

# Fatal Pulmonary Thromboembolism Caused by Popliteal Vein Aneurysm

Gyuheon Choi<sup>1</sup>, Hongil Ha<sup>2</sup>,  
Sohyung Park<sup>2</sup>

<sup>1</sup>*Departments of Pathology,  
University of Ulsan College of  
Medicine, Asan Medical Center, Seoul,  
Korea, <sup>2</sup>Medical Examiner's Office,  
National Forensic Service, Wonju,  
Korea*

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## Correspondence to

Sohyung Park  
Medical Examiner's Office, National  
Forensic Service, 139 Jiyang-ro  
Yangcheon-gu, Seoul 08036, Korea  
Tel: +82-2-2600-4614  
Fax: +82-2-2600-4828  
E-mail: zzeva@korea.kr

Popliteal venous aneurysms can be a cause of fatal pulmonary thromboembolism. We report a case of a 47-year-old woman who suddenly died of fatal pulmonary thromboembolism. Deep vein thrombosis was not observed, but a venous aneurysm with intraluminal thrombi formation was identified on the left popliteal vein. This case illustrates that venous aneurysms can be presented as fatal pulmonary thromboembolism, and that they should be considered as a rare cause of pulmonary thromboembolism.

**Key Words:** Aneurysm; Popliteal vein; Pulmonary embolism; Forensic pathology

## Introduction

Postmortem examination has a critical role in determining the causes of death in sudden unexpected deaths. Fatal pulmonary thromboembolism (PTE) is a cause of sudden natural death, and it is important to evaluate the underlying cause of PTE at postmortem examination. Various disorders or risk factors of PTE have been well known, such as malignancy, pregnancy, trauma, surgery and so on, or inherited thrombophilia [1]. While we are performing postmortem examination, such various disorders or risk factors should be concerned and examined in every organ and in deep veins in the

lower extremities.

Venous aneurysms (VAs) are rare [2, 4]. They are asymptomatic or used to be presented as various localized lesions [2–4]. However, they also may be presented as PTE when thrombi formation occurs in the aneurysm [2–4]. It suggests that it is necessary to examine the venous structures of the body as well to check for deep vein thrombosis in the lower extremities.

Herein, we present a case of a woman who suddenly died of fatal PTE. The deceased had no various disorders or risk factors related to PTE, and chronic venous disease such as deep vein thrombosis. However, a VA with intraluminal thrombosis was observed at the left

popliteal vein.

## Case Report

### 1. History

The deceased was a 47-year-old healthy woman. She worked as a cashier at a mall. While working, she suddenly suffered chest pain and lost her consciousness. Another employee found her collapsed and called 119. She was immediately transferred to a hospital, but she was expired in an hour. She had no medical history. But, according to her family's affidavit, she had been complaining of dyspnea, chest tightness and indigestion for a week. Her case was consulted for postmortem examination because there might be medicolegal disputes on her life insurance claim.

### 2. Postmortem examination

Postmortem examination was performed the day after her death. On external examination, signs of recent therapy were identified; an abrasion on the sternal area related to the cardiopulmonary resuscitation, and needle marks on the left inguinal area and the posterolateral area of the left wrist. Otherwise, there were no remarkable findings. On internal examination, extensive thromboemboli were identified on the both right and left main pulmonary artery and their branches, which lumens were near totally obliterated (Fig. 1). A fusiform VA was identified in the left popliteal vein, and thrombi were observed within the aneurysm (Fig. 2). Chronic venous diseases such as deep vein thrombosis,

phlebitis, or varicose vein were not observed. No pathologic findings or injuries were identified in other organs. The result of toxicological test was unremarkable.

## Discussion

The definition of VA is described after much discussion as follows; an isolated lesion of venous dilatation which opens on to a main venous vessel through a single channel, without any association with an arteriovenous communication, a pseudoaneurysm or a varicose vein [2,3]. But it doesn't still give any size definition for VA because it seems that there is a spectrum of progression from a focal dilatation to aneurysmal formation [3]. In our case, the diameter of popliteal venous aneurysm (PVA) was approximately three times bigger than that of the adjacent normal popliteal vein, which is consistent with the consensus on the PVA definition [3].

The pathogenesis of PVA is not well known. PVA might be caused by infection, inflammation, congenital susceptibility, and localized degenerative changes [3,5]. It is hypothesized that venous hypertension followed by obstruction, venous reflux, or variation of anatomic relationship with surrounding structures such as nerve, might contribute to the formation of PVA. However, considering that VAs also occur in the upper extremities and neck, where venous pressure is low, high venous pressure might be not relevant to formation of VAs [3,6,7]. There are two types of PVA-saccular and



**Fig. 1.** Extensive thromboemboli are observed in the both right and left pulmonary arteries.



**Fig. 2.** Fusiform aneurysm with intraluminal thrombi formation (open) is observed in the left popliteal vein.

fusiform-and saccular type is more frequent [3,8]. In this case, there was no specific history of leg injuries or diseases of the leg, and a fusiform type of PVA was identified.

Various clinical manifestations in VA were reported as episodes of deep vein thrombosis or pulmonary thromboembolism, symptoms of chronic venous diseases, soft tissue masses with or without pain, or inguinal or femoral hernia [3,4]. In this case, varicose vein was not observed, and no mass-like lesion was identified. On the history, the deceased complained of dyspnea and chest tightness which are suspicious for PTE. But there was no specific symptoms suggesting chronic venous disease of the lower extremities. According to the cases of PVA with PTE in the literature [2–4], many cases with PVA were presented as PTE or recurrent PTE, but symptoms suspicious for PVA were rare.

Among VAs, a rare cause of PTE, PVA is the most common. However, there are rarely more than a few cases of PTE caused by VAs other than PVA; the internal jugular vein aneurysm, the azygous vein aneurysm, multiple VAs (internal jugular vein, femoral and popliteal vein of both sides), and the distal femoral vein aneurysm [9–12]. If a case with PTE is encountered and no deep vein thrombosis is observed at postmortem examination, it is necessary to check main venous vessels in the other parts of the body as well as the lower extremities.

We have described a case of PTE caused by thrombosis in PVA. VAs are rare and usually asymptomatic, but it may present as a fatal PTE. This case suggests that VAs should be also concerned as a cause of PTE, and that meticulous examination on the venous system as well as other organs should be considered in a case of fatal PTE when chronic venous diseases are not observed in

the lower extremities.

### Conflicts of Interest

No potential conflict of interest relevant to this article was reported.

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