How bronchoscopy can impact bronchiectasis management: a prospective, observational study

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To the Editor:

Bronchiectasis is a chronic respiratory condition characterised by irreversible bronchial dilatation, persistent respiratory symptoms and recurrent exacerbations [1]. Despite significant progress in understanding its pathophysiology, many diagnostic and therapeutic decisions remain based on expert opinion [2, 3]. In particular, the role of bronchoscopy remains debated. According to current guidelines, bronchoscopy should be considered in patients with nonproductive cough and signs of infection on computed tomography (CT), or when obstructive causes or nontuberculous mycobacterial pulmonary disease (NTM-PD) are suspected [2, 3]. However, these recommendations are not supported by robust studies or real-world data, and bronchoscopy can be associated with complications, including bleeding, desaturation and, rarely, severe adverse events [4]. This study aimed to assess the impact of bronchoscopy on the clinical management of adults with bronchiectasis.

A prospective, observational study was conducted at the Bronchiectasis Program of IRCCS Humanitas Research Hospital, Milan, Italy, between July 2021 and September 2024. All consecutive adults (⩾18 years) with radiologically and clinically significant non-cystic fibrosis bronchiectasis who underwent bronchoscopy with bronchial lavage (BL) were included [1]. Patients underwent bronchoscopy either during clinical stability or during an exacerbation, following local Standard Operating Procedures (SOPs) and based on one or more of the following clinical indications: 1) identification of specific aetiologies (*e.g.* endobronchial obstruction); 2) aetiological evaluation of haemoptysis; 3) clinical and/or radiological suspicion of NTM-PD; 4) clinical and/or radiological suspicion of fungal pulmonary disease; 5) microbiological evaluation in patients with no expectoration and no prior microbiological data, experiencing a clinical or radiological deterioration; and 6) microbiological evaluation in patients with prior microbiological data considered inconsistent or insufficient by the treating physician to explain clinical or radiological worsening. All procedures were guided by presence, type and distribution of one or more specific radiological findings on a chest CT scan performed within the previous 6 months. All bacterial and fungal cultures were performed at IRCCS Humanitas Research Hospital, while all mycobacterial analyses were conducted at Niguarda Hospital laboratory in Milan, Italy. Patients were managed according to SOPs and international guidelines [2, 3]. The treating physician decided on any subsequent treatment change after the procedure. The primary study endpoint was the proportion of patients in whom bronchoscopy findings led to at least one change in bronchiectasis management. Predefined changes included: 1) initiation of eradication therapy for *Pseudomonas aeruginosa*, or antibiotic therapy for *Haemophilus influenzae* or *Staphylococcus aureus* chronic infection; 2) diagnosis and management of NTM-PD; 3) diagnosis and management of fungal pulmonary disease; 4) initiation of long-term immunomodulatory treatment (*e.g.* macrolide) following exclusion of NTM or other infections; 5) initiation or modification of antibiotic therapy for an exacerbation; and 6) management of specific conditions (*e.g.* obstruction or carcinoid). Secondary endpoints included procedure-related adverse events and microbiological characterisation of the population *via* BL. Based on previously reported microbiological yields for BL in bronchiectasis and anticipating a treatment change rate of ∼50%, a sample size of ⩾94 patients was required to achieve a maximum margin of error of ±10% at a 95% confidence level for this observational study [5, 6]. Continuous variables are expressed as median and interquartile range (IQR), and categorical variables as number and percentage.

Shareable abstract (@ERSpublications)
In bronchiectasis, bronchoscopy is not merely diagnostic; it may alter management. Over half of patients in this study had treatment modified after lavage, even without sputum: a step toward individualised care. https://bit.ly/4b7zqAe

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Among the 574 patients (75% female; median (IQR) age 68 (59–70) years) followed in the Bronchiectasis Program at Humanitas, 139 (24.2%) underwent bronchoscopy during the study period and were included in the analysis. These 139 patients had a median (IQR) age of 65 (57–71) years and were 80.5% female. The median (IQR) Bronchiectasis Severity Index (BSI) in this subgroup was 5 (3–7), with 15.8% classified as having severe disease (BSI ⩾9). A history of *P. aeruginosa* isolation was documented in 17.3% of patients, while 16.3% had a prior NTM isolation and 46.8% experienced two or more exacerbations in the previous year. The most common comorbidities were gastro-oesophageal reflux disease (36.7%) and chronic rhinosinusitis (18.0%). Most patients had idiopathic bronchiectasis (71.9%) and none had a prior confirmed diagnosis of primary ciliary dyskinesia. The most common CT abnormalities prompting the procedure were tree-in-bud pattern (50.4%), consolidation (45.3%) and mucus plugging (38.1%). The median (IQR) time between CT and BL was 38 (20–83) days. At the time of bronchoscopy, 20 (14.4%) patients were experiencing an exacerbation. The distribution of indications for bronchoscopy and corresponding treatment change rates are reported in figure 1. BL cultures were positive in 58.3% of cases overall, including 61.5% among patients without productive cough or sputum availability. The most frequent pathogens were *H. influenzae* (15.8%), *P. aeruginosa* (15.1%), *Mycobacterium avium* complex (11.6%), *S. aureus* (6.5%) and *Aspergillus fumigatus* (4.3%). Bronchoscopy and BL led to a treatment change in 71 (51.1%) patients, including 24 (17.3%) patients who received eradication therapy, 15 (10.8%) who initiated long-term immunomodulatory therapy following the exclusion of NTM or other chronic infections, 14 (10.1%) who were diagnosed and managed for NTM-PD, nine (6.5%) who were diagnosed and treated for a fungal disease, and nine (6.5%) who received pathogen-directed therapy for an exacerbation. Procedure-related adverse events occurred in four (2.9%) patients including two cases of minor bleeding (managed with cold saline), one episode of transient hypertension and one of post-procedural nausea. No major complications were observed.

The role of bronchoscopy in bronchiectasis workup is not supported by consistent evidence. However, BL is considered extremely reliable for identifying lower airway pathogens, as it allows sampling targeted to CT or endoscopic abnormalities while minimising oropharyngeal contamination. In previous studies, the positive culture rate using BL averaged 48% during stable disease and 66% during exacerbations, with *H. influenzae*, *P. aeruginosa* and NTM being the most frequently isolated pathogens [5, 6]. However, to our knowledge, no previous studies specifically evaluated its impact on patient management. In our prospective, real-life, single-centre study, bronchoscopy with BL led to a change in bronchiectasis management in more than half of cases. In the EMBARC registry, 28.4% of patients had no microbiological samples collected in the previous year and an additional 26.1% had negative cultures

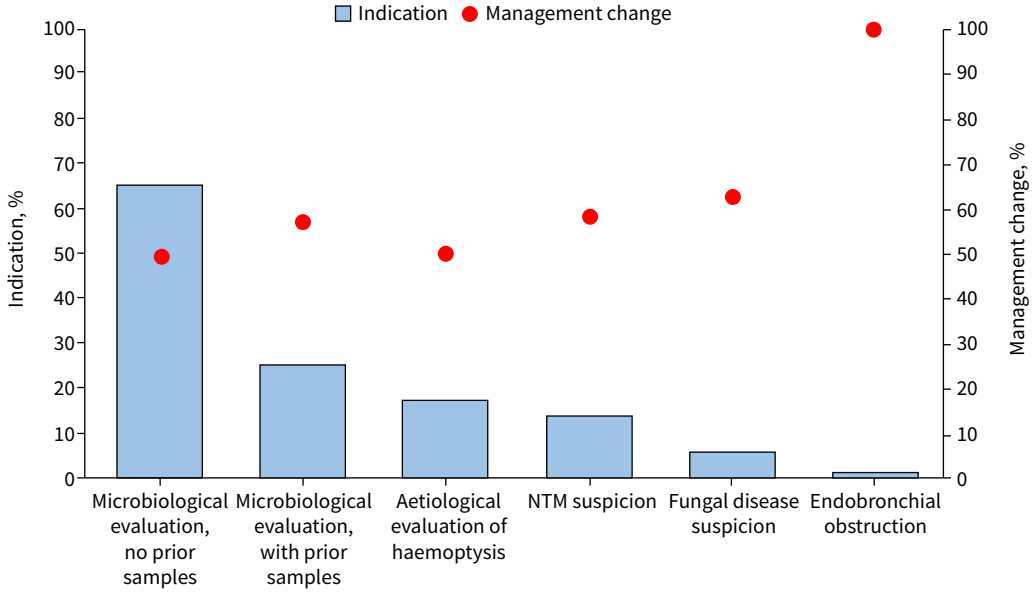

FIGURE 1 Prevalences of bronchoscopy indications and corresponding treatment change rates. The bars represent the prevalence of each clinical indication for bronchial lavage while the circles indicate the proportion of patients undergoing treatment change after bronchial lavage within each subgroup. NTM: nontuberculous mycobacteria.

despite sample availability [7]. Similar trends have been reported in other registries globally, with no culture data available in 23–41% of patients [8–11]. In our study, BL was performed in 65.5% of patients with absent or persistently negative sputum (figure 1), yet yielded a consistent positivity (61.5%), suggesting a possible added value of bronchoscopy in these challenging subgroups. Even when BL does not result in an immediate change in treatment, this does not imply a lack of clinical value. In these patients, a positive BL may confirm a pre-existing chronic infection, thereby ruling out a new microbiological trigger for clinical or radiological deterioration. In other cases, airway clearance, spontaneous recovery or comorbidity adjustment may reduce the need for immediate intervention, while BL results may still guide future decisions. Conversely, a negative BL can reasonably redirect diagnostic evaluation toward noninfectious treatable traits.

Our study has some limitations: the single-centre design and moderate sample size may affect generalisability. However, the single-centre design also ensured a high degree of methodological consistency. All bronchoscopies were performed following identical SOPs and all microbiological analyses were conducted in a single accredited laboratory using standardised culture protocols. This uniform approach minimised procedural and analytical variability, strengthening the internal validity of our findings and supporting their value as a proof of concept for future multicentre studies. The absence of long-term follow-up data precludes assessment of the sustained impact of bronchoscopy-guided interventions on outcomes such as eradication success, exacerbation frequency and quality of life, which could be relevant for personalised treatment approaches. Another limitation is that, after the COVID-19 pandemic, induced sputum was no longer part of our SOP for biosafety reasons, making bronchoscopy the second-line investigation when sputum samples were unavailable or inconclusive. Consequently, a direct comparison between bronchoscopy and noninvasive testing could not be performed, and the additional diagnostic yield of bronchoscopy remains to be quantified.

In conclusion, bronchoscopy with BL significantly influenced therapeutic management in a substantial proportion of patients and proved to be a safe procedure. These findings suggest that BL could be considered as a complementary diagnostic tool in selected cases. Future longitudinal multicentre trials should validate these findings and assess the long-term benefits of bronchoscopy-guided management in bronchiectasis, possibly integrating molecular techniques to further enhance diagnostic yield and characterisation of airway pathogens.

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