

## Parallel Technique of Endobronchial Balloon Catheter Tamponade for Transient Alleviation of Massive Hemoptysis

Endobronchial balloon tamponade is an alternative method that can be used to control massive hemoptysis. Several different techniques have been used for this purpose. We describe a new parallel method, in which biopsy forceps introduced through a bronchoscope channel is used to grasp a balloon catheter. As the bronchoscope is advanced to the bleeding site, the balloon catheter is pulled into position, and subsequently inflated. There are several advantages of this technique. It needs no specialized catheter or guide wire, the procedure is relatively easy to perform, and applicable to other purposes such as introduction of an additional suction catheter.

Key Words : Hemoptysis; Balloon Occlusion; Bronchoscopy

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### INTRODUCTION

Massive hemoptysis is a life-threatening condition. According to a report (1), the overall mortality is 37% in cases with massive hemoptysis of 600 mL or more within 48 hr. Mortality increases to 75% if the amount of hemoptysis is more than 600 mL within 16 hr. The primary goal of management is prevention of asphyxia and cessation of bleeding. Bronchial artery embolization followed thoracostomy with surgical resection is the usual treatment option for massive hemoptysis. However, in some instances, pulmonary insufficiency and other coexisting medical problems will obviate attempts at surgical intervention. Management in these cases by conventional methods of therapy has resulted in a high mortality. The use of endobronchial balloon tamponade may be a viable alternative method in these situations. We present here a relevant case introducing a new parallel technique for bronchoscopic balloon occlusion of massive hemoptysis.

### CASE REPORT

A 71-yr-old man was admitted because of hemoptysis of 250 mL per day for several days. He had a history of pulmonary tuberculosis 30 yr before and received antituberculous medication for 30 months. Three years before, he had a recurrent pulmonary tuberculosis and was treated with antituberculous drugs for 4 months. He was transferred to the Seoul Chest Clinic of Korean National Tuberculosis Association. He was

prescribed with streptomycin, ethambutol, rifampin, pyrazinamide, prothionamide (1321-TH), and cycloserine for a period of 26 months. Sputum smears were negative for acid-fast bacilli following this course of treatment.

He had been diagnosed with diabetes mellitus 1 yr prior to admission, but not received any medications. Simple chest radiography film revealed a destroyed and collapsed left lung with tracheal and mediastinal deviation to the left. Irregular hazy densities and multiple cystic cavities were also observed at the right upper lobe.

Initial laboratory results revealed a high glucose level (534 mg/dL). Bleeding profiles were within normal range (PT/aPTT :11.2/31.0 sec, INR:1.04). Three consecutive sputum acid-fast bacilli stains were negative. He continued to cough up bright red blood. On the 9th day he coughed up approximately 600 mL of fresh blood and was transferred to the intensive care unit. Emergency fiberoptic bronchoscopy was done with balloon tamponade according to the following procedure.

A 5 Fr Swan-Ganz balloon tipped catheter was used to tamponade the bleeding site. We created a wing on the end of the catheter with sterile surgical tape (Fig. 1). We introduced the catheter through the nose and advanced the bronchoscope through the mouth. We grabbed the wing of the catheter at oropharyngeal level with a biopsy forceps (Fig. 2). The catheter was pushed forward to the trachea through the vocal cords parallel to the bronchoscope. It was then placed proximal to bleeding site and inflated (Fig. 3 and 4). Two catheters were placed, one at the upper division and the other at the lingular division of left upper lobe because the two sites were consid-



Fig. 1. A wing with sterile surgical tape is attached to a 5 Fr Swan-Ganz catheter.



Fig. 2. The catheter was grabbed at the oropharyngeal level with biopsy forceps.



Fig. 3. The catheter with biopsy forceps at the bleeding site.

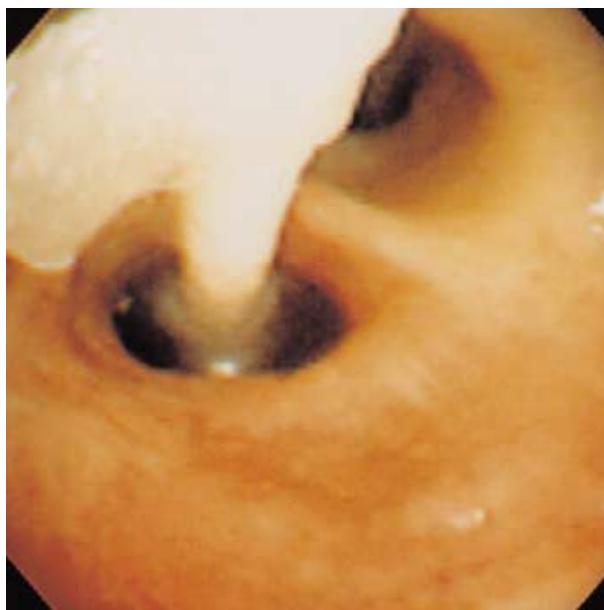


Fig. 4. The balloon situated at the proximal site of bleeding after procedure.

ered to be the bleeding foci.

Fig. 5 presents the chest radiography after the procedure. The patient complained of intolerable throat pain four day after the catheter insertion. This discomfort subsided after removal of the catheters. There was no more hemoptysis after catheter removal and after 14 days the patient was transferred to the general ward. We recommended bronchial artery embolization but the patient and his family refused the procedure. The patient expired at 22 days after the procedure due

to a recurrent sudden massive hemoptysis in spite of selective intubation and transfusion.

### DISCUSSION

Surgery for operable cases of massive hemoptysis has been reported to reduce the mortality to 18-23% (1, 2). This inter-



Fig. 5. The radiography after the procedure shows two Swan-Ganz catheters in place.

vention still has a high mortality and is not warranted for inoperable cases such as those with low lung reserve or other contraindicating medical problems.

The results of bronchial artery embolization are often good. The initial success rate has been reported to be approximately 85% (3). However, this procedure requires a well-trained and experienced radiologist, because the bleeding vessels may originate not only from the bronchial artery but also from a nonbronchial systemic artery such as the intercostal or mammary arteries. Another complication of this technique is that the neurologic deficits may occur because some spinal arteries may arise from bronchial arteries (4).

To decrease the mortality of massive hemoptysis, there should be a radical treatment followed by temporary blocking of bleeding and maintaining the patent airway with preserving lung tissue. But the single most important factor influencing mortality in massive hemoptysis is the rate of bleeding rather than the total amount of blood loss. Rapid flooding of the tracheobronchial tree causes the patient to drown in his own blood regardless of his age or the extent of underlying pulmonary disease (1). The primary objective for these patients should be prevention of asphyxia and exanguination.

Endobronchial tamponade has been used as an alternative method for conservative management of massive hemoptysis (5). With previous techniques, the tamponade catheter has been introduced through the bronchoscope. The main chal-

lenge in performing this procedure is how to handle the distal cap of the balloon catheter. Several previous methods have been suggested to deal with this: to cut the cap (6), to make a detachable cap (7), or to use a guide wire (8). The suction channel is not available during this type of the procedures.

We suggest a way to simplify the endobronchial tamponade procedure by using a catheter not introduced through the bronchoscope. One advantage of our parallel technique is that a specialized catheter is not needed. We can use the Swan-Ganz catheter, Fogarty catheter, or other balloon dilatation catheters. Availability of a working channel during the procedure is facilitated. We have found it relatively easy to perform the procedure. No specific contraindications were observed. Further studies about the effect of sustained tamponade on the bronchial tree and lung parenchyma distal to the occluded bronchus and how long the tamponade can be placed should be performed.

We can also apply this principle of parallel technique to another purpose, that is to introduce an additional suction catheter parallel to a bronchoscope.

We think that this parallel technique of endobronchial tamponade can be used as a viable and simple option for transient control of massive hemoptysis which was regarded as "too risk to do any surgical interventions".

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