Beyond Recurrent Pneumonia: A Diagnostic Surprise of Middle Lobe Syndrome

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ABSTRACT

Right Middle Lobe Syndrome (RMLS), also called Brock syndrome, includes a recurrent or chronic atelectasis, consolidation, or infection specific to the right middle lobe. This condition results from obstructive factors, such as endobronchial lesions or external compression, or non-obstructive factors like poor collateral ventilation or inflammation (1). The narrow, horizontally oriented right middle lobe bronchus (RMLB) measures 2-3 cm in length and angles sharply from the intermediate bronchus. Incomplete oblique fissures occur in 20-30% of individuals, which increases the risk of mucus buildup, bacterial stasis, and recurrent pneumonitis. (2,3)

RMLS is often underreported. Its prevalence is 1-2%, with a higher incidence in females (2:1 ratio). The peak age of incidence is between 40 and 60 years, with even higher rates in TB-endemic areas like India, where it can affect up to 15% of endobronchial TB cases. (4,5)

A 45-year-old female with uncontrolled type 2 diabetes mellitus and hypertension, presented with a 6-month history of a productive cough that was difficult to expectorate with wheeze. She also reported post-tussive pain, anorexia, and insignificant weight loss, but no fever, or hemoptysis. Past history had CT thorax suggestive of right middle lobe consolidation which improved with appropriate antibiotics.

She presented with similar complaints of cough with expectoration, breathlessness on evaluation, a contrast-enhanced CT showed evidence of persistent consolidation in the right middle lobe. Bronchoscopy revealed complete stenosis of the RMLB, and bronchoalveolar lavage CBNAAT trace detected and Pseudomonas putida she was treated with appropriate antibiotics and ATT, during the treatment, patient developed DRESS syndrome which was treated appropriately. After completing 6 months of ATT, she was cured, and repeat bronchoscopy showed a patent RMLB compared to previous bronchoscopy, This case highlights the diagnostic challenges of RMLS in diabetic patients in TB-burdened settings, the vital role of bronchoscopy with over 90% therapeutic success, and the need for vigilance regarding ATT-DRESS (incidence 1-5%). Early suspicion of tuberculosis in recurrent consolidation with co morbidities like TB or immunocompromised state should be considered. (1)

How to cite this article: Dhanireddy S, Patil B, Hattiholi J, Gautam S, Pujar K, Antin G, Karalingannavar N, Tangella R. Beyond Recurrent Pneumonia: A Diagnostic Surprise of Middle Lobe Syndrome. Int J Drug Deliv Technol. 2026;16(13s):

549-552. DOI: 10.25258/ijddt.16.13s.61
Source of support: Nil.
Conflict of interest: None

INTRODUCTION

RMLS was first described by Brock in 1946. It involves chronic or recurrent collapse of the right middle lobe due to anatomical weaknesses and pathological insults. (9)The RMLB's upward angle, small luminal diameter (5-7 mm), and limited collateral ventilation make it prone to blockages from thick secretions, inflammatory debris, or tumors.

Obstructive RMLS, which accounts for 70-80% of cases, comes from internal endobronchial causes like TB granulomas, tumors, or foreign bodies, or from external compression due to lymphadenopathy or fibrosis (1,2). The non-obstructive form, affecting 20-30% of cases, involves dynamic airway narrowing due to mucosal swelling, bronchomalacia, or poor clearance in tracheobronchial tree asthma and COPD patients (3,10) In India, endobronchial tuberculosis (EBTB) represents 10-40% of RMLS cases, appearing as edematous-hyperemic (60%), caseating (20%), or tumorous (10%) subtypes during bronchoscopy (5,11).

Globally, RMLS affects 1.5-5% are diagnosed with flexible bronchoscopy, with a higher prevalence in paediatric asthma cases (up to 18%) and a skew towards adult females (2:1) attributed to smaller airways and delayed diagnosis of 5-7 years. (4,12) The co morbidities like type 2DM, infections like TB and smoking status increases the development of RMLS (6,13). Key clinical features include a gradual onset of cough (90%), localized pain (50%), recurrent RML pneumonia (70%), haemoptysis (20%), and digital clubbing (10%); the slow progression can mimic cancer, leading to delays in diagnosis of 6-24 months (1,14)

Diagnosing RMLS requires a mix of imaging techniques: chest X-ray (50% sensitivity, identifying silhouette signs or volume loss), CT/HRCT (95% sensitivity, detecting triangular consolidation, air bronchograms, or fissural thickening), and bronchoscopy (the gold standard for direct visualization, BAL for MTB, AFB, and cultures, plus therapeutic debridement). (15,16) Differentials include RML adenocarcinoma in 30% of cases, nontuberculous mycobacteria, and fungal infections. Treatment depends on the cause, conservative approaches like antibiotics, physiotherapy, mucolytics etc, work for infections/inflammation in 80% of cases while interventional bronchoscopy (balloon dilation, laser, or stenting) achieves 90-95% patency for stenosis. Surgical lobectomy is necessary in 5-10% of cases involving chronic bronchiectasis or malignancy (17,18). DRESS can complicate 1-5% of TB-associated RMLS cases, requiring careful management of ATT. This case report details an obstructive TB with secondary bacterial infection RMLS case in a diabetic patient, emphasizing diagnostic challenges and successful resolution after targeted therapy. (8,19)

Case Presentation

Patient Information

A 45-year-old female patient came to the pulmonary outpatient department with a 6-month history of a gradually progressive productive cough with scanty mucopurulent sputum that was difficult to expectorate, right-sided chest pain after coughing sharp, non-radiating, losses in appetite, and no significant weight loss. Symptoms worsened at night without daily or positional variation. She had no fever, wheezing, hemoptysis, orthopnea, paroxysmal nocturnal dyspnea, palpitations, joint pain, or skin rashes. There was no family history of TB or asthma. She is a non-smoker, and occasionally exposed to biomass fuel.

Past Medical and Treatment History

She was a case of uncontroled T2DM and hypertension. Also a k/c/o Asthma on inhaler therapy. Five months prior, she was admitted for similar complaints (cough and dyspnea). An outside CT scan of the thorax showed RML consolidation with air bronchograms, and she was treated with IV antibiotics (ceftriaxone) before being discharged on oral antibiotics.

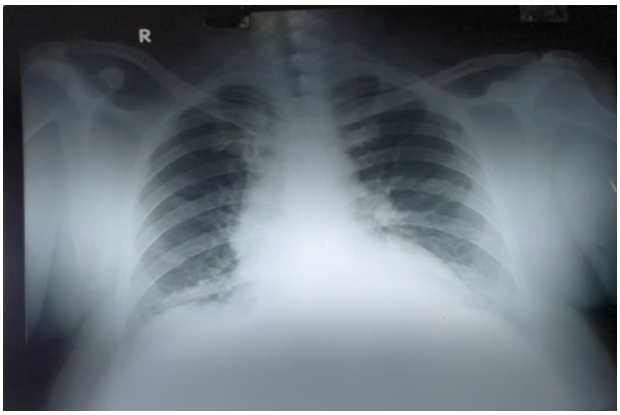
Clinical Findings

The patient was afebrile pale, and no clubbing, cyanosis, or lymphadenopathy. Vital signs showed an SpO2 of 95% in room air, pulse rate 88/min, respiratory rate 18/min, and blood pressure 130/70 mmHg. Respiratory examination revealed normal breath sounds bilaterally, with scattered coarse crepitations and rhonchi over the right inframammary and mid-axillary areas;Cardiac examination showed normal S1 and S2 with no murmurs, and the abdomen was soft and nontender.

Investigations

The hemogram showed hemoglobin at 11.2 g/dL, total leukocyte count at 11,200 per cubic millimeter (80% neutrophils, 15% lymphocytes, 3% eosinophils, and 2% monocytes), with platelets at 2.8 lakh. The erythrocyte sedimentation rate (ESR) was 45 mm/hour, and blood glucose was 180 mg/dL. Sputum tests returned negative for acid-fast bacilli on three smears, while CBNAAT detected a trace of MTB, which was rifampicin sensitive. The chest X-ray showed non homogenous opacity in the

right middle lobe with silhouette sign alongside the right heart border. Contrast-enhanced CT showed unchanged persistent consolidation in the RML with air bronchograms but no cavitation, nodules, pleural effusion, or lymphadenopathy. A pulmonary function test was anticipated to show a restrictive pattern. Flexible bronchoscopy showed complete stenosis of the RMLB due to edematous mucosa and whitish caseous material. BAL confirmed the presence of a trace of MTB and Pseudomonas putida, there was no evidence of malignancy in histopathology report.



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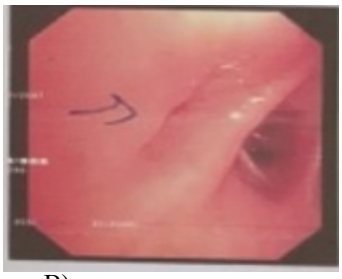

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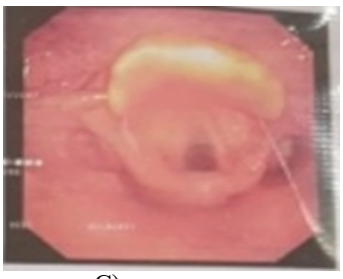

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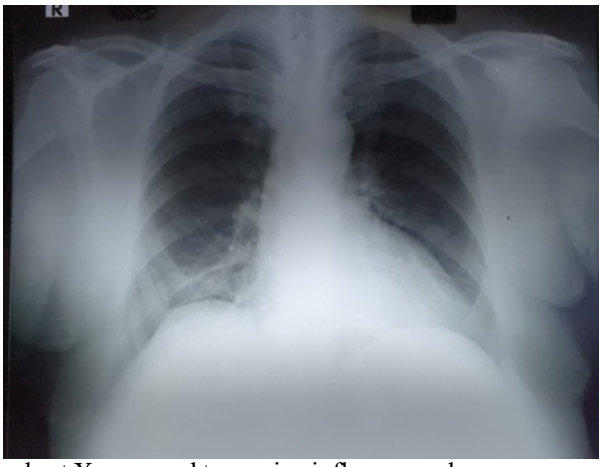
Figure 1. a) Chest X-ray PA view at presentation. b) & c) Bronchoscopy performed at presentation.

Hospital Course and Management

She was admitted and appropriate antibiotics and ATT. On Day 14, she developed DRESS, indicated by fever, a maculopapular rash on her trunk and extremities, s/o DRESS syndrome ATT was withheld for 5 days while she received topical steroids and fexofenadine 180mg once daily. Sequential rechallenge with H, R, and then Z/E was tolerated, mucolytics (acetylcysteine 600mg twice daily) and chest physiotherapy were given. Serial chest X-ray on Day 21, which showed partial clearance in the RML.

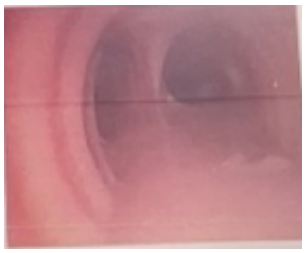
Outcome and Follow-up

At the end of 3 months, she became asymptomatic, with a resolution of cough, normal appetite, and a weight gain of 3 kg. A repeat bronchoscopy at Month 6 showed a patent RMLB with no stenosis, edema, or abnormalities, and chest X-ray and CT results returned to normal. At the 3-month follow-up after completing ATT, she showed good clinical improvement, pulmonary function tests were normal, she had good glycemic control and there was no relapse. She was advised to have annual



chest X-rays, and to receive influenza and pneumococcal vaccinations.

Figure 2. a) Chest X-ray PA view after intensive phase treatment. b) & c) Bronchoscopy following intensive phase treatment.



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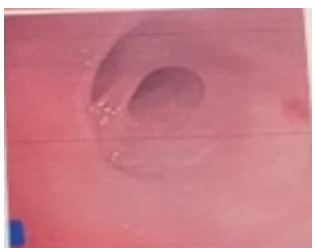

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Discussion

This case illustrates obstructive RMLS resulting from EBTB with a Pseudomonas superinfection in a diabetic patient, which resolved completely following a bronchoscopic diagnosis, appropriate antimicrobial therapy ATT, and management of DRESS [5,6]. The pathophysiology of RMLS focuses on the vulnerability of the RMLB due to its narrow diameter, horizontal angle, and incomplete fissure, leading to mucus retention, which is 3-5 times more than in other lobes. [1,2] TB granulomas can cause edematous stenosis in 64% of EBTB-RMLS cases, aggravated by diabetes-related neutrophil dysfunction, like decreased phagocytosis, and a biofilm from Pseudomonas Past antibiotic treatments without full clearance highlighted the presence of post-obstructive pneumonitis. [11,13]

The yield of bronchoscopy showed a 93% etiological identification rate (25% TB, 30% malignancy, and 20% infection) with a therapeutic success rate of 90% (through debridement and dilation). Diagnosis challenges include differentiating between RML carcinoma contributing 30% of the burden, non-tuberculous mycobacteria, and aspergilloma, where PET-CT or MTB-PCR can be useful adjuncts [14,15]. Diabetes significantly raises the risk of RMLS because of hyperglycemia-induced mucus retention. Long-term, there's a 20% chance of relapse with the risk of bronchiectasis, warranting surveillance bronchoscopy every 6-12 months. [17]

The management algorithm follows these steps: (1) Bronchoscopy with or without BAL; (2) Treatment targeted to the cause ATT/antibiotics; (3) Additional therapies like physiotherapy, inhaled corticosteroids for inflammation; (4) For refractory cases, consider stenting or lobectomy. Outcomes indicate an 85% resolution rate for conservative management and a 95% rate for interventional procedures.

Conclusion

RMLS is still often overlooked, especially in TB-endemic regions, highlighting the need for a high level of suspicion in diabetic patients with persistent opacities in the right middle lobe. Bronchoscopy is crucial for accurately determining the cause and providing effective treatment. Increased awareness can reduce diagnostic delays and avoid complications like bronchiectasis, which occurs in 15-20% of cases. A comprehensive approach that includes microbiology-driven medications, clearing blockages, and managing comorbidities can improve outcomes, while long-term monitoring ensures a relapse-free recovery. [1,7]

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