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CASE REPORT

Inadvertent Perithrombus Deployment of OptEase Vena Cava Filter: Use of Double-filter Technique for Pulmonary Embolism Protection during Retrieval of Malpositioned Filter

U Pua
Department of Diagnostic Radiology, Tan Tock Seng Hospital, Singapore

ABSTRACT

We describe a patient with inadvertent perithrombus deployment of an inferior vena cava filter and illustrate the use of the double-filter technique in affording pulmonary embolism protection during retrieval of the malpositioned filter.

Key Words: *Device removal; Prosthesis implantation; Pulmonary embolism; Vena cava filters, Venous thromboembolism*

中文摘要

錯誤放置OptEase靜脈濾器的個案：取出錯位濾器時使用雙重過濾器來防止肺動脈栓塞

U Pua

本文報告一名因靜脈血栓而需放置OptEase濾器的病人。濾器被錯誤放置，後把它取出時使用雙重過濾器的方法來防止肺動脈栓塞。

INTRODUCTION

Retrievable inferior vena cava (IVC) filters are gaining popularity as pulmonary embolism (PE) protection devices. The ability for interval filter retrieval averts potential long-term complications such as filter migration and caval thrombosis, makes it a particularly attractive protection device, especially in patients who needs only short-term protection. The body of current literature on retrievable IVC filters is centred on their safety and effectiveness, and their safety has been shown when left unretrieved.[1-3] One distinct advantage of the retrievable IVC filter that receives much less attention is the ability to retrieve and reposition it immediately post-deployment, for reasons such as severe malpositioning. However, the presence of caval thrombus or thrombus within the filter can preclude safe retrieval due to the potential for PE during retrieval. We illustrate the use of the double-filter technique, as a bail-out procedure in a case of inadvertent perithrombus IVC filter deployment.

CASE REPORT

A 59-year-old man was found to have extensive deep venous thrombosis (DVT) during contrast-enhanced computed tomography (CT) of the abdomen and pelvis performed as part of his post-laparotomy septic work-up. The image (not shown) indicated DVT extending from the right common femoral vein (CFV) to the level of the right common iliac vein but no apparent caval involvement was detected in the course of his post-laparotomy septic work-up CT.

Correspondence: *Dr U Pua, Department of Diagnostic Radiology, Tan Tock Seng Hospital, 11 Jalan Tan Tock Seng, Singapore 308433.*
Tel: (65) 9754 7525; Fax: (65) 6759 9940; Email: druei@yahoo.com

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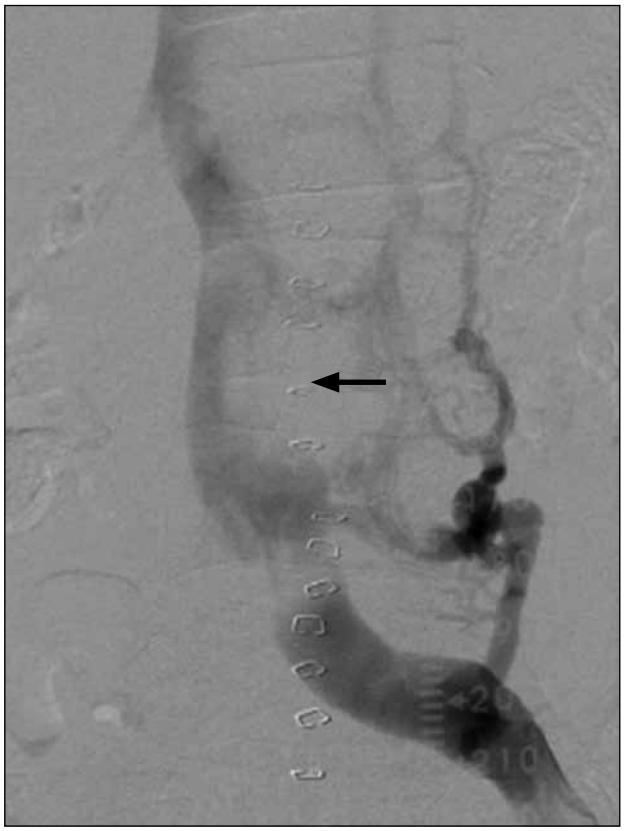

Figure 1. Digital subtraction cavogram obtained prior to inferior vena cava filter deployment, showing a caval thrombus (black arrow). This was not recognised by the operator before deployment. The thrombus was not present in the computed tomographic study performed the previous day (not shown) and is consistent with an acute thrombus.

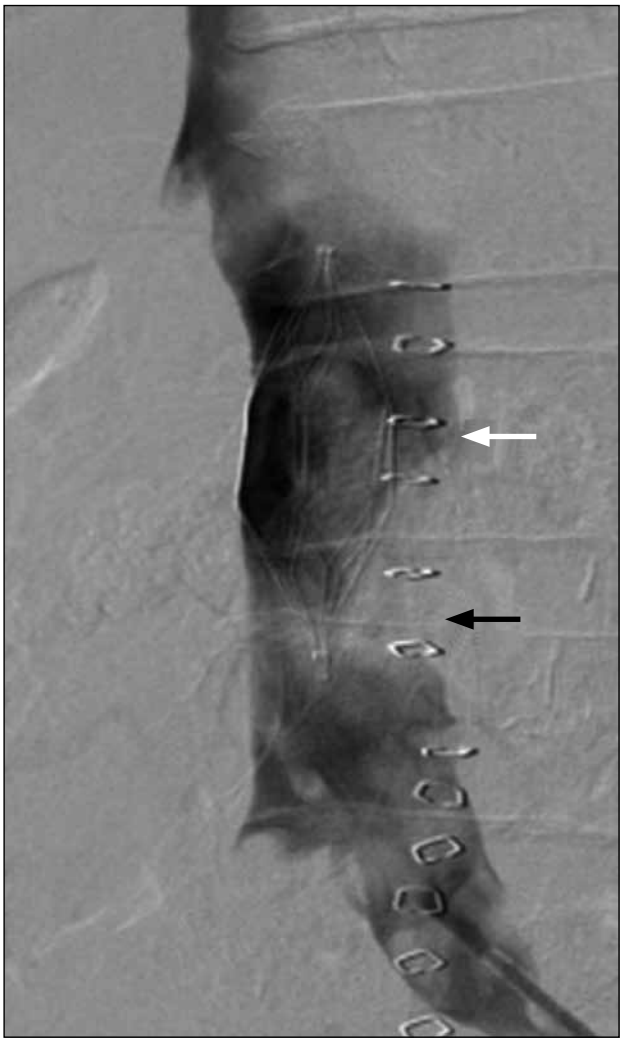

Figure 2. Digital subtraction cavogram, post–inferior vena cava (IVC) filter deployment in the infra-renal position shows incomplete opening of the IVC filter, due to the presence of the caval thrombus compressing on the filter, that is, perithrombus deployment (black arrow). A gap can be seen between the medial margin of IVC filter and the wall of IVC (white arrow), consistent with non-apposition of the IVC filter on the medial wall of the IVC.

On the following day, a prophylactic IVC filter was inserted under fluoroscopic guidance. After ultrasound-guided puncture of the left CFV, a cavogram was obtained through the sheath of the OptEase Retrievable Vena Cava Filter set (Cordis, Warren, NJ, US) [Figure 1]. The operator failed to recognise the presence of eccentric caval thrombus on the cavogram (Figure 1, arrow) and subsequently deployed the filter below the level of the renal veins, unknowingly alongside the caval thrombus, in a perithrombus position (Figure 2). Completion cavogram showed incomplete opening of the filter, with compression of the filter by the caval thrombus. In addition, only the lateral aspect of the filter was apposing and anchored on the caval wall, while the medial aspect was partly anchored on the thrombus itself.

Owing to the incomplete filter opening with poor caval wall apposition, the filter was at risk of migration and embolisation, and therefore needed re-sitting. Furthermore, incomplete filter opening constituted ineffective protection against PE. Although repositioning by simple filter retrieval and redeployment in a supra-renal position was feasible, dislodgement leading to embolisation of the caval thrombus during filter manipulation and retrieval was a concern, This was particularly worrying as the caval thrombus was probably fresh, not having been present on the previous day's CT.

To protect against caval thrombus dislodgement and PE during retrieval, a separate OptEase filter was then inserted under fluoroscopy through the right internal jugular vein and deployed uneventfully below the level of the hepatic veins in a supra-renal position (Figure 3). Vascular access to the left CFV was then upsized to accommodate a 10-F vascular sheath and the malposi-

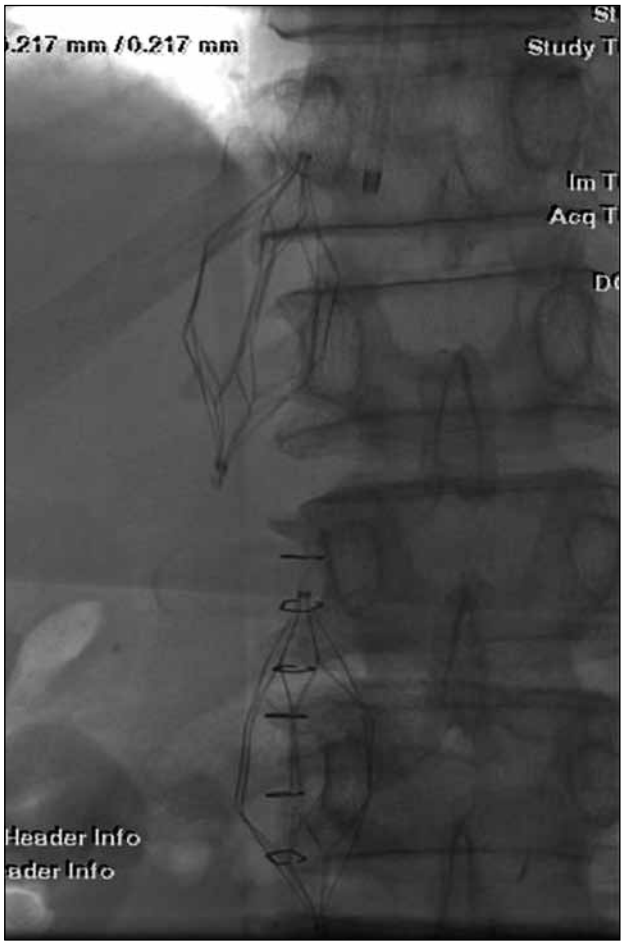

Figure 3. Fluoroscopic image of 'double-filter'. The superior inferior vena cava (IVC) filter was deployed in the supra-renal position as a thrombus capturing device prior to retrieval and manipulation of the inferior IVC filter. This was a precautionary step to avert potential pulmonary embolism from the large fresh caval thrombus during filter retrieval.

Figure 4. Post-retrieval digital subtracted cavogram showing good position of the supra-renal inferior vena cava filter with no thrombus within.

tioned OptEase filter retrieved without incidence, using the OptEase retrieval set and a goose-snare. Completion cavogram showed good position of the supra-renal filter (Figure 4). Post-retrieval examination of the OptEase filter showed presence of thrombus along the side struts of the filter. The OptEase filter was left in-situ (referring physician's decision) and the patient had no filter-related complication when seen at a follow-up after 6 months.

DISCUSSION

Migration is a rare but potentially fatal complication of IVC filters.[4] Filter malposition and incomplete opening are known risk factors and their occurrence needs to be identified and if possible rectified in the immediate post-deployment period, as procrastination increases the difficulty in retrieval and repositioning.[5] Retrievable IVC filters are gaining popularity as they can be deployed temporarily and in our case, this characteristic proved to be especially advantageous.

The double-filter technique was first described by Nomura et al[6] where an additional IVC filter was placed to capture dislodged thrombus while retrieving a thrombus-filled retrievable filter. In our case, the risk of thrombus dislodgement during retrieval was probably just as great as the caval thrombus appeared to be fresh and unrestrained, and located outside the deployed IVC filter. This case illustrates how operators can and perhaps should exploit the retrievable property of retrievable IVC filters to correct severe filter malposition and other problems immediately post-deployment. If the PE

risk during retrieval is deemed high, cranial placement of an additional IVC filter (resulting in a double filter) can serve to allow safe filter retrieval.

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