

## LETTER

## Bronchoscopy with bronchoalveolar lavage: determinants of yield and impact on management in immunosuppressed patients

Fibreoptic bronchoscopy with bronchoalveolar lavage (FOB/BAL) is a common modality for the evaluation of pulmonary infiltrates.<sup>1 2</sup> We recognised there are limitations of comparison between subgroups of immunosuppressed patients, non-uniform definitions of a positive yield, suboptimal description of the impact of concurrent antimicrobial use at the time of the bronchoscopy and sometimes insufficient assessment of management decisions surrounding FOB/BAL.<sup>3–5</sup> To address these issues, we performed a retrospective analysis of 190 immunosuppressed patients who underwent FOB/BAL for a pulmonary abnormality (clinical or radiographic) at the University of Rochester Medical Center from 2005 to 2008. A positive yield was defined as one of the following: (1) positive culture—bacterial, viral or fungal (not including *Candida albicans* alone); (2) positive finding on cytopathology or fungal stain; or (3) diffuse alveolar haemorrhage. Antimicrobial and corticosteroid treatment changes were assessed 7 days after the bronchoscopy. Bivariate  $\chi^2$  analyses were performed using SAS statistical software (SAS Institute, Cary, North Carolina, USA) to determine significance between variables.

A total of 106/190 (55.8%) FOB/BALs had a positive yield. No difference in yield was found on the basis of baseline demographics, type or severity of immunosuppression, severity of illness or positive blood or urine cultures. A positive sputum culture, however, was predictive of a positive yield ( $p=0.002$ ). A total of 37/118 sputum cultures were positive. Twenty-three were concordant with FOB/BAL; however, 35 identified organisms not found on FOB/BAL. Bacteria, fungi and/or viruses were isolated in 4.7, 4.7 and 12.6% of patients who were not on corresponding antimicrobials. Bacteria, fungi and/or viruses that were resistant to concurrent antimicrobials were isolated in 3.6, 2.1 and 10% of patients, respectively.

The duration of treatment doses of antibiotics and the presence of consolidation on chest CT were negatively associated with yield ( $p<0.021$  and  $p<0.03$ ); however, consolidation on CT was not associated with a longer duration of antimicrobial treatment ( $p=0.252$ ). If FOB/BAL was performed within 3 days of starting treatment dose antibiotics, the overall yield was 63.4%, but was reduced to 57.6% and 34.4% when performed within 3–14 days or after 14 days, respectively. The use and/or duration of prophylactic antibiotics, antifungals and/or antivirals did not negatively impact yield.

Seventy-five per cent of patients had treatment altered after FOB/BAL. Overall, 41.5% of patients had antibiotic treatment discontinued or narrowed. Antibiotic coverage was more likely to be narrowed when bacterial cultures were negative ( $p=0.003$ ) and more likely to be broadened if bacterial cultures were positive ( $p<0.0001$ ). Antiviral and antifungal coverages were also more likely to be broadened if viral or fungal cultures were positive ( $p=0.008$  and  $p=0.003$ ). The all cause 30-day mortality after FOB/BAL was 16.8%. A positive yield on FOB/BAL did not impact mortality. Furthermore, changes in treatment made on the basis of the bronchoscopy did not significantly impact 30-day mortality.

We found a similar overall yield to previous studies (up to 65%), and we demonstrated that positive sputum cultures were associated with a positive yield on bronchoscopy. It is unclear whether the additional organisms found in the sputum represent upper airway contamination. Furthermore, duration of treatment dose antibiotics for  $>2$  weeks prior to the FOB/BAL and consolidation on CT were important negative predictors of yield. While a positive yield on FOB/BAL was statistically associated with a change in medical management, neither the presence of a positive yield nor changes in treatment were predictive of 30-day mortality.

Ultimately, FOB/BAL is a relatively safe method of obtaining lower respiratory specimens. There were no significant complications directly attributable to the bronchoscopy in our study. While routine bronchoscopy for immunosuppressed patients with pulmonary disease cannot be definitively endorsed on the basis of this study alone, we would suggest FOB/BAL would most optimally be performed within 3 days of the initiation of broad-spectrum antibiotics.

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