figure 3

Gastroscopic appearance. A smooth-surfaced elevated lesion in the lower esophagus, close to the cardia.

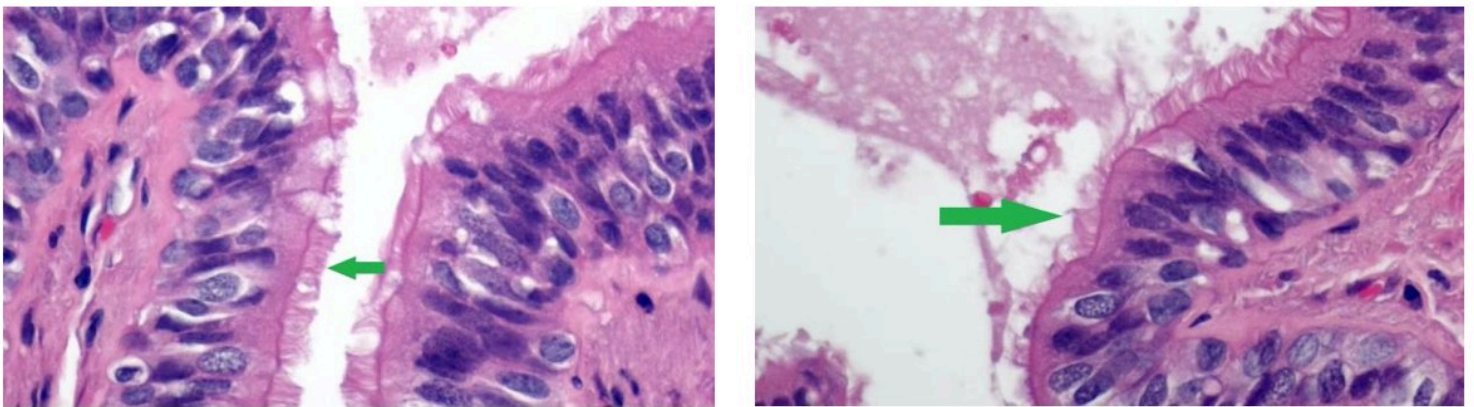


Figure 4

Histopathological findings (hematoxylin and eosin stain, ×400). The cyst wall is lined by pseudostratified ciliated columnar epithelium with well-differentiated cells. The wall is composed of fibrous tissue with a mild surrounding inflammatory infiltrate, consistent with bronchogenic cyst.