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Case Report

A Giant Bronchogenic Cyst Masquerading as a Massive Pleural Effusion: A Case Report

Virendra Kumar Meena[1], Sonali Gadhavi[2], Ravinder Kumar Kundu[3], Nishant Soni[4], Raghav Singla[5]

[1]Professor, Department of Radiodiagnosis, Geetanjali Medical College and Hospital, Udaipur, Rajasthan, India

[2]Assistant Professor, Department of Radiodiagnosis, Geetanjali Medical College and Hospital, Udaipur, Rajasthan, India

[3]Professor and Head, Department of Radiodiagnosis, Geetanjali Medical College and Hospital, Udaipur, Rajasthan, India

[4]Post-Graduate Resident, Department of Radiodiagnosis, Geetanjali Medical College and Hospital, Udaipur, Rajasthan, India

[5]Post-Graduate Resident, Department of Radiodiagnosis, Geetanjali Medical College and Hospital, Udaipur, Rajasthan, India

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Corresponding Author: Dr. Nishant Soni

Conflict of interest: Nil

Abstract

Background: Bronchogenic cysts are rare congenital foregut malformations that typically present as well-defined mediastinal or intrapulmonary cystic lesions. Giant bronchogenic cysts are exceedingly uncommon, and when they attain a size sufficient to occupy a large portion of the hemithorax, they may closely mimic massive pleural effusion on initial imaging creating a significant diagnostic challenge on initial imaging.

Case Presentation: An 8-year-old boy presented with progressive dyspnoea. Chest radiography revealed near-complete opacification of the left hemithorax, initially suspected massive pleural effusion. Contrast-enhanced computed tomography of chest demonstrated a large, well-defined multiseptated cystic lesion occupying almost the entire left hemithorax, causing marked compression and collapse of the adjacent lung. A small enhancing soft-tissue nodule abutting the internal septa was noted, raising the possibility of a pleural-origin cystic lesion on imaging. Complete surgical excision was performed, and histopathological examination confirmed a bronchogenic cyst.

Discussion: Giant bronchogenic cysts may closely simulate pleural effusion on radiographs, particularly in paediatric patients owing to their large size and homogeneous radiographic appearance. CT plays a pivotal role in differentiating cystic intrathoracic masses from pleural collections by demonstrating lesion margins, internal characteristics, and mass effect on adjacent structures.

Conclusion: Bronchogenic cyst should be considered in the differential diagnosis for unilateral extensive pleural opacification in the paediatric population. Awareness of this uncommon radiological masquerader is essential to minimise diagnostic errors and to ensure timely and appropriate management.

Keywords: bronchogenic cyst; computed tomography; multiseptated cystic lesion.

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Introduction

The respiratory system develops from the primitive foregut with the appearance of the laryngotracheal groove towards the end of the third week of gestation. Subsequent longitudinal separation of the foregut results in the formation of the dorsal oesophagus and the ventral tracheobronchial tree, reflecting their shared embryological origin [1-2]. Disruption of this complex budding and separation process can give rise to congenital foregut anomalies. Bronchogenic cysts and oesophageal duplication cysts are congenital foregut anomalies that results from abnormal budding of the ventral foregut during early embryogenesis, typically around the fifth week of intrauterine life [2-3]. Bronchogenic cysts are lined by respiratory type of epithelium and may contain cartilage, smooth muscle, or mucous glands, depending on the timing of aberrant development [3-4]. Approximately 90% of bronchogenic cysts are located within the mediastinum, most commonly in the posterior

mediastinum, with less frequent intrapulmonary or extra thoracic locations [4]. Although many remain asymptomatic, large or atypically located cysts may present with mass effect or mimic other thoracic pathologies on imaging, including pleural effusion or pleural-based cystic lesions, posing a significant diagnostic challenge [5].

Case Presentation

An 8-year-old boy was referred to the pulmonology outpatient department of a primary health centre with a two-year history of breathlessness and recurrent left-sided pleural effusion of unknown aetiology. At initial presentation, he had been diagnosed with tuberculous pleural effusion based on chest radiography demonstrating a large left pleural effusion and was treated with antitubercular therapy (ATT) for nine months. However, there was no documented clinical or radiological improvement. Subsequent chest ultrasonography continued to show a persistent massive left pleural effusion, following which he received a further six months of ATT along with corticosteroids, again without improvement. Owing to the refractory nature of the effusion, he was referred to our institution for further evaluation. On admission, he had a massive left sided pleural effusion with undetermined aetiology. Contrast-enhanced CT of the chest showed gross pleural effusion on left side with multiple septations and near complete collapse of left lung causing shift of trachea and mediastinal structure towards right side. An intercostal chest drain was inserted for fluid aspiration, and he was again discharged on antibiotics.

He was readmitted 10 days later with similar complaints. Imaging findings remained unchanged. Notably, throughout this prolonged course, the patient remained afebrile and maintained stable body weight. Extensive evaluation, including tuberculosis workup, hydatid serology, autoimmune profile, ESR, CRP, pleural fluid triglyceride levels, and eosinophil count, was unremarkable. Due to financial constraints, the patient declined video-assisted thoracoscopic surgery (VATS).

He was subsequently referred for open thoracic surgery with pleurectomy. Intraoperatively, a large cystic lesion occupying the left hemithorax was identified and completely excised. Histopathological examination confirmed the diagnosis of a bronchogenic cyst. The postoperative course was uneventful. The patient was discharged in stable condition, and follow-up chest radiography showed complete resolution of the lesion, with the patient remaining asymptomatic.

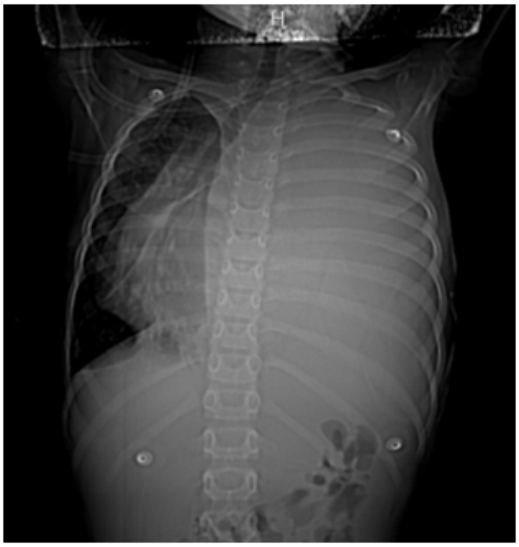

Figure 1: Frontal chest radiograph demonstrating homogeneous opacification of left hemithorax with associated mediastinal shift toward the contralateral side, suggestive of a large right-sided pleural effusion

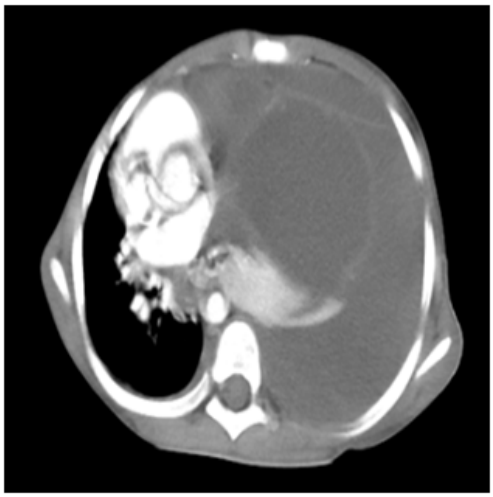

Figure 2: Axial contrast-enhanced CT (CECT) chest image demonstrating a large, well-defined fluid attenuation collection occupying the right hemithorax with compressive collapse of the adjacent lung parenchyma and contralateral mediastinal shift

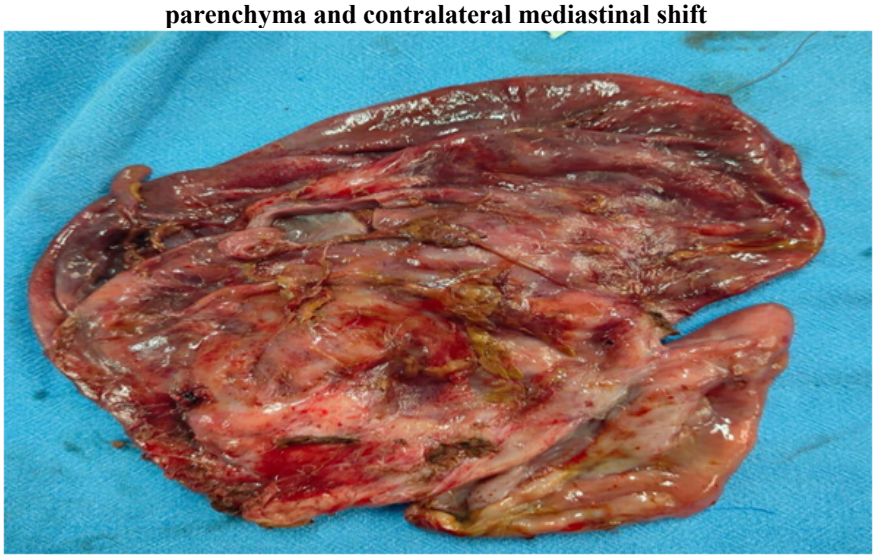

Figure 3: Gross specimen showing a well-circumscribed cystic lesion with a smooth external surface and thick wall, containing mucoid material, consistent with a bronchogenic cyst

Discussion

Bronchogenic cysts originate from aberrant budding of the primitive foregut-derived lung bud, occurring after the third week of embryonic life. During normal development, these buds migrate caudally along with the oesophagus and are most commonly located in the posterior mediastinum near the carina, often maintaining a relationship with the tracheobronchial tree or oesophagus [1-2].

In rare instances, the aberrant bud may completely detach from its site of origin, resulting in bronchogenic cysts at unusual locations such as the pericardium, cervical region, subcutaneous tissues, or skin [6]. An origin from the pleura is exceptionally uncommon, with very few cases reported in the literature. In a large radiologic-pathologic series by McAdams et al., among 68 cases of bronchogenic cysts, only one lesion (1.5%) was found adjacent to the pleura, underscoring the rarity of this presentation [3]. Moreover, pleural bronchogenic cysts remain poorly described in terms of their imaging and histopathological characteristics. On computed tomography, bronchogenic cysts classically appear as well-defined, non-enhancing cystic lesions with smooth walls, demonstrating attenuation values ranging from near-water density (0–20 HU) to higher attenuation when the cyst contains proteinaceous material, mucous, or haemorrhage [3-4]. The presence of internal septations or soft-tissue nodularity, as observed in our case, may further complicate diagnosis and raise suspicion for alternative pleural-based cystic lesions. Nakagawa et al. described two cases of bronchogenic cysts attached to the parietal pleura by a pedunculated stalk, highlighting a potential mechanism for pleural involvement [7]. Both visceral and parietal pleural bronchogenic cysts may therefore occur and can closely mimic pleural-origin cysts such as coelomic cysts or even massive pleural effusion, particularly when large. Awareness of this rare

entity is essential to avoid misinterpretation and inappropriate management.

Conclusion

Bronchogenic cysts arising from the parietal or visceral pleura are exceedingly rare but represent an important and often overlooked differential diagnosis for cystic lesions originating from the pleural cavity, particularly in paediatric patients. Their atypical location and variable imaging appearances may closely mimic pleural effusion or pleural-origin cystic lesions, leading to potential misdiagnosis. This case underscores the pivotal role of contrast-enhanced computed tomography in identifying defining imaging characteristics—including well-circumscribed margins, complex internal architecture, absence of dependent fluid layering, and significant mass effect on the adjacent lung parenchyma—which are instrumental in refining the differential diagnosis. Correlation with histopathological examination, demonstrating features consistent with a bronchogenic cyst, confirmed the radiologic impression and established the definitive diagnosis. Familiarity with this rare entity and its diverse imaging spectrum is crucial to prevent misdiagnosis and unnecessary interventions, facilitate timely surgical excision, and ultimately ensure optimal clinical outcomes.

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