Introduction

As for many clinical tools, there is at the present time no clear agreement on the appropriate clinical use of BAL. Undoubtedly, the recent and encouraging clinical experiences with BAL for diagnosis of opportunistic infections in the immunocompromised patient have encouraged a universal acceptance and interest in BAL. Because of the low morbidity of the lavage procedure and the significant yield of clinically important information, many physicians have been encouraged to perform a lavage during bronchoscopies undertaken for a variety of indications. This has resulted in a considerable body of experience with BAL in a number of clinical settings. For many years, one of the main obstacles for general acceptance of BAL as a clinical tool has been the vast disparity among centres worldwide regarding the technique and the processing of the BAL material.

In order to address this important issue of standardization the European Society of Pneumology (SEP), in 1988, set up a Task Force on Bronchoalveolar Lavage. The first report of the group focused specifically on technical recommendations and guidelines on how to perform BAL and how to process BAL material and was published in 1989 in this journal [1].

This is the second joint report of the SEP Task Group on BAL and gives appropriate guidelines and information about the clinical indications and use of BAL in various diseases of the lung. The members of the Task Group have collected all relevant information so far available about the clinical usefulness and indications of BAL. As a result of a critical review of the material and with the help of two consensus conferences of the group this state-of-the-art paper has been produced. It was the aim of the group to provide a short and informative report for the use of clinicians. Thus, this report is not intended as a comprehensive review of each of the topics. It provides guidelines and recommendations about the clinical value of BAL for diagnosis, for prediction of prognosis, and gives some comparative evaluation of BAL to other established investigative means. Only the pertinent literature for these issues is referenced. A small chapter deals with therapeutic applications of bronchial lavage or bronchoalveolar lavage.

Because the field of BAL worldwide is so rapidly evolving and the application of BAL is so widespread, this report can only give recommendations and guidelines, and should not be regarded as an "indication book". There will be several centres where a special expertise for diagnostic applications of BAL has been accomplished which will regard our recommendations as being too restrictive; and there will be other centres also which are still in a learning and experimental stage regarding the clinical use and performance of BAL. Therefore, our Task Group tried to meet the understanding and the requirements of most of the centres currently performing BAL and to give a fair balance regarding our clinical recommendations.

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Side-effects and safety of BAL

H. Klech and C. Hutter

Today, BAL is regarded as a very safe procedure. Side- effects are more or less comparable to regular fibrebronchoscopy unless specific invasive procedures like transbronchial lung biopsy are performed. The overall complication rate with BAL is reported to be 0–3% in comparison to 7% with transbronchial lung biopsy and 13% when using open lung biopsy [2]. So far no lethal complication directly attributable to BAL has been reported. Lethality for transbronchial biopsy is reported to be 0.2% and for open lung biopsy 1.8% [2].

Minor side-effects of BAL include coughing during lavage, fever and chills some hours after lavage (which can usually be treated with the help of simple antipyretics), transient alveolar infiltration in the dependent lung segment 24 h after the procedure, transient deterioration of lung function parameters like vital capacity, forced expiratory volume in one second (FEV_1), decrease of oxygen tension (Po_2) (consequences of saline lavage are expressed more in patients with underlying pulmonary diseases in comparison to healthy volunteers). Most side-effects reported are closely related to endoscopic technique, location and extent of lavaged lung area, volume and temperature of instilled fluid (summary in table 1).

Supplemental oxygen delivery as well as ear oximetry and electrocardiogram (ECG) monitoring is strongly advised in patients with severe underlying diseases or in any other critical condition [3]. Patients with mild asthma have been successfully lavaged [4], however, patients with a history of asthma bronchiale should be handled with special caution and careful monitoring is advised [5, 6]:

1) Supplemental oxygen with a nasal prong should be administered throughout the entire procedure.
2) Premedication with aerosolized beta-agonists.
3) Ear-oximetry and ECG-monitoring.

Table 1. – Consequences and side effects of BAL

Alveolar infiltration	<10% of cases, usually subside after 48 hours[§]	7, 8, 9
Crackles	withing 24 hours over dependent areas[§§]	5, 10
Wheezing	in hyperreactive patients up to 1–2 weeks	4
Bronchospasm	rarely in normoreactive, more frequent in hyperreactive patients	4, 5, 9
Fever	10–30%, some hours after BAL[§§]	7, 8, 11, 12, 14
Lung function	transient decrease of FEV_1, VC, PEF, Po_2[§§, $, $$]	5, 11, 12, 13, 14, 15, 16, 17, 18
	transient rise of Pco_2 in patients with COPD	19
Bronchial Reactivity	no change after BAL	15, 20
Epithelial integrity	no effect on lung epithelial permeability 24 hours after BAL	21
	transient decrease of ciliary beat frequency	2
Bleeding	insignificant	9

§: Risk increases with size of instilled lavage fluid volume and numbers of lavaged segments; §§: Risk increases with volume of instilled lavage volume; $: More likely in hyperreactive patients or in patients with severe underlying infiltrative lung diseases; $$: Supplemental oxgyen prevents hypoxemia during BAL.

The clinical role of BAL in idiopathic pulmonary fibrosis

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The aim of this paper is to review the literature on the clinical value of bronchoalveolar lavage (BAL) in the diagnosis and management of patients with idiopathic pulmonary fibrosis (IPF) (synonym: cryptogenic fibrosing alveolitis). This topic has been included in a number of recent detailed reviews [22–24]]. IPF is one of the most serious interstitial lung diseases. The prognosis is poor, with a mean survival of only 3–5.6 yrs [25–27], but progression is very variable in individual patients. Objective response to corticosteroids is achieved in only about 20% of cases [25, 26, 28], and prognostic factors associated with favourable response are younger age, shorter duration of disease [27–29], and more cellular lung biopsies [26, 30, 31]. Thus, it is important to achieve diagnosis and start treatment as soon as possible.

Diagnostic value of BAL in IPF

There are no specific diagnostic BAL features in IPF, but useful information can be provided by the differential counts of BAL cells, and the profile of BAL cell types. Different types of increased BAL cells predominate in the different interstitial lung diseases, which do not provide a definitive diagnosis because of variation within, and overlap between, disorders but trends of difference between the disorders can support the provisional diagnosis or suggest an alternative.

Neutrophils are the main lavage cell type increased in IPF [32–34] and in other diffuse interstitial fibrosing lung disorders including fibrosing alveolitis associated with collagen vascular diseases (see below), the inorganic dust disease asbestosis [35], and experimental models of silicosis [36]. Patients with IPF, collagen vascular diseases, and asbestosis also frequently have increased eosinophils in lavage [34–38]. Apart from this, high counts of eosinophils in lavage have only been reported in cases of eosinophilic pneumonia, in patients with Churg-Strauss syndrome and in patients with in asthma [39].

The most useful aid to diagnosis is given by the full profile of BAL cell types increased in each patient. The combination of increased neutrophils and eosinophils occurs in about two-thirds of patients with