Medical and Health Journal
Volume 6, Issue 1, 2026, pp. 117-125
e-ISSN: 2807-3541
Open Access: https://jos.unsoed.ac.id/index.php/mhj

Chronic Wet Cough as a Warning Sign of Bilateral Cystic Bronchiectasis in an Adolescent: A Case Report

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ARTICLE INFO

Article history:
Received August 10, 2026
Revised August 13, 2026
Accepted August 15, 2026
Available online August 20, 2026

Keywords:
Bronchiectasis, Chronic wet cough, Hemoptysis, Cystic bronchiectasis

ABSTRACT

Background: Bronchiectasis is a chronic respiratory disease characterized by irreversible bronchial dilatation resulting from structural damage to the bronchial walls. In children and adolescents, chronic wet cough is an important clinical warning sign that may indicate chronic suppurative lung disease and should prompt further evaluation, particularly when accompanied by recurrent respiratory infections or other signs of chronic pulmonary disease. Case Presentation: A 17-year-old girl presented with hemoptysis and intermittent dyspnea. She reported a chronic productive cough with yellowish sputum and blood, recurrent respiratory symptoms since childhood, difficulty gaining weight, and a smaller body size compared with her peers. She had repeatedly sought treatment at primary healthcare facilities for persistent cough without significant improvement. Physical examination revealed mild respiratory distress, mild intercostal retractions, fine basal crackles, and digital clubbing. Her body weight was 31 kg, height 141 cm, and body mass index 15.48 kg/m², indicating undernutrition. Laboratory investigations showed leukocytosis (16.62 × 10³/µL), thrombocytosis (549 × 10³/µL), neutrophilia, an elevated neutrophil-to-lymphocyte ratio (5.8), and increased C-reactive protein (11.1 mg/L). Chest radiography demonstrated bilateral lower-lobe infected bronchiectasis with a possible underlying pulmonary tuberculosis and bilateral pleural effusion. Contrast-enhanced chest computed tomography revealed bilateral cystic and infected bronchiectasis. Sputum molecular testing did not detect Mycobacterium tuberculosis. The working diagnosis was bronchiectasis with clinically suspected pulmonary tuberculosis. The patient received azithromycin, antituberculosis therapy, and prednisone, with clinical improvement during hospitalization. Conclusion: This case highlights the importance of recognizing chronic wet cough as an early warning sign of bronchiectasis in children and adolescents, particularly when accompanied by recurrent respiratory symptoms, hemoptysis, impaired growth, and digital clubbing. Chest computed tomography can confirm structural bronchial abnormalities and define disease distribution. When radiological findings suggest tuberculosis but microbiological testing is negative, the relationship between tuberculosis and bronchiectasis should be interpreted cautiously. Early recognition, appropriate radiological evaluation, and systematic assessment of underlying etiologies are essential to prevent further progression of structural lung damage.

1. INTRODUCTION

Bronchiectasis is a chronic pulmonary disease characterized by irreversible bronchial dilatation resulting from structural damage to the bronchial walls associated with recurrent inflammation and infection (Long et al., 2024). In children, bronchiectasis is one of the manifestations of chronic suppurative lung disease (CSLD), which is characterized by impaired mucociliary clearance, chronic airway inflammation, and recurrent infection. The interaction among these three processes forms a vicious cycle in which impaired secretion clearance promotes airway colonization and infection, which subsequently triggers inflammatory responses and further damages the bronchial walls (Wael et al., 2025). This structural damage further impairs mucociliary clearance and increases susceptibility to subsequent infections, ultimately leading to progressive lung damage and declining pulmonary function.

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Pediatric bronchiectasis is an important clinical problem because it can cause long-term morbidity and contribute to impaired growth, reduced physical activity, recurrent infective exacerbations, and declining lung function (Choi and Chalmers, 2022). The disease burden varies across regions and is influenced by socioeconomic status, access to healthcare services, and the prevalence of respiratory infections. In developing countries, pediatric bronchiectasis remains a relevant health problem, particularly because recurrent respiratory infections and delayed diagnosis may lead to potentially preventable lung damage. Although epidemiological data on pediatric bronchiectasis in Indonesia remain limited, the presence of cases with advanced disease highlights the need for increased clinical awareness and earlier diagnosis.

The etiology of bronchiectasis in children is heterogeneous and may reflect a variety of underlying disorders. These include severe or recurrent respiratory infections, previous pneumonia, chronic aspiration, immune disorders, primary ciliary dyskinesia, cystic fibrosis, and structural or congenital airway abnormalities. In some patients, the specific cause cannot be readily identified, making systematic etiological evaluation necessary. Identifying the underlying cause is important because the management of bronchiectasis is not limited to controlling infection and symptoms but also aims to prevent recurrent exacerbations and slow the progression of lung damage.

One of the most important clinical warning signs of pediatric bronchiectasis is persistent chronic wet cough. In children, a wet cough should not be regarded simply as a symptom of an uncomplicated respiratory infection when it persists or recurs, particularly when accompanied by sputum production, recurrent respiratory infections, or an inadequate response to initial treatment. Chronic wet cough may represent an early manifestation of CSLD and, if not appropriately evaluated and managed, may progress to persistent bronchial damage and bronchiectasis. Therefore, early recognition of symptoms, investigation of underlying causes, and appropriate imaging, particularly high-resolution computed tomography (HRCT) of the chest when indicated, play important roles in preventing disease progression.

Although pediatric bronchiectasis has been extensively discussed, its diagnosis and management remain challenging, particularly in patients with an atypical clinical course, prolonged symptoms, or delays in obtaining a definitive diagnosis. Cases with specific clinical trajectories may provide important insights into the relationship between early symptoms, predisposing factors, radiological findings, and the progression of bronchial damage. Case reports are also important for increasing clinical awareness of chronic wet cough as an early sign of chronic suppurative lung disease and emphasizing the importance of comprehensive evaluation in children with recurrent respiratory infections.

This case report aims to describe the clinical manifestations, diagnostic process, radiological findings, clinical course, and management of bronchiectasis in an adolescent patient, with emphasis on the importance of early recognition of chronic wet cough and evaluation of underlying etiological factors to prevent progressive lung damage.

2. METHOD

Case Report

A 17-year-old female patient presented to the pediatric outpatient clinic with a chief complaint of hemoptysis and shortness of breath. She reported a productive cough with yellowish sputum mixed with blood. The cough was accompanied by intermittent dyspnea, which worsened particularly during physical activity. At night, she needed to sleep with her head elevated using several pillows to relieve her shortness of breath. She reported difficulty gaining weight since childhood and stated that she was smaller in stature than her peers. The patient denied fever and any history of contact with individuals with tuberculosis. She had repeatedly sought treatment at primary healthcare centers for persistent cough, but her symptoms did not resolve.

On physical examination, the patient appeared dyspneic but was conscious and fully oriented, with a Glasgow Coma Scale score of E4V5M6. Her vital signs were as follows: pulse rate, 90 beats/min, with good pulse volume; respiratory rate, 20 breaths/min; axillary temperature,

36.6°C; and oxygen saturation (SpO_2), 97% on room air. Her body weight was 31 kg and height was 141 cm, with a body mass index (BMI) of 15.48 kg/m^2, indicating undernutrition.

Chest examination revealed symmetrical chest expansion, mild intercostal retractions, and fine moist crackles over the basal lung fields. No wheezing was detected in either lung field. Examination of the extremities revealed warm extremities with digital clubbing. Capillary refill time was less than 2 seconds, and no peripheral edema was observed (figure 1).

Figure 1. Clinical photograph showing digital clubbing in the patient

Initial investigations performed in the emergency department (ED) included laboratory tests consisting of a complete blood count, random blood glucose (RBG), and quantitative C-reactive protein (CRP) measurement. Chest anteroposterior (AP) and two-position abdominal radiographs were also performed. The laboratory findings were as follows (Table 1):

Table 1. Initial Laboratory Findings

Parameter	Result	Unit	Reference Range
Hemoglobin	12.1	g/dL	10.8 – 15.6
Leukosit	16.62	10^3/uL	4.8 – 10.8
Hematokrit	38.4	%	33.0 – 45.0
Eritosit	4.43	10^6/uL	3.80 – 5.80
Trombosit	549	10^3/uL	150 – 450
MCV	82.2	fL	79.0 – 99.0
MCH	27.3	Pg	27.0 - 31.0
MCHC	33.2	g/dL	33.0 – 37.0
RDW	14.7	%	11.5 – 14.5
MPV	-	fL	7.2 – 11.1
Basofil	0.2	%	0.0 – 1.0
Eosinofil	1	%	2.0 – 4.0
Batang	0.3	%	2.00 – 5.00
Segmen	81.5	%	40.0 – 70.0
Limfosit	14	%	25.0 – 40.0
Monosit	4	%	2.0 – 8.0
Glukosa Sewaktu	135	mg/dL	< 100
CRP Kuantitatif	11.1	mg/L	< 5

Chest radiography revealed the following findings (Figure 2):

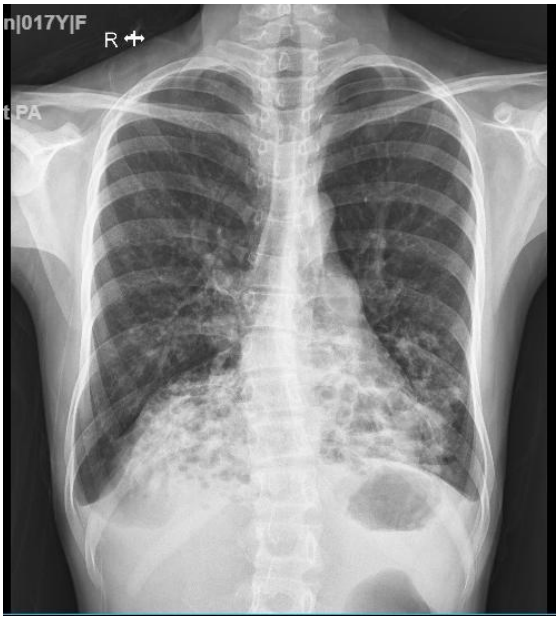

Figure 2. igure 2. Chest radiograph showing bilateral lower-lobe infected bronchiectasis with possible underlying pulmonary tuberculosis and bilateral pleural effusion

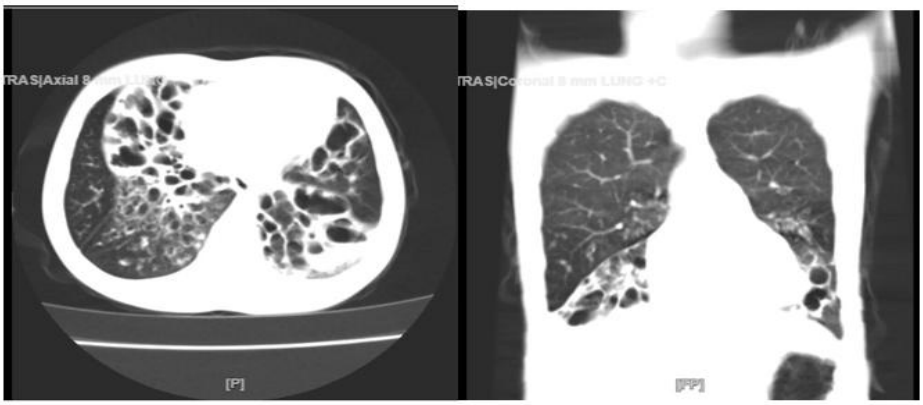

Figure 3. Anteroposterior (AP) chest radiograph

Based on the patient's history, physical examination, and supporting investigations, the working diagnoses were bronchiectasis and clinically suspected pulmonary tuberculosis. The patient received azithromycin as antibiotic therapy, antituberculosis treatment (ATT), and corticosteroid therapy with prednisone.

3. RESULT AND DISCUSSION

Result

A 17-year-old female adolescent presented with hemoptysis, intermittent dyspnea, and a chronic productive cough with yellowish sputum mixed with blood. The dyspnea was exacerbated by physical activity and improved with head elevation during sleep. The patient reported difficulty gaining weight since childhood and a smaller body size compared with her peers. She had a history of recurrent visits to primary healthcare facilities for persistent cough without resolution. She denied fever and contact with individuals with tuberculosis.

On physical examination, the patient appeared dyspneic but was conscious and fully oriented, with a Glasgow Coma Scale score of E4V5M6. Her pulse rate was 90 beats/min, respiratory rate was 20 breaths/min, axillary temperature was 36.6°C, and oxygen saturation was 97% on room air. Her body weight was 31 kg, height was 141 cm, and body mass index was 15.48

kg/m^2, indicating undernutrition. Chest examination revealed symmetrical chest expansion, mild intercostal retractions, and fine moist crackles over the basal lung fields, without wheezing. Digital clubbing was also observed, with capillary refill time of less than 2 seconds and no peripheral edema.

Laboratory investigations demonstrated leukocytosis (16.62 × 10^3/µL), thrombocytosis (549 × 10^3/µL), neutrophilia (81.5%), lymphopenia (14%), an elevated neutrophil-to-lymphocyte ratio (5.8), and increased quantitative C-reactive protein (11.1 mg/L). Random blood glucose was 135 mg/dL. Chest radiography showed bilateral lower-lobe infected bronchiectasis, with findings suggestive of possible underlying pulmonary tuberculosis, accompanied by bilateral pleural effusion. Contrast-enhanced chest computed tomography demonstrated cystic and infected bronchiectasis involving both lungs. However, sputum molecular testing did not detect Mycobacterium tuberculosis.

Based on the clinical, laboratory, and radiological findings, the working diagnoses were bronchiectasis and clinically suspected pulmonary tuberculosis. The patient received azithromycin, antituberculosis treatment, and prednisone. Clinical improvement was reported during hospitalization. However, the available case data did not include serial pulmonary function measurements, complete microbiological evaluation, or sufficient follow-up data to objectively assess the long-term response to treatment..

Discussion

Pediatric bronchiectasis is a chronic pulmonary disease characterized by irreversible bronchial dilatation resulting from structural damage to the bronchial walls. The disease process develops through interactions among impaired mucociliary clearance, recurrent infection, and chronic inflammation, forming a vicious cycle. Respiratory infections activate inflammatory responses, particularly neutrophilic inflammation, which subsequently causes epithelial and structural damage to the bronchial walls. This damage further impairs secretion clearance and increases the risk of airway colonization and subsequent infections (Cole, 2020; Watkin et al., 2022). In children, this process is particularly important because lung damage occurring during the growth period may have long-term consequences for pulmonary function and quality of life (Chang et al., 2021; Faverio et al., 2024).

In the present case, the disease course was characterized by chronic wet cough from an early age, recurrent respiratory infections, difficulty gaining weight, and subsequent development of hemoptysis. This combination of findings suggests that the disease process had likely been present for a prolonged period before the diagnosis was established. Chronic wet cough in children is an important clinical warning sign of chronic suppurative lung disease (CSLD) and bronchiectasis, particularly when persistent or accompanied by recurrent infections. The ERS guidelines emphasize the importance of recognizing chronic wet cough and conducting further evaluation to prevent progressive lung disease (Chang et al., 2021). Therefore, the history of chronic cough in this patient should not be regarded merely as recurrent episodes of respiratory infection but rather as a manifestation potentially indicative of chronic suppurative lung disease.

The patient's nutritional status was also a relevant finding. Her body weight was 31 kg, height was 141 cm, and body mass index (BMI) was 15.48 kg/m^2. In chronic pulmonary disease, persistent infection and inflammation may increase metabolic demands and contribute to impaired growth. Conversely, suboptimal nutritional status may impair immune function and increase susceptibility to infection. Therefore, the relationship between chronic pulmonary disease and nutritional impairment may form a cycle that potentially exacerbates the patient's clinical condition. Assessment of nutritional status is an important component of pediatric bronchiectasis management and should be performed longitudinally (Chang et al., 2021; Faverio et al., 2024).

The presence of digital clubbing in this patient was also clinically relevant. Digital clubbing may occur in various chronic pulmonary diseases and, in the context of bronchiectasis, may indicate a longstanding disease process. In this patient, digital clubbing was observed together with chronic wet cough, pulmonary crackles, impaired nutritional status, and bilateral bronchiectasis on chest computed tomography. These findings therefore further support the

possibility of a chronic pulmonary disease that had progressed over an extended period. However, digital clubbing is not specific to bronchiectasis and should be interpreted in conjunction with other clinical and radiological findings (Mathew et al., 2021).

Hemoptysis was another important clinical manifestation in this case. In bronchiectasis, chronic inflammation may cause structural and vascular changes in the bronchial walls, thereby increasing the risk of bleeding from the bronchial circulation. Consequently, hemoptysis may occur in patients with bronchiectasis and may prompt them to seek medical attention. In this patient, the development of hemoptysis in the course of the disease, together with chronic productive cough and radiological evidence of bronchiectasis on chest computed tomography, indicated a clinically significant manifestation of airway damage. However, the severity of hemoptysis and its relationship with the extent of structural bronchiectasis should be assessed individually, as the association is not necessarily linear.

The patient's chest computed tomography (CT) scan demonstrated bilateral cystic bronchiectasis. This finding provided anatomical evidence of persistent bronchial dilatation and demonstrated the distribution of the disease in both lungs. High-resolution computed tomography (HRCT) plays an important role in confirming bronchiectasis in children when the diagnosis is clinically suspected, while also helping to assess the distribution and characteristics of structural lung abnormalities (Gade et al., 2020; Chang et al., 2021). In this patient, the presence of cystic bronchiectasis indicated that the disease process had resulted in significant structural changes, supporting the diagnosis not only on the basis of clinical manifestations but also through clear radiological correlation.

One important aspect of this case was the CT finding suggestive of possible underlying tuberculosis (TB), whereas molecular testing using the rapid molecular test (Tes Cepat Molekuler, TCM) did not detect Mycobacterium tuberculosis. This finding indicates that the relationship between TB and bronchiectasis in this patient could not be definitively established. Bronchiectasis may occur as a consequence of post-tuberculosis lung damage; however, the diagnosis of active TB requires integration of clinical manifestations, radiological findings, and microbiological evidence. Therefore, suspicious radiological findings alone should not be considered definitive evidence of active TB, particularly when microbiological testing does not detect MTB (World Health Organization, 2021).

In this context, the possibility of TB as an underlying cause or contributing factor to bronchiectasis needs to be distinguished from pre-existing bronchiectasis. TB can cause structural airway damage and leave residual pulmonary abnormalities after infection; however, in this case, there was insufficient evidence to determine whether the bronchiectasis was a consequence of previous TB, part of an ongoing TB process, or attributable to another underlying etiology. Therefore, the administration of antituberculosis treatment (ATT) should be understood as a clinical decision based on the overall clinical and radiological findings at the time of treatment rather than as evidence of microbiologically confirmed TB. This limitation is important to acknowledge to avoid overinterpretation of the relationship between TB and bronchiectasis.

In addition to TB, evaluation for other potential etiologies remains necessary in pediatric bronchiectasis, particularly in patients with symptoms dating back to early childhood. The etiology of bronchiectasis in children is heterogeneous and may include congenital airway abnormalities, immune disorders, primary ciliary dyskinesia, cystic fibrosis, chronic aspiration, and previous severe or recurrent respiratory infections (Cohen et al., 2021; Subbarao et al., 2021; Faverio et al., 2024). In patients with a prolonged disease course beginning in childhood, evaluation for these conditions is particularly important. However, based on the available data in this case, not all etiological investigations were documented; therefore, the underlying cause of the bronchiectasis could not be determined with certainty.

From a therapeutic perspective, the patient received ATT, azithromycin, and prednisone based on the clinical considerations at the time of treatment. The administration of ATT was associated with the suspicion of TB based on the clinical and radiological findings. However, because molecular testing did not detect MTB, the interpretation of this treatment should be

approached cautiously. Microbiological results and radiological findings should be considered together when assessing the likelihood of TB and determining the need for treatment (World Health Organization, 2021).

Azithromycin may have a role in selected pediatric bronchiectasis cases, particularly in patients with recurrent exacerbations. In addition to its antimicrobial activity, macrolides have immunomodulatory effects that may help reduce airway inflammation and the frequency of exacerbations in patients who meet the criteria for long-term therapy (Kapur et al., 2021). However, long-term macrolide therapy should be considered on an individual basis, taking into account the potential risks of antimicrobial resistance and adverse effects. Therefore, the clinical improvement observed in this patient cannot be directly attributed solely to azithromycin therapy.

The use of prednisone should also be interpreted cautiously. Systemic corticosteroids are not routinely indicated for all patients with bronchiectasis and are generally considered only when specific clinical indications are present. Because the specific indication for prednisone in this patient was not fully documented, it cannot be determined whether the clinical improvement observed was directly attributable to corticosteroid therapy. This should be acknowledged as one of the limitations of this case report.

In addition to pharmacological therapy, airway clearance is an important component of the management of pediatric bronchiectasis. Effective clearance of respiratory secretions may help reduce mucus retention, maintain airway patency, and reduce conditions that promote microbial colonization. Guidelines for the management of pediatric bronchiectasis emphasize optimizing airway clearance as a key component of non-pharmacological management (Chang et al., 2021; Faverio et al., 2024). If chest physiotherapy or other airway clearance techniques were performed in this patient, the type and frequency of these interventions should be documented because they may represent an important component of the therapeutic response. Conversely, if such interventions were not performed or were not documented, this should be explicitly stated.

The therapeutic response in this patient should primarily be assessed based on clinical changes, including changes in cough, sputum production, hemoptysis, dyspnea, exercise tolerance, and the frequency of respiratory infections or exacerbations (Des Jardins et al., 2023). Symptomatic improvement is an important indicator of treatment response but should not be equated with reversal of structural bronchial damage. Bronchiectasis represents an irreversible anatomical abnormality; therefore, the primary goals of treatment are to control symptoms, reduce exacerbations, preserve lung function, improve nutritional status, and prevent disease progression (Chang et al., 2021; Faverio et al., 2024).

This case also highlights the importance of early diagnosis in children and adolescents presenting with chronic wet cough. Persistent wet cough, particularly when accompanied by recurrent infections, hemoptysis, impaired growth, or digital clubbing, should prompt further evaluation for CSLD and bronchiectasis. Delayed diagnosis may allow the cycle of infection and inflammation to continue, resulting in progressive structural lung damage (Goyal et al., 2020; Chang et al., 2021). In this patient, the history of symptoms since early childhood and the subsequent emergence of signs of chronic pulmonary disease underscore the importance of maintaining a high index of suspicion for bronchiectasis in patients with prolonged wet cough.

This case has several limitations. First, the underlying cause of bronchiectasis could not be definitively determined because a complete evaluation of all potential etiologies in children was not fully documented. Second, the relationship between suspected TB on chest CT and bronchiectasis could not be established because molecular testing did not detect MTB. Third, microbiological data, including sputum culture and antibiotic susceptibility testing, were not fully available, limiting the assessment of the contribution of bacterial colonization or infection to the disease course. Fourth, serial pulmonary function data and objective measures of functional capacity were unavailable. Fifth, the contribution of each individual treatment to the clinical improvement could not be determined because the patient received multiple interventions concurrently. These limitations are inherent to the case report design and should be considered when interpreting the clinical outcome.

Overall, this case emphasizes that chronic wet cough in children or adolescents, particularly when accompanied by hemoptysis, impaired nutritional status, and digital clubbing, is a warning sign that warrants systematic evaluation for bronchiectasis and chronic suppurative lung disease. Chest CT can confirm structural abnormalities and help define disease distribution, while etiological evaluation is necessary to guide management. In patients with radiological findings suspicious for TB but negative microbiological testing, both the diagnosis of TB and its causal relationship with bronchiectasis should be interpreted cautiously. The clinical lesson from this case is that early recognition of symptoms, radiological confirmation, investigation of underlying etiologies, infection control, and optimization of airway clearance are essential components of pediatric bronchiectasis management to prevent progressive lung damage (Chang et al., 2021; Faverio et al., 2024).

4. CONCLUSION

This case describes bilateral bronchiectasis in an adolescent presenting with chronic productive cough, hemoptysis, dyspnea, undernutrition, and digital clubbing. Chest computed tomography demonstrated bilateral cystic and infected bronchiectasis, supporting the diagnosis of bronchiectasis. The radiological findings also raised the possibility of underlying pulmonary tuberculosis; however, sputum molecular testing did not detect Mycobacterium tuberculosis, and therefore the causal relationship between tuberculosis and bronchiectasis should be interpreted cautiously. The patient received antibiotic therapy, antituberculosis treatment, and corticosteroids, with clinical improvement during hospitalization. This case highlights the importance of maintaining clinical awareness of chronic productive cough in children and adolescents, particularly when accompanied by hemoptysis, impaired growth, and signs of chronic pulmonary disease, to facilitate earlier etiological evaluation and appropriate radiological assessment and thereby prevent progressive lung damage.

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