Usefulness of a Second Temporary Vena Cava Filter for Preventing Acute Pulmonary Thromboembolism

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The incidence of acute pulmonary thromboembolism (APTE) has been increasing in Japan, although it is still rare compared with Western countries. To prevent APTE becoming life threatening, the insertion of a temporary inferior vena cava filter (t-IVC-f) has been advocated for cases of venous thromboembolism (VTE) of the lower extremities. However, when the t-IVC-f captures a thrombus, other problems need to be anticipated, such as dispersal of thrombi after combination anticoagulant and fibrinolytic therapies after the C/S, the t-IVC-f was found to contain a thrombus and in order to prevent its dissemination during the removal of the closed filter, another filter was inserted and expanded proximal to the first. Insertion of an additional t-IVC-f may prevent occurrence of APTE during removal of the primary filter containing a friable thrombus after fibrinolytic therapy, and the technique proved useful in the present case of VTE during pregnancy. (Circ J 2003; 67: 718 – 720)

Key Words: Acute pulmonary thromboembolism; Inferior vena cava; Oral anticoagulants; Pregnancy; Temporary filter; Venous thromboembolism

The usefulness of a temporary inferior vena cava filter (t-IVC-f) for the prevention of acute pulmonary thromboembolism (APTE) associated with venous thromboembolism (VTE) has been established, but not the requirement for an additional therapeutic method when the t-IVC-f has captured a thrombus. A woman underwent implantation of a t-IVC-f just caudal to the bifurcation of the renal vein immediately before cesarean section (C/S) for VTE that had occurred during the third trimester of pregnancy. After receiving a combination of anticoagulant and fibrinolytic therapies after the C/S, the t-IVC-f was found to contain a thrombus and in order to prevent its dissemination during the removal of the closed filter, another filter was inserted and expanded proximal to the first. Insertion of an additional t-IVC-f may prevent occurrence of APTE during removal of the primary filter containing a friable thrombus after fibrinolytic therapy, and the technique proved useful in the present case of VTE during pregnancy. (Circ J 2003; 67: 718 – 720)

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Fig 1. Pelvic computed tomography (CT) detected the venous thrombotic occlusion. (A) Left common iliac vein (arrow) was compressed by the uterus. Note the fetus. (B) Thrombotic occlusion of the left femoral vein (arrow).
monary lung perfusion scintigraphy did not show any defects (Fig 2). On Day 10, a captured thrombus was seen by venography of the IVC (Fig 3A) and so fibrinolytic therapy with urokinase (240,000 units, once daily) and warfarin therapy were initiated. On Day 15, although venography did not show a friable thrombus and despite contration of the captured thrombus (Fig 3B), the VTE of her leg remained unchanged. Therefore, we decided to remove the t-IVC-f with its captured thrombus and at the same time insert a second t-IVC-f from the right internal carotid vein, which was also expanded at the bifurcation of the renal vein. The thrombus in the second t-IVC-f showed similar histological features and was friable, so it could have lead to symptomatic APTE.

Histopathological examination revealed that all the red-colored thrombi in the primary t-IVC-f, which remained in situ for 15 days, were several centimeters in size, accompanied by endothelial cells, and partial organization was seen, which was suspected to have occurred within a few days after formation of thrombi. The thrombus in the second t-IVC-f showed similar histological features and was friable, which was also expanded at the bifurcation of the renal vein. The primary t-IVC-f was closed and then both of the filters were slowly removed. There were not any clinically suspicious symptoms related to APTE nor was a right-heart strain pattern detected on either standard 12-lead ECG or on cardiac ultrasound during her hospitalization.

Clinically suspicious symptoms related to APTE have not been observed during the 15-month follow-up, but because her left leg is still edematous, oral anticoagulant therapy with warfarin has been maintained.

**Discussion**

In the present case involving a pregnant woman who had VTE in the third trimester, APTE was prevented at C/S by heparin,6,7 dalteparin,9 warfarin6,7 and concomitant low-dose aspirin10 to prevent the VTE progressing to APTE. Moreover, we inserted a t-IVC-f immediately before C/S because of the high risk of APTE complication at the time of surgery.11 The postoperative clinical findings suggest APTE did not occur and lung perfusion scintigraphy on Day 8 after t-IVC-f insertion did not show any defects (Fig 2).

In the case of pregnancy-related VTE, the risk of APTE gradually decreases with time after C/S.12 In the present patient, venography of the IVC on Day 15 after t-IVC-f insertion did not show friable thrombus, and venography of the lower extremity showed no changes in VTE, which had also been noted on the venogram performed on Day 8 after insertion (Fig 2). Therefore, we decided to use the closed removal method for the t-IVC-f because of the risk of deterioration of the VTE and APTE in the future if the t-IVC-f remained in place for a long period of time.13 The preferred removal method of a t-IVC-f that includes captured thrombus has not been established and there is a risk of inducing APTE at the time of removal through dispersion of thrombi, especially when the thrombus is fragile after fibrinolytic therapy or there is damage to the vascular wall when inserting and removing the filter. Therefore, in order to capture any dispersed thrombi, we inserted a second t-IVC-f immediately before closing the primary t-IVC-f, which contained the thrombus. Based on the morphology of the captured thrombus, there was a risk of inducing symptomatic APTE, and we consider that our method prevented the development of life-threatening APTE when removing the t-IVC-f and also prevented APTE during the peri-operative days of C/S.

The optimal duration of oral anticoagulant therapy in order to prevent the recurrence of APTE is also controversial11,12 and depends upon the patient-specific risk factors of VTE.13 If the genesis of the idiopathic VTE in this case was pregnancy, then long-term anti-coagulant therapy is...
not essential. On the other hand, it is recommended that anticoagulant therapy be prolonged when the thrombosis is associated with persistent risk factors, and because the underlying reason for the present patient’s edematous left leg has not been fully investigated, oral anticoagulant therapy has been continuous. According to Agnelli et al the risk of APTE does not increase for approximately 1 year after continuous oral anticoagulant therapy and so we hope to prevent the development of APTE.

In conclusion, this case indicates that a second t-IVC-f is useful for preventing APTE when removing a primary filter that contains captured friable thrombus. In addition, t-IVC-f is useful for preventing APTE in cases of pregnancy-induced VTE during the peri-operative days of C/S. Moreover, continuous oral anticoagulant therapy can prolong the benefit gained from the use of the filters.

References