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Case Report

Successful treatment of spontaneous middle mediastinum hematoma due to rupture of bilateral bronchial artery with transcatheter arterial embolization using N-butyl-2-cyanoacrylate: A case report [☆]

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ABSTRACT

Mediastinum hematoma is often caused by chest trauma, aortic dissection, and tumor. Spontaneous nontraumatic middle mediastinum hematoma is a rare and potentially life-threatening condition. Here, we report the case of a patient who was a 46-year-old experienced sudden chest pain with spontaneous middle mediastinum hematoma caused by rupture of the bilateral bronchial artery. We successfully treated the patient with transcatheter arterial embolization via the bilateral bronchial artery using N-butyl-2-cyanoacrylate.

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Introduction

Spontaneous mediastinum hematoma is a rare and life-threatening event. The causes are categorized into 3 groups.

As per the first category, it may occur secondary to bleed-ing disorders and anticoagulant treatment. According to the second category, mediastinum tumors, such as thymo-mas, organs, and blood vessels may cause it. As per the third category, it may occur due to spontaneous idiopathic

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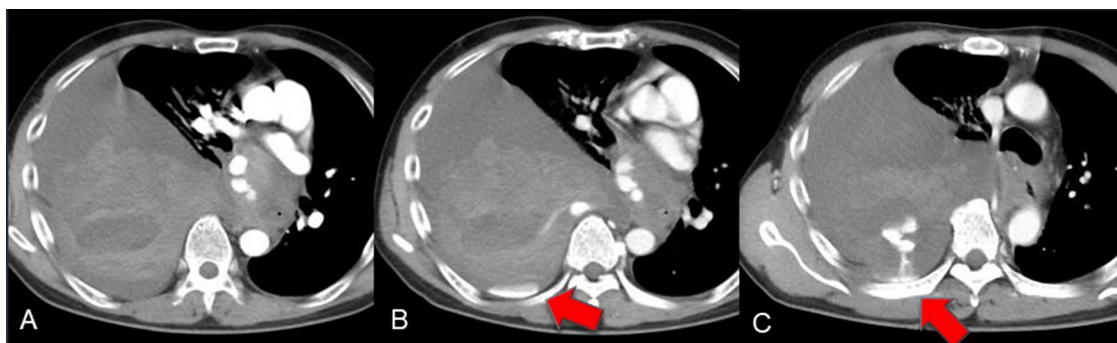


Fig. 1 – (A) A Contrast-enhanced computed tomography (CT) scan reveals hemothorax in arterial phase. (B, C) A Contrast-enhanced CT scan in venous phase reveals extravasation (arrow) in the middle mediastinum from the bronchial artery.

mediastinum hematoma following sudden increase in the intrathoracic pressure due to vomiting, coughing, sneezing, or sudden sustained hypertension [1,2]. With respect to blood vessels, aortic dissection is the most common cause, while bronchial artery aneurysm is an uncommon cause. Here, we report a case of spontaneous nontraumatic middle mediastinum hematoma due to rupture of the bilateral bronchial artery with transcatheter arterial embolization (TAE) using N-butyl-2-cyanoacrylate (NBCA).

Case

A 46-year-old man presented to the emergency of our hospital 1 hour after the sudden chest pain. He had no previous medical or trauma history and was not on any medication. Clinical examination revealed low blood pressure (systolic blood pressure, 60 mmHg) and tachycardia (heart rate, 112 s/min) and physical examination showed severe chest pain and dyspnea. His initial laboratory examination did not reveal any abnormalities or anemia (hemoglobin level was 13.9 mg/dL). To investigate the chest pain, urgent contrast-enhanced computed tomography (CT) was performed. It showed hemothorax and extravasation in the middle mediastinum from the bronchial artery (Fig. 1). There was no obvious abnormality in the lung. Thereafter, there was a drop in the hemoglobin level (from 13.9 mg/dL to 8.4mg/dL) with 1 hour after the initial laboratory examination.

Therefore, emergency angiography was performed. The right common femoral artery was punctured under local anesthesia, and a 5-Fr sheath introducer was inserted. Thereafter, a 4-Fr shepherd hook-shaped catheter was inserted into the right bronchial artery. Digital subtraction angiography (DSA) from the artery revealed extravasation in the middle mediastinum (Fig. 2). Using the coaxial technique, a 1.7-Fr micro catheter (Prograte λ , Terumo Clinical Supply, Gifu, Japan) was advanced into the proximal portion of the extravasation. TAE using gelatin sponge did not reduce the extravasation. The use of a 0.5 mL NBCA:lipiodol mixture (1:1) resulted in complete embolization and loss of extravasation (Fig. 3).



Fig. 2 – Digital subtraction angiography from the right bronchial artery shows extravasation in the middle mediastinum (arrow).



Fig. 3 – The use of a 0.5 mL NBCA:lipiodol mixture (1:1) resulted in complete embolization and loss of extravasation (arrow).

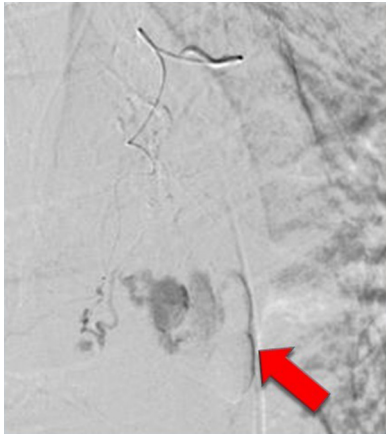


Fig. 4 – Digital subtraction angiography from the left bronchial artery shows extravasation in the middle mediastinum (arrow).



Fig. 5 – The use of a 0.5 mL NBCA:lipiodol mixture (1:1) resulted in complete embolization and loss of extravasation (arrow).

Although complete embolization was achieved, his blood pressure did not rise. Therefore, a 4-Fr shepherd hook-shaped catheter was inserted into the left bronchial artery. DSA from the artery also revealed extravasation in the middle mediastinum (Fig. 4). Complete embolization was achieved using a 0.5 mL NBCA:lipiodol mixture (1:1; Fig. 5); thereafter, his blood pressure increased.

Twenty minutes after the embolization, he experienced cardiopulmonary arrest because of bradycardia. Cardiopulmonary resuscitation was performed for 20 minutes, and a thoracostomy tube was inserted into the right thoracic cavity. Thereafter, there was return of spontaneous circulation. On the next day, hematoma in the thoracic cavity was removed using a thoracoscope. He had no additional bleeding and was discharged 23 days after TAE; he could walk and had no obvious neurology complications.

Discussion

Various causes of acute mediastinum hemorrhage are often life threatening. These include cases of trauma, tumor, iatrogenic procedure, aortic dissection, and aneurysm rupture [3].

In most cases of spontaneous mediastinum hemorrhage, the main symptoms include chest pain and dyspnea. Hemorrhagic shock sometimes occurs and may lead to rapid deterioration and death [2].

Early diagnosis of mediastinum hemorrhage is crucial. The primary diagnostic procedures are contrast-enhanced CT, intra-arterial angiography, and occasionally magnetic resonance imaging. Contrast-enhanced CT is useful in a diagnosis of mediastinum hemorrhage and hemothorax to detect the bleeding point before the treatment. In hemodynamically stable patients, selective angiography that enables concurrent TAE may be required [2].

Surgical treatment, transcatheter treatment and conservative management have been chosen for patients with spontaneous mediastinum hemorrhage [2,3]. Although conservative management may prevent surgical and transcatheter treatment, in cases with mediastinum organs compressed by hematoma, subsequent exacerbation of respiratory and hemodynamic status requires that other treatments be performed [4]. Surgical treatment can be performed to reliably eliminate the lesion with hematoma. However, it is very invasive and is not feasible for all patients because of its high morbidity and mortality [2]. Thus, TAE has been increasingly performed. Superselective catheterization using a microcatheter can be performed for diagnosis and treatment [5].

Coils and gelatin sponge are usually used for safe embolization of the bronchial artery. Although embolization of the bronchial artery is associated with a high success rate, there are some cases of recurrence after successful embolization due to incomplete embolization, and collateral vessels, necessitating re-intervention [1]. NBCA is an adhesive liquid embolic material that immediately polymerizes and permanently occludes the varices on exposure to anions in the blood [6]. Furthermore, it is not dependent on coagulation. NBCA was also used to embolus rupture of bronchial artery aneurysm without complications [7]. Woo et al. [8] reported that NBCA was superior to polyvinyl alcohol for preventing recurrent hemoptysis and did not increase the complication rates. There was no evidence of pulmonary parenchymal ischemia or airway abnormalities on follow-up bronchoscopy, and there was no procedure-related mortality.

After embolization, chest pain or dysphagia may occur because of the ischemic event due to embolization; these events are usually transient [1]. Moreover, it is crucial to evaluate the occult spinal cord branch prior to embolization and avoid spinal cord ischemia. In our case, DSA showed no intercostal branches, indicating a lower risk of spinal cord ischemia; therefore, we used NBCA for embolization.

In our case, there was severe extravasation in the middle mediastinum and hemothorax. He had no significant history of trauma and contrast-enhanced CT did not show any tumor, aortic dissection, any other visceral artery aneurysm, or lung inflammation. His laboratory examination also did not show any coagulation disorder or vasculitis. Therefore,

we diagnosed mediastinal hematoma resulting from spontaneous rupture of bronchial artery possibly with bronchial artery aneurysm.

Conclusion

Spontaneous rupture of the bilateral bronchial artery can cause spontaneous mediastinum hematoma. TAE using NBCA can be used in the treatment of a patient with hemorrhagic shock due to rupture of the bronchial artery without significant complications.

REFERENCE

- [1] Vosse BA, van Belle AF, de Vries GJ, Das M. Hemomediastinum due to spontaneous rupture of a mediastinal bronchial artery aneurysm - a rare cause of thoracic pain. *Respir Med Case Rep* 2014;12:27–9.
- [2] Seo YH, Kwak JY. Spontaneous hemomediastinum and hemothorax caused by a ruptured bronchial artery aneurysm. *Korean J Thoracic Cardiovasc Surg* 2011;44(4):314–17.
- [3] Iskander M, Siddique K, Kaul A. Spontaneous atraumatic mediastinal hemorrhage: challenging management of a life-threatening condition and literature review. *J Investigat Med High Impact Case Rep* 2013;1(2):2324709613484451.
- [4] Mikubo M, Sonoda D, Yamazaki H, Naito M, Matsui Y, Shiomi K, et al. Spontaneous non-traumatic mediastinal hematoma associated with oral anticoagulant therapy: a case report and literature review. *Int J Surg Case Rep* 2017;39:221–4.
- [5] Mizuguchi S, Inoue K, Kida A, Isota M, Hige K, Aoyama T, et al. Ruptured bronchial artery aneurysm associated with bronchiectasis: a case report. *Ann Thoracic Cardiovasc Surg* 2009;15(2):115–18.
- [6] Pollak JS, White RI Jr. The use of cyanoacrylate adhesives in peripheral embolization. *J Vasc Intervent Radiol* 2001;12(8):907–13.
- [7] Pugnale M, Portier F, Lamarre A, Halkic N, Riis HB, Wicky S, et al. Hemomediastinum caused by rupture of a bronchial artery aneurysm: successful treatment by embolization with N-butyl-2-cyanoacrylate. *J Vasc Intervent Radiol* 2001;12(11):1351–2.
- [8] Woo S, Yoon CJ, Chung JW, Kang SG, Jae HJ, Kim HC, et al. Bronchial artery embolization to control hemoptysis: comparison of N-butyl-2-cyanoacrylate and polyvinyl alcohol particles. *Radiology* 2013;269(2):594–602.