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EDITORIAL

Antoni Torres
Laia Fernández-Barat

New developments in the diagnosis of VAP make bronchoalveolar lavage less useful: some considerations

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A. Torres (✉)
Department of Pulmonology, Hospital Clinic of Barcelona, Villarroel 170.08036, Barcelona, Spain
e-mail: atorres@ub.edu

L. Fernández-Barat
University of Barcelona, IDIBAPS, CIBERES, Barcelona, Spain

Although the incidence of ventilator-associated pneumonia (VAP) has decreased in the last 5 years, VAP is still an important complication of mechanically ventilated patients. The diagnosis of VAP is a frequent clinical challenge and remains a matter of debate.

In many ICUs, in the event of clinical suspicion of pneumonia, the first step of the diagnostic and treatment process is initiated when clinical signs and symptoms are present. In a postmortem study published many years ago by our group [1], the specificity and sensitivity of these signs and symptoms were both 70 %, a figure not too low for initial screening. However, this figure is insufficient, especially in terms of sensitivity, since 30 % of patients requiring antibiotic treatment would be missed. Furthermore, a 70 % specificity means that 30 % of patients would potentially be treated with antibiotics unnecessarily. It is clear that the process of clinical suspicion needs to be improved. In order to increase the operative values of clinical signs and symptoms, some clinicians and researchers recommend using the clinical pulmonary infection score (CPIS) [2] to start the diagnosis process. However, some of the variables in this score are highly subjective (e.g., number of endotracheal aspirations) and subsequently they potentially affect sensitivity and specificity. Ventilator-associated complications (VAC) is a concept aimed at increasing the sensitivity of clinical suspicion of VAP [3, 4]. In addition to classical signs and symptoms, VAC includes sustained changes in oxygenation and the need for PEEP to define VAC and suspect VAP. This strategy is probably oversensitive given the many other complications that may affect oxygenation in mechanically ventilated patients.

The use of blood biomarkers such as procalcitonin (PCT) has not fulfilled initial expectations for improving the diagnostic process of VAP. Observational studies have confirmed that serum PCT has poor operative performance for the diagnosis of VAP [5] and its utility is much better for monitoring evolution and shortening the duration of antibiotic treatment.

Bronchoalveolar lavage (BAL) is probably the best respiratory sample for diagnosing VAP. The reason for this is not only the extensive area of alveoli explored but also the quality of the samples obtained (Fig. 1), which allows cytological examination (intracellular organisms), rapid molecular techniques, rapid stains, and qualitative or quantitative cultures. The clinical problem is that BAL has to be performed before antibiotics are started, which is difficult in some units 24 h a day. But assuming that it is feasible to perform BAL 24 h a day and 365 days a year, what we really need is rapid detection of microorganisms and patterns of resistance in these samples. This can be achieved by implementing point-of-care testing with molecular methods in respiratory samples to detect the majority of bacteria, viruses, and fungi that might cause VAP. Although some units have already implemented this strategy we are still a long way from achieving its systematic use. Having these microbiological devices available to clinicians for point-of-care testing will enable us to change from empirical medicine to pathogen-targeted therapy early in the evolution of VAP.

With regard to the question of whether new developments in the diagnosis of VAP make bronchoalveolar lavage less useful, the answer is probably no. However, in

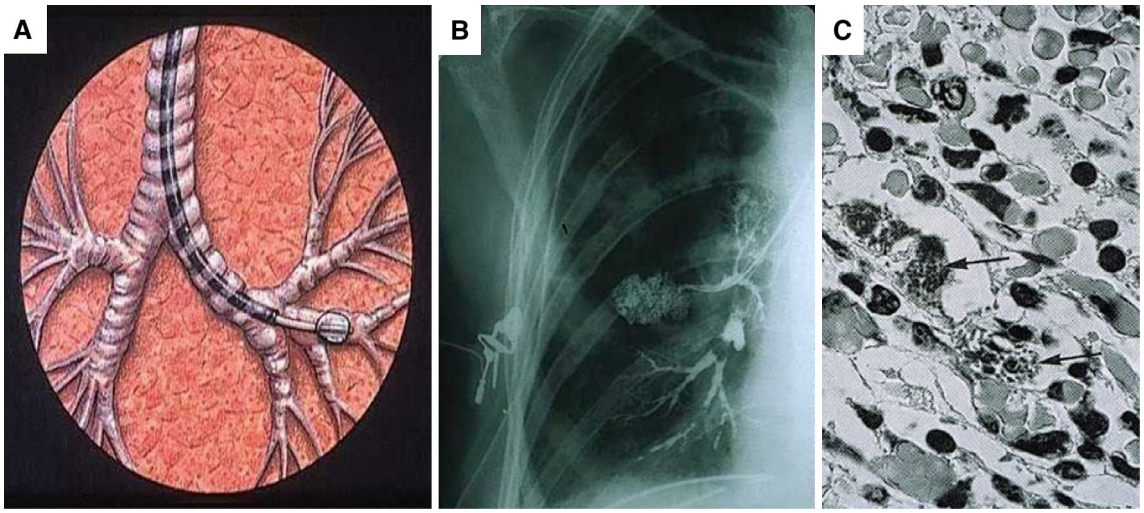

Fig. 1 **a** Protected bronchoalveolar lavage (BAL) via fiberoptic bronchoscopy. **b** Segments of the lung explored in a BAL procedure after injecting radiopaque contrast during BAL, by courtesy of Dr. J. M. Sirvent. **c** Intracellular microorganisms (*arrow*) in the centrifuged BAL fluid. More than 2 % in macrophages and neutrophils is highly specific to VAP

a recent issue of *Intensive Care Medicine*, Bos et al. [6] reviewed noninvasive innovations for improving the early recognition of VAP, including sensing airway colonization and pulmonary infection. As acknowledged by the authors, neither technique is free of limitations and uncertainties. In our opinion, one of these is the interaction with biofilm formation. Detection of volatile compounds leading one to suspect VAP (sensing pulmonary infection) is promising in the sense that this technique may trigger the diagnostic process earlier. As mentioned by the authors, we need clinical trials to determine its operative value.

We think that there is a need to evolve from empirical antibiotic treatment to early pathogen-targeted therapy. This strategy will make it possible to improve the number of early initial adequate antibiotic treatments, avoid noneffective antibiotics, decrease resistance in the future and, very probably, improve outcomes. In parallel, having new techniques for early recognition of colonization and infection will be more than welcome.

References

1. Fabregas N, Ewig S, Torres A, El Ebiary M, Ramirez J, de la Bellacasa JP, Bauer T, Cabello H (1999) Clinical diagnosis of ventilator associated pneumonia revisited: comparative validation using immediate post-mortem lung biopsies. Thorax 54:867–873
2. Pugin J, Auckenthaler R, Mili N, Janssens JP, Lew PD, Suter P (1991) Diagnosis of ventilator associated pneumonia by bacteriologic analysis of bronchoscopic and non-bronchoscopic "blind" bronchoalveolar lavage fluid. Am Rev Respir Dis 143:1121–1129
3. Klompas M, Kleinman K, Khan Y, Evans RS, Lloyd JF, Stevenson K, Samore M, Platt R (2012) Rapid and reproducible surveillance for ventilator-associated pneumonia. Clin Infect Dis 54:370–377
4. Muscedere J, Sinuff T, Heyland DK, Dodek PM, Keenan SP, Wood G, Jiang X, Day AG, Laporta D, Klompas M (2013) The clinical impact and preventability of ventilator-associated conditions in critically ill patients who are mechanically ventilated. Chest 144:1453–1460
5. Luyt CE, Guerin V, Combes A, Trouillet JL, Ayed SB, Bernard M, Gibert C, Chastre J (2005) Procalcitonin kinetics as a prognostic marker of ventilator-associated pneumonia. Am J Respir Crit Care Med 171:48–53
6. Bos LDJ, Martin-Loeches I, Artigas A (2014) Innovations that could improve early recognition of ventilator-associated pneumonia. Intensive Care Med 40:1352–1354. doi:10.1007/s00134-014-3356-y