Case Report

Patient with a Massive Idiopathic Thrombosis in the Inferior Vena Cava

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A 50 year-old man with no significant medical history was admitted for dyspnea and left femoral swelling. Contrast-enhanced computed tomography revealed pulmonary thromboembolism (PTE) and a thrombus in the inferior vena cava (IVC). The thrombus extended from the proximal IVC to the left popliteal vein. Therefore, we decided that an IVC filter insertion was difficult to indicate. Urgent IVC and peripheral vein thrombectomy was performed under cardiopulmonary bypass. On postoperative day 1, venous ultrasonography showed residual deep vein thrombosis in the left external iliac–femoral vein and the popliteal vein. The IVC filter insertion was performed to prevent the recurrence of PTE.

Keywords: ivc thrombus, ivc filter, deep vein thrombosis

INTRODUCTION

Deep vein thrombosis (DVT) is a common condition. However, pulmonary thromboembolism (PTE) secondary to DVT is still high mortality. The first-line treatment for DVT is anticoagulation therapy, although, the safety and efficacy of inferior vena cava (IVC) filters are remarkable. IVC filters are commonly used to prevent PTE. However, it is not enough to investigate the indications for the use of IVC filters in DVT patients. Several reports have described IVC thrombus secondary to renal tumor or trauma. Idiopathic IVC thrombosis is very rare, and there is no established treatment procedure for it. In our case, multiplanar reconstruction images revealed a massive IVC thrombus extending from the proximal IVC to the left popliteal vein. Insertion of an IVC filter might have crushed the IVC thrombus and provoked a fatal PTE; therefore, we performed thrombectomy under cardiopulmonary bypass. The length of the excised thrombus was 60 cm. After thrombectomy, venous ultrasonography was performed, and it showed residual floating DVT. The patient had a high risk of recurrent pulmonary embolism. Therefore, we inserted OptEase® filter (Cordis Corporation, USA, NJ), after confirming the removal of the IVC thrombus by using venography. To our knowledge, there are no reports on cases of such a massive IVC thrombus in the literature. The careful examination, for example, contrast-enhanced computed tomography (CT) is essential before IVC filter insertion, whether the patients have complications.

CASE REPORT

A 50 year-old man with no significant medical history was admitted for dyspnea and left femoral swelling and pain. He took notice on the 2 days before admission. He had a smoking habit (20 cigarettes per day) and was not obese. His vital signs were as follows: blood pressure, 122/86 mmHg; heart rate, 74/minute; and oxygen saturation, 92% (room air). Results of laboratory tests showed that levels of fibrin degradation products (160–320 µg/mL) and d-dimer (8–16 µg/mL) were high. However, levels of protein C, protein S, and anti-phospholipid antibodies were within normal limits. Venous ultrasonography revealed a...
thrombus extending from the left femoral vein to the popliteal vein and venous occlusion. Contrast-enhanced CT revealed a thrombus in the right pulmonary artery and basal segmental branches. Furthermore, multiplanar reconstruction images revealed an IVC thrombus extending from the proximal part of the IVC and the renal vein junction to the left popliteal vein (Fig. 1). Because the insertion of an IVC filter might crush the huge IVC thrombus and provoke a fatal PTE, we decided to immediately perform a thrombectomy by using a Fogarty catheter under cardiopulmonary bypass. Drainage cannulas were inserted superior vena cava and upper IVC via lower right atrium (above hepatic vein). The 7 Fr Fogarty catheter was inserted from the left femoral vein towards the IVC. We also performed peripheral vein thrombectomy. An enormous thrombus (length, approximately 60 cm) was extracted by performing a Fogarty thrombectomy (Fig. 2). After the IVC thrombectomy, no thrombus was detected in the right atrium or in venous blood coming from the IVC.

Venous ultrasonography performed on postoperative day 1 showed a residual thrombus extending from the left common iliac vein to the left popliteal vein. The possibility of the recurrence of PTE was high; therefore, we inserted the OptEase® filter (Cordis Corporation, USA, NJ). Before inserting the IVC filter, we confirmed the removal of the IVC thrombus by using venography via the right femoral vein. Further, anticoagulation therapy with warfarin was started. CT performed before the patient’s discharge from the hospital showed IVC shrinkage and entire removal of the IVC thrombus. However, a residual thrombus extending from the left common iliac vein to the left popliteal vein was detected despite anticoagulation therapy. The patient made satisfactory progress and was discharged on postoperative day 21.

**Discussion and Conclusion**

Cases of PTE caused by DVT are sometimes encountered in the emergency room. Hirst et al. reported that the prevalence of PTE was lower in Japanese (0.7%) than in North Americans (15%). Several reports have stated that the proportion of idiopathic venous thromboembolism ranged from 26% to 47%. Our patient showed no complication, malignancy, trauma, or abnormal clotting and had not undergone any prior surgery. IVC thrombosis commonly occurs in patients with renal tumor or trauma. In this case, the thrombus was 60 cm in length. It is the longest IVC ever reported. At first, we intended to insert an IVC filter to prevent the recurrence of PTE because the patient showed no complications and the symptom progressed quickly. Venous ultrasonography could not provide images of the more proximal part of the common iliac vein and IVC. However, enhanced CT images revealed a massive IVC thrombus. The insertion of an IVC

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**Fig. 1** Coronal multiplanar volume reformation image showed almost complete occlusion of the inferior vena cava (IVC) distal to the renal vein by the IVC thrombus. The arrow indicates the proximal end of the IVC thrombus.

**Fig. 2** Inferior vena cava (IVC) thrombectomy specimen. The left portion is the thrombus from the proximal IVC. The right-most portion was extracted from the left femoral vein.
filter without detection of a massive IVC thrombus may have resulted in the crushing of the IVC thrombus and development of a lethal PTE. IVC thrombosis with DVT is rare, especially in patients without complications. However, for the patients’ safety, a detailed examination by using techniques such as enhanced CT, venous ultrasonography, or venography is required to check the extent of DVT before IVC filter insertion. Usually, venous ultrasonography is most suitable modality to evaluate the extent of DVT. However, venous ultrasonography is difficult to detect the extent of IVC thrombus, because IVC is in the abdominal cavity. Therefore, in this case the enhanced CT is most effective to evaluate DVT including IVC thrombus.

Thrombectomy was performed under cardiopulmonary bypass. There have been cases in which the IVC filter was inserted in the more proximal part of the renal vein. In this case, thrombectomy was performed under cardiopulmonary bypass since IVC filter insertion was difficult to be indicated. Our decision was based on the following reasons:

1) The multiplanar reconstruction images showed that the thrombus extended to the proximal IVC.
2) The CT images suggested that this thrombus was unusually massive.
3) Progression of the thrombus indicated a high possibility of occlusion of the IVC filter.
4) Thrombectomy under cardiopulmonary bypass could have eliminated the possibility of secondary PTE during the operation.

There is a debate on the indication for IVC filter insertion. Becker et al. reviewed whether the risk associated with filter placement for the prevention of recurrent PTE is justified in cases in which anticoagulation therapy is contraindicated or fails.4 Previous reports have described the following complications of IVC filter insertion: filter migration, insertion-site DVT, erosion or perforation of the filter into the IVC wall, and IVC obstruction and lower extremity venous insufficiency.4 However, Decousus et al. showed that the use of a permanent filter for patients with proximal DVT reduced the occurrence of symptomatic or asymptomatic PTE without major complications. In addition, they also showed that IVC filters had no effect on mortality.5 Therefore, the use of IVC filters increased because IVC filter insertion was easy and reduced complications by technical improvement.6,7 Chung et al. reported that IVC filter insertion was a safe and effective method for preventing PTE.8 Chiu et al. have discussed the use of IVC filters as a prophylactic treatment for proximal free-floating thrombi.9 The incidence of pulmonary embolism has been reported to be 60% in patients who show free-floating parts of an iliofemoral thrombus even after receiving anticoagulation therapy.10 In this case, we inserted an IVC filter on the first day after the thrombectomy because venous ultrasonography showed a mobile residual thrombus in the left external iliac vein. Despite adequate anticoagulant therapy, the CT images taken before the patient’s discharge confirmed the presence of DVT extending from the left common iliac vein to the popliteal vein; however, the IVC thrombus was completely removed. We do not recommend the systematic use of IVC filters for all DVT patients. However, in very high-risk patients, an IVC filter must be inserted to prevent lethal PTE. The findings of this case suggest that physicians should carefully evaluate the risks and benefits of inserting an IVC filter in each patient.

REFERENCES