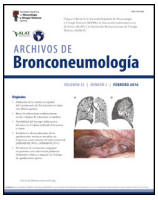
Arch Bronconeumol. 2016;52(7):368–377

Sociedad Española de Neumología y Cirugía Torácica SEPAR

ARCHIVOS DE Bronconeumología

www.archbronconeumol.org



SEPAR's voice

Diagnosis and Treatment of Hemoptysis☆

Rosa Cordovilla,[a,*] Elena Bollo de Miguel,[b] Ana Nuñez Ares,[c] Francisco Javier Cosano Povedano,[d] Inmaculada Herráez Ortega,[e] Rafael Jiménez Merchán[f]

[a] Servicio de Neumología, Complejo Asistencial Universitario de Salamanca, Salamanca, Spain
[b] Servicio de Neumología, Complejo Asistencial Universitario de León, León, Spain
[c] Servicio de Neumología, Complejo Hospitalario Universitario de Albacete, Albacete, Spain
[d] Servicio de Neumología, Hospital Universitario Reina Sofía, Córdoba, Spain
[e] Servicio de Radiología, Complejo Asistencial Universitario de León, León, Spain
[f] Servicio de Cirugía Torácica, Hospital Universitario Virgen Macarena, Sevilla, Spain

ARTICLE INFO

Keywords:
Hemoptysis
Interventional radiology
Bronchoscopy
Life-threatening hemoptysis

ABSTRACT

Hemoptysis is the expectoration of blood from the tracheobronchial tree. It is commonly caused by bronchiectasis, chronic bronchitis, and lung cancer. The expectorated blood usually originates from the bronchial arteries. When hemoptysis is suspected, it must be confirmed and classified according to severity, and the origin and cause of the bleeding determined. Lateral and AP chest X-ray is the first study, although a normal chest X-ray does not rule out the possibility of malignancy or other underlying pathology. Multidetector computed tomography (MDCT) must be performed in all patients with frank hemoptysis, hemoptoic sputum, suspicion of bronchiectasis or risk factors for lung cancer, and in those with signs of pathology on chest X-ray. MDCT angiography has replaced arteriography in identifying the arteries that are the source of bleeding. MDCT angiography is a non-invasive imaging technique that can pinpoint the presence, origin, number and course of the systemic thoracic (bronchial and non-bronchial) and pulmonary arterial sources of bleeding. Endovascular embolization is the safest and most effective method of managing bleeding in massive or recurrent hemoptysis. Embolization is indicated in all patients with life-threatening or recurrent hemoptysis in whom MDCT angiography shows artery disease. Flexible bronchoscopy plays a pivotal role in the diagnosis of hemoptysis in patients with hemoptoic sputum or frank hemoptysis. The procedure can be performed rapidly at the bedside (intensive care unit); it can be used for immediate control of bleeding, and is also effective in locating the source of the hemorrhage. Flexible bronchoscopy is the first-line procedure of choice in hemodynamically unstable patients with life-threatening hemoptysis, in whom control of bleeding is of vital importance. In these cases, surgery is associated with an extremely high mortality rate, and is currently only indicated when bleeding is secondary to surgery and its source can be accurately and reliably located.

Diagnóstico y tratamiento de la hemoptisis

Palabras clave:
Hemoptisis
Radiología intervencionista
Broncoscopia
Hemoptisis amenazante

RESUMEN

La hemoptisis es la expectoración de sangre proveniente del árbol traqueobronquial. Las enfermedades que más frecuentemente la originan son las bronquiectasias, la bronquitis crónica y el carcinoma broncogénico. Las arterias bronquiales son el origen de la mayoría de las hemoptisis. Ante un paciente con sospecha de hemoptisis se debe confirmar su existencia, establecer su gravedad, localizar el origen y determinar su causa. La radiografía de tórax posteroanterior y lateral es la primera prueba de imagen que debe realizarse, aunque la existencia de una radiografía de tórax normal no excluye la posibilidad de malignidad u otra patología de base. Debe realizarse TC multidetector (TCMD) de tórax en todos los pacientes con hemoptisis franca, en los que presentan esputo hemoptoico y sospecha de bronquiectasias

☆ Please cite this article as: Cordovilla R, Bollo de Miguel E, Nuñez Ares A, Cosano Povedano FJ, Herráez Ortega I, Jiménez Merchán R. Diagnóstico y tratamiento de la hemoptisi. Arch Bronconeumol. 2016;52:368–377.

* Corresponding author.
E-mail address: rcordovilla@usal.es (R. Cordovilla).

o factores de riesgo de carcinoma broncogénico, y en los que tienen radiografía de tórax patológica. La angio-TCMD ha sustituido a la arteriografía como método diagnóstico de las arterias que son fuente de sangrado en las hemoptisis. La angio-TCMD es una técnica de imagen no invasiva que identifica correctamente la presencia, el origen, el número y el trayecto de las arterias sistémicas torácicas, bronquiales y no bronquiales, y de las arterias pulmonares que pueden ser fuente del sangrado. El tratamiento más seguro y eficaz para detener el sangrado en la mayoría de los casos de hemoptisis masiva o recurrente es la embolización endovascular. La embolización está indicada en todos los pacientes con hemoptisis amenazante o recurrente en los que se detectan arterias patológicas en la angio-TCMD. La broncoscopia flexible juega un papel primordial en el diagnóstico de la hemoptisis, tanto de la expectoración hemoptoica como de la hemoptisis franca. Puede ser realizada rápidamente en la cama del paciente (UCI) y, además de su utilidad en el control inmediato de la hemorragia, tiene una alta rentabilidad en la localización del sangrado. La broncoscopia flexible es el procedimiento inicial de elección en pacientes con hemoptisis amenazante e inestabilidad hemodinámica, donde el control de la hemorragia es vital. La cirugía en estos casos tiene una tasa de mortalidad muy alta, por lo que la indicación actual de cirugía en la hemoptisis amenazante está reservada para aquellas situaciones en las que la causa de la misma sea tributaria de tratamiento quirúrgico y haya una localización concreta y fiable del origen de la hemorragia.

Introduction

Since the 1994 publication of the SEPAR guidelines[1] on the management of life-threatening hemoptysis, significant advances have been made in diagnostic and therapeutic techniques, necessitating an update of the diagnostic and therapeutic recommendations, not only for life-threatening hemoptysis but also for other less critical but equally important situations. The prognosis of patients with hemoptysis has improved substantially in recent years, thanks to improved thoracic radiology and bronchoscopic techniques and the implementation of multidisciplinary management.

Patients with hemoptysis must be fully evaluated according to a clinical protocol to determine the most appropriate diagnostic and therapeutic procedures. These SEPAR guidelines outline the definition, classification and etiology, diagnosis (initial evaluation, bronchoscopy and radiology), treatment (general measures, therapeutic bronchoscopy, arterial embolization and surgery) of hemoptysis and the management of special situations, such as life-threatening hemoptysis. Life-threatening hemoptysis is one of the emergencies most feared by pulmonologists. Due to its acute, high risk nature, it has been the subject of very few prospective diagnostic and therapeutic studies, and therefore the quality of the scientific evidence used to establish recommendations for management is generally low.

The GRADE system[2] has been adopted to classify the strength of recommendations based on expected risk/benefit ratios (strong 1, weak 2); the quality of scientific evidence is defined as high (A), moderate (B), low (C), or very low (D).

Definition and Etiology

Hemoptysis is the expectoration of blood from the tracheobronchial tree. It has multiple causes and ranges in severity from blood-streaked sputum, gross hemoptysis (expectoration of blood only), and massive hemoptysis (expectoration of large amounts of fresh blood).

Massive hemoptysis has been defined in the literature by several different criteria, ranging from 100 ml to 600 ml of blood over wide-ranging periods of time. These variations in definition are compounded by the difficulty in quantifying the amount of blood expectorated, which is usually overestimated by patients. However, underestimation is also an issue, as part of the blood may be retained in the tracheobronchial tree.

We prefer to use the term life-threatening hemoptysis, defined as hemoptysis which jeopardizes the patient's life; the risk is determined by the total volume and speed of the bleeding, and the patient's cardiopulmonary reserve.[1] Risk factors to be taken into account include the volume of hemoptysis (greater than 100 ml) and the presence of airway obstruction, respiratory failure or hemodynamic instability.[3]

Vascular Origin of Hemoptysis

The lung is supplied by blood from 2 systems: the pulmonary arteries and the bronchial arteries. The pulmonary arteries form a low pressure system through which the cardiac output circulates, and are responsible for gas exchange. Bronchial arteries are part of the systemic circulation and carry blood at a higher pressure and a much lower flow rate; these vessels are responsible for the irrigation of the bronchi and the visceral pleura. Even though they contribute less to the pulmonary blood flow, the bronchial arteries are the source of most hemoptysis, although non-bronchial systemic arteries can also be involved. A much lower percentage of bleeding originates in the pulmonary arteries and in the pulmonary microcirculation.[4]

The vessels in the bronchial network that cause bleeding are usually newly formed, generally secondary to inflammatory disease (bronchiectasis, pulmonary abscess, tuberculosis). The walls of these vessels are surrounded by smooth muscle fiber that contracts due to both physical and pharmacological stimuli. Arterial embolization is an effective method of eliminating this neovascularization. However, vasospasms in the pulmonary arterial network are not as strong as those occurring in the bronchial vessels. This is because the walls of these vessels are thin and delicate and do not actively contract, and are therefore only mildly affected by physical and pharmacological stimuli. The most common cause of pulmonary arterial hemorrhage is ulceration of the vessel wall caused by destruction of the pulmonary parenchyma (lung cancer, necrotizing bacterial pneumonia, mycetoma). In these cases, bleeding is often contained when a clot temporarily seals the lesion, but if the clot dissolves or the rupture progresses, relapse is more severe.[5] Unfortunately, it is not always possible to determine in which vascular network the hemorrhage began.

Etiology of Hemoptysis

The underlying disease causing hemoptysis may involve the airway, the pulmonary parenchyma or the pulmonary veins themselves. The most common overall cause of hemoptysis is airway disease. The diseases which most commonly produce hemoptysis are bronchiectasis, chronic bronchitis and lung cancer, although this will vary depending of the population studied[6,7] (Table 1).

In around 20% of cases of hemoptysis[11,12] and up to 42% of smokers, an etiological diagnosis cannot be established after