DIAGNOSIS OF BRONCHIECTASIS AND RAPID STABILIZATION FOLLOWING HFCWO INITIATION IN A PATIENT WITH RECURRENT RESPIRATORY SYMPTOMS

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INTRODUCTION: Bronchiectasis is a chronic lung condition characterized by permanent dilation of the airways due to recurrent inflammation or infection.[1] Despite advancements in imaging and diagnostic tools, early detection of bronchiectasis remains a challenge as its symptoms often overlap with other respiratory conditions such as asthma and chronic obstructive pulmonary disease (COPD). Early diagnosis and interventions are crucial to prevent disease progression, reduce exacerbations, and improve quality of life. This case report highlights the journey of a patient who received a timely diagnosis of bronchiectasis, escalation of treatment management including SmartVest® high-frequency chest wall oscillation (HFCWO) therapy, and the significant improvements in patient reported outcomes.

CASE PRESENTATION: A 58-year-old female presented to our pulmonary clinic with complaints of chronic cough, daily morning sputum production, and intermittent dyspnea on exertion for the past two years. She reported experiencing three episodes of lower respiratory tract infections in the previous year, each requiring antibiotic treatment and one requiring hospitalization for intravenous therapy. Additional symptoms included fatigue, anorexia and nocturnal wheeze. Her medical history was significant for recurrent mucopurulent bronchitis, allergic rhinitis and an episode of severe pneumonia 10 years prior. She had been maintained on a high-dose inhaled corticosteroid (ICS) /long-acting beta-agonist (LABA) combination inhaler for many years but did not have a secure diagnosis of asthma or chronic obstructive pulmonary disease (COPD). She had no known history of smoking or occupational exposures.

On physical examination, pertinent positives included a thin female with coarse crackles in the right lower lung field but no finger-clubbing, nasal polyps or signs of heart failure. Baseline oxygen saturation was 96% on room air. Spirometry demonstrated moderate airflow obstruction with an FEV1 of 65% of predicted and an FEV1/FVC ratio of 69% (low).

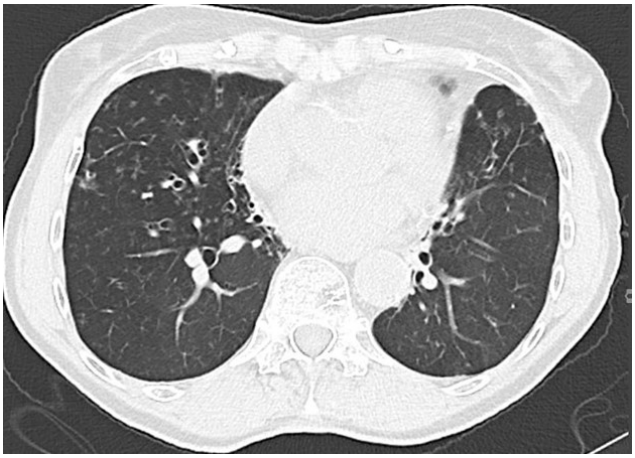

Figure 1.
Initial computed tomography (CT) image demonstrating central large airway cylindrical bronchiectasis.

Given her clinical history and symptoms, a high-resolution computed tomography (HRCT) scan of the chest was performed. The HRCT images **(Figure 1)** revealed cylindrical bronchiectasis predominantly in the lower lobes, with airway wall thickening, peribronchial consolidation, and mucus plugging **(Figure 2)**. No significant nodules, masses, or interstitial lung disease were observed. Immunological testing, including bacteria-specific antibody levels, immunoglobulin G level and CFTR genotyping was all normal. A sputum culture identified heavy growth of pan-sensitive Pseudomonas aeruginosa. Mycobacterial cultures were negative.

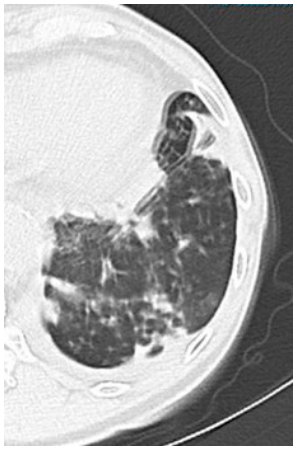

Figure 2.
Computed tomography (CT) image illustrating areas of mucus plugging in the left lower lobe (pre-treatment).

The patient was promptly diagnosed with idiopathic bronchiectasis and initiated on a multi-modal management plan including:

- **Aggressive antimicrobial therapy**: A 14-day course of oral levofloxacin targeting Pseudomonas aeruginosa.
- **Bronchodilators**: Daily use of a LABA and antimuscarinic combination inhaler. The ICS component of her inhaled regimen was stopped.
- **Mucolytics**: Nebulized hypertonic saline (7%) to aid mucus clearance.
- **Airway clearance therapy (ACT)**: The patient was started on an oscillating positive expiratory pressure device and SmartVest HFCWO, with sessions recommended for 20 minutes twice daily. The patient was taught to use the active cycle breathing technique (ACBT) to optimize the process of removing mucus from the lungs.[2]

RESULTS: At her 3-month follow-up, the patient reported significant improvement in symptoms, including reduced sputum production, improved cough and resolution of wheeze. Importantly she suffered no respiratory exacerbations. SmartVest HFCWO therapy was particularly effective in helping mobilize and clear mucus when used with other prescribed treatments. Repeat spirometry demonstrated some improvement in lung function with an FEV1 of 72% predicted.

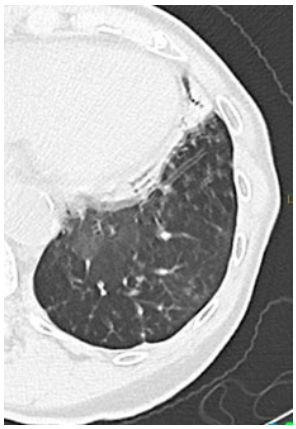

Figure 3. Computed tomography (CT) image showing significant improvement in lower lobe mucus plugging after starting multimodal bronchiectasis therapies.

A repeat CT chest revealed significant improvement in mucus plugging in the lower lobes when compared to her initial baseline CT **(Figures 2 & 3)**. She continued daily use of SmartVest therapy, bronchodilators and hypertonic saline three times a week. Overall, she noted a marked improvement in her energy levels and overall quality of life.

DISCUSSION: This case underscores the critical role of early and accurate diagnosis of bronchiectasis, particularly in patients with recurrent respiratory infections and chronic sputum production. HRCT imaging remains the gold standard for diagnosing bronchiectasis, providing detailed visualization of airway abnormalities.[3] Pulmonary function testing can further support diagnosis and monitor disease progression. The early initiation of HFCWO therapy significantly improved this patient's clinical outcomes. By facilitating effective mucus clearance, SmartVest reduced the risk of airway obstruction and subsequent infections. This aligns with existing literature, which highlights the benefits of HFCWO therapy in improving lung function, reducing exacerbations, and enhancing quality of life in patients with bronchiectasis.[4]

Inhaled mucoactive agents such as hypertonic saline have been shown to mobilize airway secretions, improve symptoms of breathlessness and improve lung function.[5] Bronchodilators may be useful adjuncts in airway clearance to facilitate ACT on a case-by-case basis. Inhaled corticosteroids are controversial in bronchiectasis in the absence of a prior diagnosis of asthma as they may increase the risk of non-tuberculous mycobacterial infection and pneumonia.[6]

CONCLUSION: Early diagnosis and management of bronchiectasis can prevent disease progression and improve patient outcomes. The use of SmartVest HFCWO therapy in this case exemplifies its effectiveness in airway clearance and symptom control. Regular follow-ups and adherence to a tailored treatment plan are essential to achieving sustained clinical improvement.

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Disclosures: Case Summarized Under Electromed's Case Report Program
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