Respiratory Medicine (2012) 106, 413–419

Available online at www.sciencedirect.com

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# The clinical implications of bronchoscopy in hemoptysis patients with no explainable lesions in computed tomography

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Received 25 May 2011; accepted 12 November 2011
Available online 12 December 2011

**KEYWORDS**
Hemoptysis;
Chest computed tomography;
Flexible bronchoscopy;
Clinical outcome;
Normal chest

**Summary**
*Introduction:* Hemoptysis is observed frequently in patients, although chest computed tomography (CT) shows no explainable lesion as the cause of hemoptysis. However, the clinical course of these patients has not been reported fully.
*Methods:* This study included patients who visited Seoul National University Hospital and Seoul National University Bundang Hospital to be treated for hemoptysis from January 2003 through October 2009 and who had no lesion causing hemoptysis in chest CT. We retrospectively analyzed their bronchoscopic and clinical findings.
*Results:* A total of 228 patients were included, and the mean follow-up duration was 781 days. All patients underwent bronchoscopy. The bronchoscopic findings of 191 patients (83.8%) were negative for hemoptysis and showed the possible causes of bleeding in 37 patients (16.2%). Forty-three of the 191 patients with negative bronchoscopic findings had oronasopharyngeal problems or were using anticoagulants. After excluding these 43 patients, hemoptysis recurred in 29 (19.6%) of the remaining patients. Thirteen of the patients whose bronchoscopic findings identified the possible causes of bleeding (35.1%) experienced recurrence. Only one patient (0.4%) was diagnosed with lung cancer by the initial bronchoscopy, and no patient developed malignancy during the follow-up period.

*Abbreviations:* CT, computed tomography; SD, standard deviation.

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0954-6111/$ - see front matter 
doi:10.1016/j.rmed.2011.11.010

*Conclusion:* The recurrence rate was higher in the patients with positive findings than in the patients with negative findings on bronchoscopy. Although about 20% of patients with negative bronchoscopy findings experienced recurrence, the clinical course of those in whom recurrent bleeding occurred was usually benign.


## Introduction

Hemoptysis is a common and important symptom in clinical practice and accounts for 10—15% of all pulmonary consultations. Hemoptysis can range from blood streaking of sputum to gross blood without any accompanying sputum. The symptoms are distressing for the patient and frequently raise concern about serious underlying disorders, including lung cancer.[1] Therefore, a thorough evaluation of a patient with even a small amount of hemoptysis is important.

Diagnosing the cause of hemoptysis is often difficult, more so in patients presenting with a normal or nonlocalizing chest radiograph. In 1985, Adelman et al. referred to a condition called 'cryptogenic hemoptysis,' which was defined as no clear cause of bleeding despite a thorough evaluation.[2] They estimated that this occurs in about 30% of all hemoptysis patients and suggested that this condition is related most often to acute or chronic bronchial inflammation, occult bronchiectasis, inactive tuberculosis, pulmonary vascular abnormalities, and coagulation abnormalities.[2]

A Korean study reported the clinical outcomes of hemoptysis patients with normal chest radiographs in 1993.[3] Initial bronchoscopy was performed in all patients and produced a diagnosis in 10% (8/80) of patients. Among the remaining 72 patients, chest computed tomography (CT) or bronchography was performed to evaluate the cause of hemoptysis. However, only 22% (16/72) of patients had a chest CT because CT was not readily available at that time. The causes of hemoptysis in this study were listed as endobronchial cancer, chronic bronchitis, endobronchial tuberculosis, bronchiectasis, and catamenial hemoptysis.[3]

CT and bronchoscopy are now widely accepted in the screening of hemoptysis patients with normal chest radiographs. The technology and resolution power have improved markedly. Magu and colleagues reported that a chest CT provided diagnostic information in 16 (53%) of 30 patients with normal chest radiographs.[4] Other authors have reported abnormalities in 39—60% of cases.[5—7]

Many studies have suggested that CT and bronchoscopy are complementary methods, and have recommended that both tests are used in hemoptysis patients with a nonlocalizing chest radiograph. However, there has been little research on the clinical course of patients whose chest CT does not show an obvious cause of hemoptysis.Most articles included patients with hemoptysis whose simple radiographs were normal, but did not focus on patients with a normal CT. However, in clinical practice, a chest CT cannot identify a lesion as the cause of hemoptysis in some patients, and it can be difficult to manage these patients and to explain the clinical course and prognosis of their symptoms.

The aim of this study was to describe the clinical course and long-term outcomes of patients with hemoptysis whose chest CT shows no lesion to explain the hemoptysis.

## Methods

This study included patients who visited Seoul National University Hospital and Bundang Seoul National University Hospital from January 2003 through October 2009. The included patients had a chief complaint of subjective hemoptysis or blood-tinged sputum but had no explainable lesions for hemoptysis on chest CT. The results of the chest CT were reported by a radiologist.

We retrospectively reviewed the medical records, chest CT, and bronchoscopy findings of the patients. From the medical records, the following clinical variables were collected: age, sex, smoking history, comorbidities, duration of follow-up, recurrence of hemoptysis, newly developed significant findings during the follow-up period, and the final diagnosis based on clinical, radiological, and histological findings. All patients underwent bronchoscopic evaluations by the pulmonology doctors in the fellowship under the supervision of senior professors. In cases without evidence of bleeding in bronchoscopy, the patients visited an otolaryngologist or dentist, and some were examined by esophagogastroduodenoscopy to exclude intraoral or nasopharyngeal bleeding. This retrospective data collection was approved by the institutional review board of Seoul National University (IRB No: H-0904-048-278) and has therefore been performed in accordance with the Declaration of Helsinki.

The Statistical Package for the Social Sciences (SPSS) version 10.0 (SPSS Corporation, Chicago, IL) was used for statistical analysis. The patients' clinical variables were expressed as mean ± standard deviation (SD) and range. We compared the clinical variables between the recurrence group and nonrecurrence group using Student's $t$ test and the $\chi^2$ test. Logistic regression was used for multivariate analysis.

## Results

### Clinical features

Two hundred and twenty-eight patients, whose mean age was 51.6 years, were included in this study; about 56% of these patients had never smoked ($n = 129$), and 26 (11.4%) had been treated adequately for pulmonary tuberculosis previously. The baseline characteristics and comorbidities of the patients are listed in Table 1.

### CT findings

The chest CT findings of these patients were normal (36.0%) or included granulomas or tiny nodules (32.9%), ground glass opacity (16.7%), linear atelectasis (15.8%), small