J Cardiol 2000; 36: 337–342

Massive Deep Vein Thrombosis After Cesarean Section Treated With a Temporary Inferior Vena Cava Filter: A Case Report

Osamu NAKAJIMA, MD
Kumiko ARISHIRO, MD
Kayoko KANI, MD
Tomonori MORIGUCHI, MD
Shigemi TAMOTO, MD
Hisashi AKIOKA, MD
Wataru HIGASHIURA, MD*
Hiroshi SAKAGUCHI, MD*
Shoichi OHUE, MD*

Abstract

A 25-year-old woman suffered a massive deep vein thrombus in her left common iliac vein extending to the inferior vena cava after an abdominal cesarean section. The massive and floating inferior vena cava thrombus was considered to pose a high risk of pulmonary thromboembolism. After placement of a temporary inferior vena cava filter via the left brachial vein, thrombolytic therapy and anticoagulation therapy were instituted. The filter successfully prevented pulmonary thromboembolism during thrombolytic therapy. This patient was confined to bed because the filter moved vertically with left shoulder joint abduction. Although a temporary inferior vena cava filter is very useful for the prevention of pulmonary thromboembolism in a patient with deep vein thrombus, the appropriate range of activity for such a patient needs careful consideration.

J Cardiol 2000; 36(5): 337–342

Key Words

■ **Thrombosis (deep vein)** ■ **Interventional cardiology (inferior vena cava filter)**
■ **Pulmonary embolism** ■ **Complications (cesarean section)**

INTRODUCTION

Deep vein thrombus is a major pathogenesis of pulmonary thromboembolism which is sometimes fatal and a proximal deep vein thrombus is thought to carry a high risk of pulmonary thromboembolism[1]. A permanent inferior vena cava filter is very useful for the prevention of pulmonary thromboembolism in patients with deep vein thrombus, but it may cause late onset of pulmonary thromboembolism. Temporary inferior vena cava filters have recently become available for deep vein thrombus. One of their major advantages is that patients with a temporary inferior vena cava filter inserted via a brachial vein can walk[2,3]. This is important because the venous flow is accelerated by walking, so that patients with lower limb deep vein thrombus are encouraged to walk for prophylaxis of thrombus extension[4,5].

We describe a patient with a massive deep vein thrombus after cesarean section which was successfully treated with a temporary inferior vena cava

日生病院 第一内科, *放射線科: 〒550−0012 大阪市西区立売堀6−3−8
The First Department of Internal Medicine and *Department of Radiology, Nissay Hospital, Osaka
Address for reprints: NAKAJIMA O, MD, The First Department of Internal Medicine, Nissay Hospital, Itachibori 6−3−8, Nishi-ku, Osaka 550−0012
Manuscript received April 5, 2000; revised June 30, 2000; accepted July 13, 2000

Fig. 1 Abdominal enhanced computed tomography scan
A massive thrombus(*arrows*)is seen in the inferior vena cava(*left*)and the left common iliac vein(*right*).

filter.

CASE

A 25-year-old woman was admitted to our hospital on December 16, 1998, for a delivery. She had been healthy except for an abortion because of a hydatid mole in June of the previous year. Her family history was unremarkable. She underwent an abdominal cesarean section because of weak pain on December 18, 1998. She was given a diuretic (trichlormethiazide 2 mg daily)for mild hypertension starting soon after the operation, and began to complain of a painful swelling in her left thigh 7 days after the cesarean section.

She was referred to us on December 29. The patient was 160 cm tall and weighed 58 kg, her blood pressure was 120/80 mmHg and her body temperature was 37.5 ℃. Although she had a painful swelling in her left thigh, there was no Homans' sign in her calf to suggest a deep vein thrombus below the knee. Blood examination showed a red cell count of $4.45 \times 10^6/mm^3$ and a white cell count of $9{,}920/mm^3$. The hematocrit reading was 35%. Chemical findings showed slightly increased lactate dehydrogenase(364 IU/*l*) and elevated C-reactive protein(21.1 mg/d*l*)levels. Coagulation and fibrinolysis tests showed 607 mg/d*l* fibrinogen, 14.8 μg /m*l* fibrin degeneration products and at 4.2 μg/m*l* D-dimer, whereas the other data, such as antithrombin Ⅲ(97%), protein C(116%)and protein S(120%), were all within the normal range. The patient was negative for antiphospholipid antibody.

The diagnosis was deep vein thrombus in the left femoral vein based on her symptoms and laboratory findings. The previous weak pain and the subsequent abdominal cesarean section and administration of the diuretic were thought to constitute the background for the deep vein thrombus formation.

Duplex sonography of her left femoral vein revealed that it was blocked by a thrombus. Abdominal enhanced computed tomography and cavography revealed a massive thrombus in the inferior vena cava slightly distal to the orifices of the renal veins(**Figs. 1, 2−left**). This massive floating inferior vena cava thrombus was considered to pose a high risk of fatal pulmonary thromboembolism, so an inferior vena cava filter was considered appropriate for the prevention of pulmonary thromboembolism during thrombolytic treatment.

In this patient, venous compression by the uterine and hemoconcentration due to diuretics were suspected to be transient causes of the deep vein thrombus formation. Therefore, a permanent inferior vena cava filter, which cannot be removed after the implantation, was unsuitable, so a temporary inferior vena cava filter(Anthéor vena cava filter catheter; Meditech, Boston Scientific)was inserted into the inferior vena cava via the left brachial vein on December 29. The filter was placed just cranially to the orifices of the renal veins because the massive thrombus extended slightly distally to the orifices into the inferior vena cava from the left common femoral vein(**Fig. 2−right**). After the insertion, intravenous administration of a recombinant

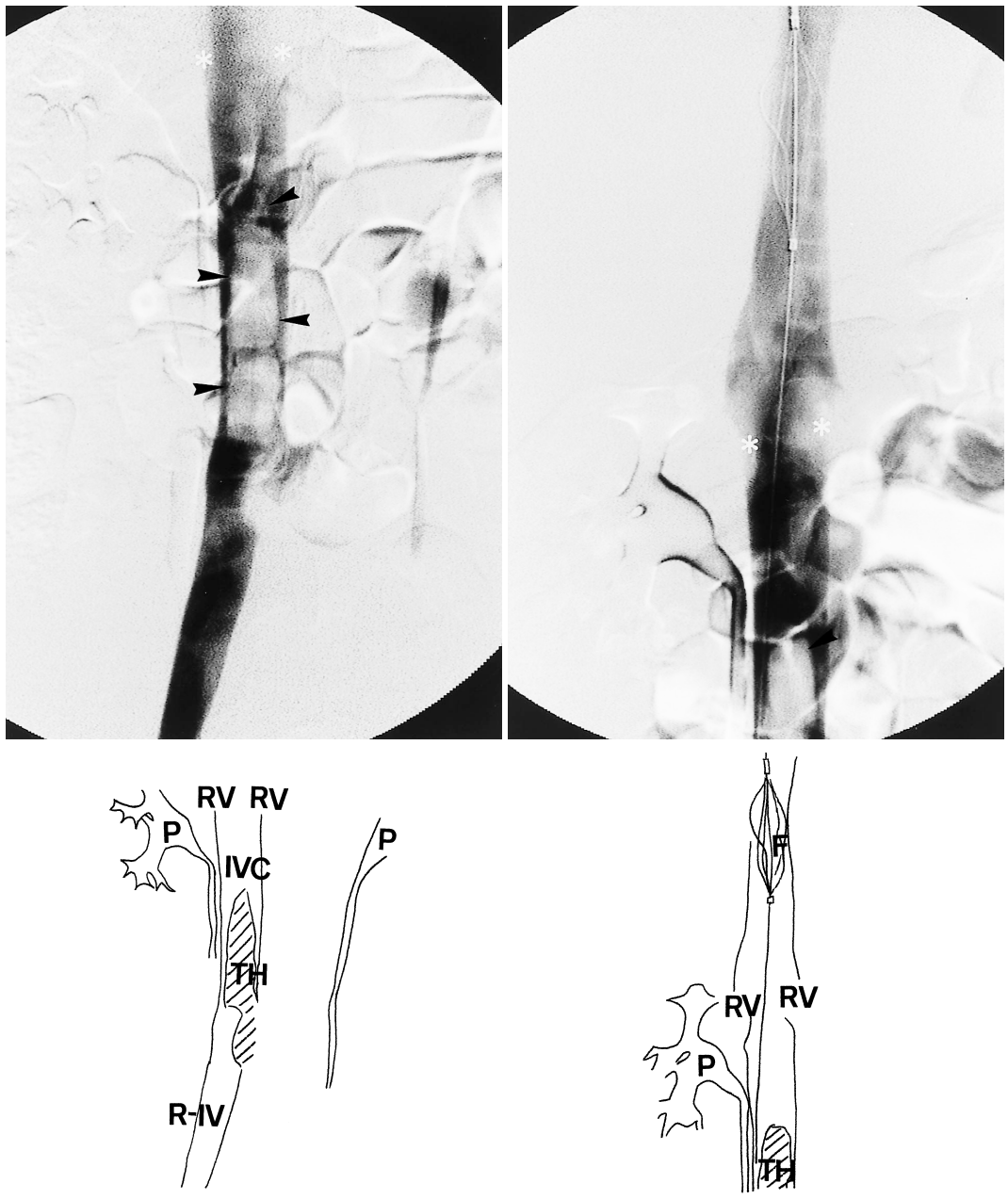

Fig. 2 Cavograms (*upper*) and schemata (*lower*)
The thrombus (*arrows*) extended slightly distally to the orifices (＊) of the renal veins in the inferior vena cava from the left common iliac vein (*left*). A temporary inferior vena cava filter was inserted into the inferior vena cava just cranially to the orifices (＊) of the renal veins via the left brachial vein (*right*).
RV = renal vein; P = renal pelvis; IVC = inferior vena cava; TH = thrombus; R-IV = right common iliac vein; F = temporary IVC filter.

tissue plasminogen activator (GRTPA®, 24 million U/48 hr), heparin (10,000 U/day) and an oral anticoagulant (warfarin potassium, 2.5 mg/day) were started.

The filter could move vertically by half a vertebra height with left shoulder joint abduction, so the patient was confined to bed while the filter system was being used (**Fig. 3**). Although the thrombus was markedly reduced on the 7th day, a small thrombus remained in the inferior vena cava, so that urokinase (480,000 U/day) was also administered from the 13th to 15th day. On the 16th day,

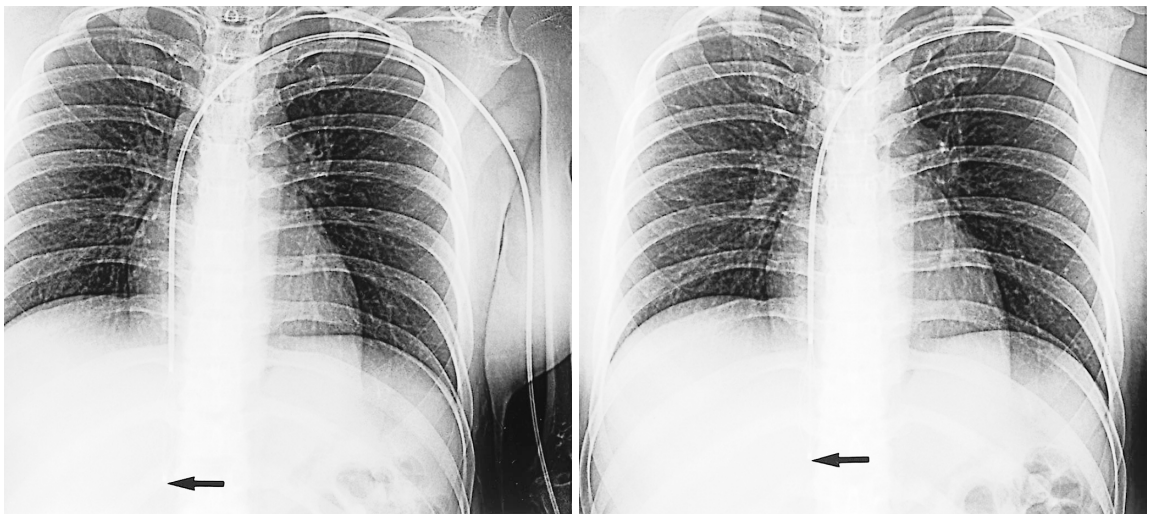

Fig. 3 Chest radiographs
The temporary inferior vena cava filter was inserted into the inferior vena cava via the left brachial vein (*left*). The filter moved vertically by half a vertebra height with left shoulder joint abduction (*right*). The arrow indicates the end of the filter.

Fig. 4 Cavogram on the 16th day
The thrombus in the inferior vena cava has been completely dissolved.

cavography showed that the thrombus in the inferior vena cava had been completely dissolved, and the entire filter system was removed (**Fig. 4**). Ventilation-perfusion scintigram of the lungs immediately after filter removal showed normal results. After continuous treatment with warfarin potassium for 6 months, the patient recovered completely even though a part of the thrombus remained in her left common iliac vein.

DISCUSSION

Deep vein thrombus formation in our patient is thought to have occurred mainly as a result of confinement to bed after the cesarean section. In addition, hemoconcentration caused by diuretics after the operation may also have been important in the deep vein thrombus formation[6]. As the free-floating massive inferior vena cava thrombus was considered to pose a high risk of pulmonary thromboembolism, inferior vena cava filter implantation was indicated to prevent pulmonary thromboembolism. Clinical studies have shown that a permanent inferior vena cava filter can significantly reduce the risk of pulmonary thromboembolism in the early phase of proximal deep vein thrombus, but may cause late onset of pulmonary thromboembolism[7]. Linsenmaier *et al.*[3] have mentioned that temporary filters should be considered for young patients with an otherwise normal life expectancy.

The patient was a relatively young female and

the cause of deep vein thrombus formation seemed to be transient, so that transient protection against pulmonary thromboembolism was thought to be appropriate. For these reasons, a temporary inferior vena cava filter was selected. Although deep vein thrombus is usually caused by bed rest, patients with lower limb deep vein thrombus are now encouraged to walk for prophylaxis of thrombus extension, because it accelerates venous flow[4,5].

The Anthéor vena cava filter catheter consists of a basket filter made up of 6 Phynox, a nonferromagnetic alloy, wires with Biocarbon sheaths to form a self-expanding basket filter system, which can be inserted via a brachial vein[3,8]. The carbon sheaths are designed to reduce intimal reaction. For these reasons, a patient with a temporary inferior vena cava filter is encouraged to walk. An experimental study of this filter has suggested that fibrotic wall reactions start in the third week after insertion, so that a temporary filter system should be removed within 2 weeks[9]. Because the filter was inserted via the left brachial vein, our patient was able to walk. However, we noticed that the filter moved vertically by half a vertebra height with left shoulder joint abduction（**Fig. 3**）. We therefore confined the patient to bed for about 2 weeks to avoid any complications such as vascular injuries[2]. Most temporary inferior vena cava filters are positioned caudally to the orifices of the renal veins, but in our patient the filter was positioned cranially because the distance between the orifices of the renal veins and the top of the inferior vena cava thrombus was less than 50 mm and thus did not leave enough space to place an inferior vena cava filter.

Other studies have suggested that the Anthéor filter catheter should be removed within 2 weeks[3,10]. In our patient, however, we had to keep the filter inserted for a relatively longer period of 16 days because of the slow dissolution of the massive thrombus. Even though some investigators have recently recommended that a patient with a lower limb deep vein thrombus should walk, we hesitated to have our patient walk for the reasons mentioned before. However, the resultant bed rest may have contributed to the relatively longer period after the filter insertion needed to dissolve the inferior vena cava thrombus. Further studies are therefore needed to determine the efficacy of combining a temporary inferior vena cava filter with thrombolytic therapy compared with thrombolytic therapy only.

Our patient was a good candidate for a temporary inferior vena cava filter, and the filter was indeed successful for the prevention of pulmonary thromboemblism. Appropriate activity of the patient during thrombolytic therapy, however, especially in a case with a massive proximal deep vein thrombus and a filter which can move vertically, needs further consideration[11].

要　　約

一時的下大静脈フィルターを用いた帝王切開後の巨大深部静脈血栓の1例

中島　伯　　有城久美子　　可児佳代子　　森口　知則　　田本　重美

秋岡　壽　　東浦　渉　　阪口　浩　　大上　庄一

症例は25歳の女性で，帝王切開後に左総腸骨静脈から下大静脈にかけての巨大な深部静脈血栓症を発症した．本例の下大静脈血栓は，巨大な浮遊血栓であり，肺塞栓症の危険性が高いと判断し，一時的に下大静脈フィルターを左上腕静脈より留置した後，血栓溶解療法と抗凝固療法を行った．また，フィルターが左肩関節の外転で上下に移動したことから，安全のため患者にはベッド上での安静を指示し，血栓溶解に2週間を要した．肺塞栓症予防のため安全に血栓溶解療法を施行するには，本例では一時的下大静脈フィルターが有効であった．しかし，下肢深部静脈血栓症は，歩行による下肢静脈血流の増大が血栓の発育を阻止することから，安静を保つべきではないとの考えがある．深部静脈血栓症例において，一時的下大静脈フィルター留置中の患者の安静度に関しては，今後の検討を要するものと思われる．

J Cardiol 2000; 36(5): 337−342

References

1) Goldhaber SZ: Pulmonary embolism. N Engl J Med 1998; **339**: 93−104
2) Millward SF: Temporary and retrievable inferior vena cava filters: Current status. J Vasc Interv Radiol 1998; **9**: 381−387
3) Linsenmaier U, Rieger J, Schenk F, Rock C, Mangel E, Pfeifer KJ: Indications, management, and complications of temporary inferior vena cava filters. Cardiovasc Intervent Radiol 1998; **21**: 464−469
4) Partsch H: Thrombophlebitis: Bed rest or walking exercise? Wien Med Wochenschr 1999; **149**: 50−53 (in German)
5) Partsch H, Kechavarz B, Kohn H, Mostbeck A: The effect of mobilisation of patients during treatment of thromboembolic disorders with low-molecular-weight heparin. Int Angiol 1997; **16**: 189−192
6) Carr MH, Towers CV, Eastenson AR, Pircon RA, Iriye BK, Adashek JA: Prolonged bedrest during pregnancy: Does the risk of deep vein thrombosis warrant the use of routine heparin prophylaxis? J Matern Fetal Med 1997; **6**: 264−267
7) Decousus H, Leizorovicz A, Parent F, Page Y, Tardy B, Girard P, Laporte S, Faivre R, Charbonnier B, Barral FG, Huet Y, Simonneau G, Prevention du Risque d Ėmbolie Pulmonaire par Interruption Cave Study Group: A clinical trial of vena caval filters in the prevention of pulmonary embolism in patients with proximal deep-vein thrombosis. N Engl J Med 1998; **338**: 409−415
8) Neuerburg J, Günther RW: Developments in inferior vena cava filters: A European viewpoint. Semin Intervent Radiol 1994; **11**: 349−357
9) Neuerburg J, Günther RW, Rassmussen E, Vorwerk D, Tonn K, Handt S, Kupper W, Hausen JV: New retrievable percutaneous vena cava filter: Experimental in vitro and in vivo evaluation. Cardiovasc Intervent Radiol 1993; **16**: 224−229
10) Matsuzaki T, Ohbayashi T, Ichinose H, Satoh O, Yamamoto H, Namiki A: The efficacy of temporary IVC filters in abdominal panhysterectomy complicated with deep vein thrombosis. J Clin Anesth 1997; **21**: 1552−1556 (in Jpn with Eng abstr)
11) Harenberg J, Schmitz-Huebner U, Breddin KH, Hass S, Heinrich F, Heinrichs C, Kienast J, Roebruck P, Theiss W, Wenzel E: Treatment of deep vein thrombosis with low-molecular-weight heparins: A consensus statement of the Gesellschaft für Thrombose-und Hamostaseforschung (GTH). Semin Thromb Hemost 1997; **23**: 91−96