Characteristics of congenital bronchial atresia with cystic lesions: a single-center retrospective study

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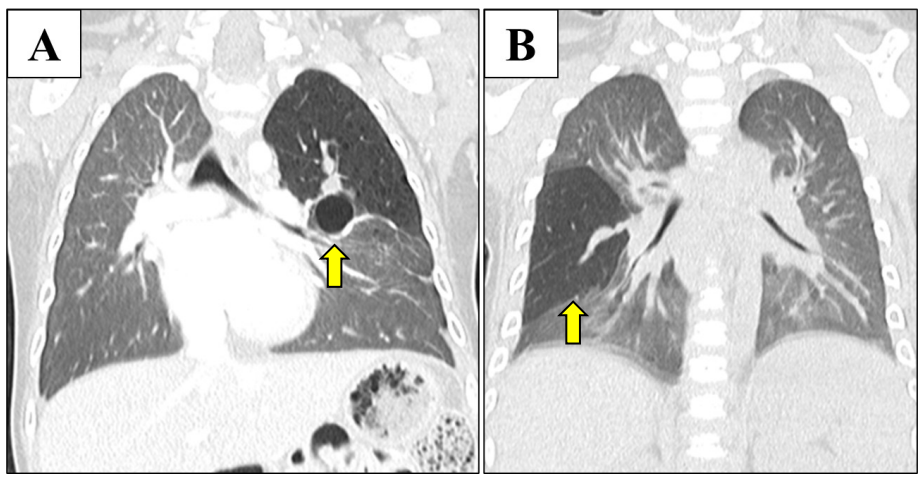
Introduction

Congenital bronchial atresia (CBA) is a rare lung abnormality and often associated with cystic lesions (CLs) mimicking Stocker type 2 congenital pulmonary airway malformation (CPAM). Because of these overlapping features, the accurate diagnosis of CBA can be challenging. We hypothesized that CBA with CLs is more likely to present with symptoms due to CPAM-like radiological findings. Therefore, this study aimed to characterize CBA with CLs and investigate the association between CLs and the symptomatic rate.



Methods

Patients with prenatally detected lung lesions who were born between April 2015 and March 2024 were collected. Among them, patients with radiologically or pathologically diagnosed CBA in our hospital were included. Clinical, radiological, surgical, and pathological data were retrospectively reviewed and analyzed.

Results

Twenty-three patients (13 female; 15 left-sided) were diagnosed with CBA. Chest CT revealed that CLs were detected in 18 patients (78%) with a maximum size of 16 [4-28] mm. Thirteen patients with CLs required radiological differentiation between CBA and CPAM (**Table 1**); however, CBA was finally diagnosed based on pathological findings of peripheral dilated bronchiole due to bronchial obstruction. Conversely, all five patients without CLs could be diagnosed with CBA based on the CT findings of hyperlucency in the lung field.

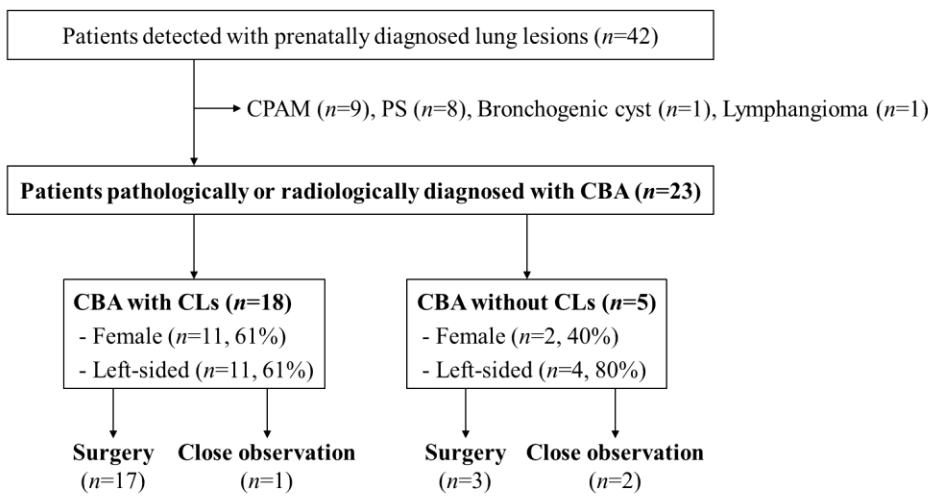


Table 2. Neonatal clinical course

	CBA with CLs (*n*=18)	CBA without CLs (*n*=5)	*P* value
Gestational age at birth (weeks)	40.1 [35.6-41.4]	37.4 [33.4-38.1]	0.014*
Body weight at birth (g)	3015 [2352-3974]	2770 [2400-3984]	0.88
Delivery (%)			0.53
Vaginal delivery	14 (78)	3 (60)	
Elective Caesarean section	3 (17)	1 (20)	
Emergency Caesarean section	1 (6)	1 (20)	
Apgar score at 1 minute	8 [7-10]	8 [8-9]	0.79
Apgar score at 5 minutes	9 [8-10]	9 [9-9]	0.56
Respiratory support (%)			0.29
Intubation	1 (6)	1 (20)	
CPAP/DPAP	2 (11)	0 (0)	
HFNC	0 (0)	1 (20)	
None or supplemental oxygen	15 (83)	3 (60)	

Table 1. Postnatal radiological diagnosis

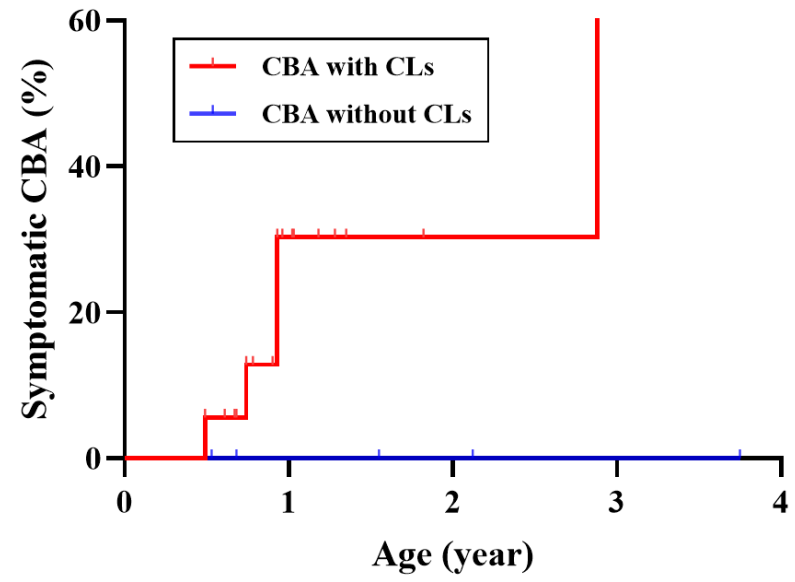
	CBA with CLs (*n*=18)	CBA without CLs (*n*=5)	*P* value
Radiological diagnosis (%)			<0.01**
CBA	4 (22)	5 (100)	
CPAM	14 (78)	0 (0)	
Chest CT findings (%)			
Hyperlucent area in the lung field	12 (71)	5 (100)	0.29
Consolidation	4 (24)	2 (40)	0.59
Maximum diameter of the cyst (mm)	16 [4-28]	-	-

Most of the patients remained asymptomatic immediately after birth regardless of CLs (**Table 2**). Only three patients without CLs chose conservative management, and the other patients underwent lobectomy or segmental lobectomy at 329 [187-1152] days of age. There were no significant differences in late postoperative complications between the two groups (**Table 3**).

Table 3. Operative information

	CBA with CLs (*n*=17)	CBA without CLs (*n*=3)	*P* value
Age at surgery (days)	371 [187-1159]	247 [194-773]	0.53
Body weight at surgery (kg)	8.7 [6.8-12.1]	8.9 [8.6-9.5]	0.52
Symptomatic CBA (%)	5 (29)	0 (0)	0.55
Thoracoscopic surgery (%)	5 (29)	0 (0)	0.54
Segmentectomy (%)	1 (6)	1 (33)	0.28
Operative time (minutes)	213 [135-460]	212 [202-216]	0.63
Blood loss (mL)	18 [0-280]	53 [26-102]	0.59
Intraoperative complications (%)	1 (6)	0 (0)	1.00
Postoperative hospital stays (days)	6 [5-11]	6 [5-7]	0.65
Early postoperative complications (%)	2 (12)	0 (0)	1.00
Late postoperative complications (%)	2 (12)	1 (33)	0.40
Postoperative follow-up time (years)	6.3 [2.1-8.5]	3.2 [0.1-9.3]	0.19

Five patients with CLs (28%) developed their first episode of lower respiratory tract infection after 6 months of age. No patient experienced pneumothorax before surgery or during follow-up. Kaplan–Meier analysis showed that symptom onset typically occurred between 6 and 12 months of age. The symptomatic rates did not differ significantly between patients with and without CLs (28% vs. 0%, p=0.14).



Discussion

1. Approximately 10% of infants with CPAM require surgical intervention within the neonatal period. In our cohort, no CBA patients, regardless of CLs, developed symptoms or required surgery during the neonatal period, suggesting that CBA follows a more benign postnatal course than CPAM.

2. The presence of CLs was not associated with an increased risk of symptom development. These findings support the view that conservative management is a reasonable option for asymptomatic CBA, especially in cases without CLs.

Conclusion

CLs were observed in the majority of patients with CBA and frequently led to postnatal misdiagnosis of CPAM. However, the presence of CLs was not significantly associated with symptom development or adverse clinical outcomes.

<References>
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3) Pasqua N, et al. Congenital bronchial atresia: to surgically treat or conservatively manage? A systematic review. *J Pediatr Surg*. (2025)

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