Bronchoscopic Endobronchial Application of Tranexamic Acid in Bronchopulmonary Bleeding

Thesis

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List of Abbreviations

Abb.	Full term
ABG	*Arterial blood gases*
APC	*Argon photo coagulation*
BAL	*Bronchoalveolar lavage*
BUN	*Blood urea nitrogen*
CBC	*Complete blood picture*
CCD	*Charge coupled device*
CO_2	*Carbon dioxide*
COPD	*Chronic obstructive airway disease*
CT	*Computed tomography*
EACA	*ε-aminocaproic acid*
ECG	*Electrocardiogram*
HAE	*Hereditary angioedema*
HIV	*Human immunodeficiency virus*
HRCT	*High resolution computed tomography*
INR	*International normalized ratio*
O_2	*Oxygen*
PBF	*Pulmonary blood flow*
PCP	*Pneumocystis carinii pneumonia*
PT	*Prothrombin time*
PTT	*Partial thromboplastin time*
TA	*Tranexamic acid*
TBB	*Transbronchial biopsy*
TBNA	*Transbronchial needle aspiration*

Abstract

There is also significant statistical difference between systolic blood pressure before and after bronchoscopy only in cold saline and adrenaline group (i.e. systolic blood pressure increased after bronchoscopy in this group).

Dose of TA didn't depend on the amount of initial bleeding.

There is significant positive correlation between amount of blood loss during bronchoscopy and dose of haemostatic agent used to control this bleeding. This correlation is more significant in cold saline and adrenaline group than in cyclokapron group.

There is significant correlation between time of cessation of bleeding and dose of haemostatic agent required to stop this bleeding. This correlation is comparable in both groups.

Bleeding didn't recur in any patient within the period of follow up after the procedure which was 2 weeks.

Keywords: *Arterial blood gases- Bronchoalveolar lavage- ε-aminocaproic acid- Electrocardiogram*

INTRODUCTION

Endobronchial bleeding could be spontaneous as a complication of wide variety of chest diseases or iatrogenic during interventional procedures. If blood is coughed up it is termed hemoptysis. Massive hemoptysis has been variably defined according to the volume, but its presence implies a potentially life threatening process requiring immediate evaluation and treatment. [1]

The differential diagnosis of hemoptysis includes disorders arising within the airways and the pulmonary parenchyma. Inflammatory processes (e.g., bronchitis and bronchiectasis) and neoplasms are the most common causes of blood arising within the airways. Within the pulmonary parenchyma, common causes are infections, such as tuberculosis, pneumonia, aspergillus, or lung abscess. Bleeding may be iatrogenic, as for example after a lung biopsy. Vascular disorders, including pulmonary embolism, arteriovenous malfunctions, and mitral stenosis are also to be considered in the differential diagnosis. Unexplained hemoptysis occurs in COPD and usually is not recurrent. Hemoptysis before middle age usually brings to mind infections; after 40 to 45 years of age, or if there is a history of smoking, bronchogenic carcinoma heads the list. [1, 2]

The evaluation of hemoptysis involves a careful history, physical examination, and a chest radiograph. Initial studies also include a complete blood picture and bleeding profile. Patients

with hemoptysis and a history of tobacco smoking, individuals who are more than 40 years of age, or those who experience hemoptysis that lasts for more than 1 week are at greater risk for a worrisome cause and warrant additional studies. A high-resolution computed tomography (HRCT) of the chest is usually the next step if the patient has no history of tobacco use or if the plain chest radiograph suggests a parenchymal abnormality, such as bronchiectasis or arteriovenous malformation. Patients with a history of tobacco use or other risk factors for a malignancy warrant fiberoptic bronchoscopy. [3]

Gustav Killian reported his experience with the first bronchoscopy in 1898. Technological advances during the next century facilitated development of bronchoscopy as a pivotal diagnostic and therapeutic tool in pulmonary medicine. The advent of flexible fiberoptic bronchoscopy, pioneered by *Ikeda* in 1967, opened new horizons to clinicians. [4]

Bronchoscopy plays a central role in the evaluation of lung masses and nodules, including those suspicious for bronchogenic carcinoma. It remains the most commonly used modality for the diagnosis of bronchogenic carcinoma and plays an important role in staging of the disease, as well. Simple visualization of lesions is usually not sufficient to determine a precise diagnosis and to guide management. Pathological confirmation through biopsy is frequently required. A variety of instruments with improved distal control (i.e., control beyond the tip of the bronchoscope) have been developed that permit tissue cutting and retrieval of biopsy

specimens. The cutting cups of biopsy forceps could result in tissue trauma and the concomitant risk of bleeding. [4]

One of the most frequently reported complications related to bronchoscopy is hemorrhage. Clinically significant bleeding as a consequence of diagnostic bronchoscopy is reported to occur in 1% to 4% of cases, but it is more likely to occur after tansbronchial biopsy (TBB) and brushings. Bleeding is more common in patients with immunosuppressed state, thrombocytopenia, uremia, liver disease, pulmonary hypertension, concurrent anticoagulation, and those on positive pressure ventilation.[5]

Bronchoscopy may be of value in hemoptysis for several reasons: to identify site of bleeding, to provide endobronchial therapy to reduce or stop bleeding, to clear blood clots that might impair gas exchange, or to place an endoluminal blocking device to prevent further airway occlusion with blood. In attempts to cease bleeding, iced saline or an epinephrine solution can be instilled into a bleeding airway or applied topically onto a proximal bleeding site in attempt to induce vasoconstriction.[6]

Tranexamic acid (TA) is a simple little molecule, just a synthetic derivative of the amino acid lysine. But it's also a potent pro-hemostatic drug that binds plasminogen and plasmin and stops the degradation of fibrin (the stuff in blood clots). [7]

Aim of the Work

The aim of this study is to evaluate the therapeutic effect of endobronchial administration of TA in control of bronchopulmonary bleeding versus administration of cold saline with or without adrenaline.

Chapter One

PULMONARY BLEEDING

Hemoptysis

The coughing up of blood is termed hemoptysis. The material and amount produced varies from mere blood streaking of expectorated sputum to massive volumes of pure blood. [8]

Massive hemoptysis

The term massive hemoptysis has been variably defined according to the volume, but its presence implies a potentially life-threatening process requiring immediate evaluation and treatment. It has been defined by a number of different criteria, ranging from 100 ml to more than 600 ml of blood over a 24 hours period. [9]

False hemoptysis

An initial decision faced by the physician who is told that blood has been coughed up is whether to conclude that the blood is coming from the respiratory tract. Any portion of the respiratory tract can be the source of bleeding including a main bronchus, the lungs, or the nose or throat. On occasion, blood from the nose and throat is inhaled and then expectorated. As long as this possibility is kept in mind, bleeding that originates in the nose, throat, or larynx is not expected to be overlooked. [10]

Hemoptysis versus hematemesis

A matter of great importance is to distinguish hemoptysis from hematemesis (vomited blood). Even if the blood is aspirated