Annals of Vascular Medicine & Surgery

Editorial
Published: 17 Oct, 2018

Sheath Centered Deployment of the Cook Günther Tulip Inferior Vena Cava Filter

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Abstract

IVC filters remain a mainstay of prevention of pulmonary embolism (PE) when primary anticoagulation therapy cannot be started, must be stopped, or is insufficient to protect patients from clinically significant PE who are at high risk. One particular challenge of optimal filter deployment is filter stability during deployment. The Cook Günther Tulip is typically deployed completely unsheathed which can lead to filter malposition, typically tilt. Sheath centered deployment of the Günther Tulip filter optimizes filter centering within the IVC by minimizing the potential for filter tilt.

Learning Objective: To discuss the challenges of and solutions to optimal centered deployment of the Günther Tulip inferior vena cava (IVC) filter (Cook, Bloomington, Indiana) vis-á-vis the "sheath centered deployment" technique.

Background

IVC filters remain a mainstay of prevention of pulmonary embolism (PE) when primary anticoagulation therapy cannot be started, must be stopped, or is insufficient to protect patients from clinically significant PE who are at high risk [1]. One particular challenge of optimal filter deployment is filter stability during deployment. The Cook Günther Tulip is typically deployed completely unsheathed which can lead to filter malposition, typically tilt, upon deployment [2]. Filter tilt is suboptimal in that the filter may not be protective against PE and filter retrieval is often more technically challenging resulting in increased procedure time and radiation exposure to the patient [3-6]. This technical guide will focus on use of the sheath as a stabilizing measure to ensure centered filter deployment via the jugular vein approach. Despite claims otherwise, in over-the-wire deployment systems it is the sheath that stabilizes the guidewire and therefore centers the filter. A guidewire alone can only serve as a centering force if it spans the entire IVC.

Procedure Details

Current instructions for placement of the Günther Tulip filter via a jugular approach provided by Cook Medical suggest the operator "stabilize the introducer, and withdraw the introducer sheath

Figure 1: Spot radiograph demonstrating pre-deployment positioning of the filter relative to the sheath. (inset: Positioning of introducer/protection sheaths relative to handle prior to filter deployment).

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Received Date: *21 Sep 2018*
Accepted Date: *10 Oct 2018*
Published Date: *17 Oct 2018*

Citation:
Michael S, Dave S, Christopher S, Sabah B, Lyndsay O, Sinsabaugh C, et al. Sheath Centered Deployment of the Cook Günther Tulip Inferior Vena Cava Filter. Annals Vasc Med Surg. 2018; 1(1): 1005.

Figure 2: Spot radiograph demonstrating position of filter/hook relative to the sheath at the time of deployment. (inset: Positioning of introducer/protection sheaths relative to handle during filter deployment. Note the sheaths and handle are never connected).

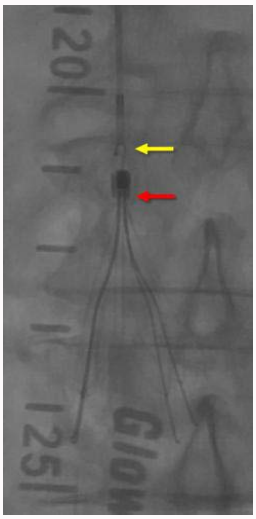

Figure 3: Magnified view of Figure 2 spot radiograph demonstrating position of filter/hook relative to the sheath at the time of deployment. (red arrow - sheath opening; yellow arrow - filter hook/stem within sheath connected to introducer).

and protection sheath until the protection sheath and handle are connected. At this point the filter is expanded, still connected to the filter introducer." The filter is deployed by first pressing the red safety button on the introducer handle to prepare for filter release. The blue release button must then be pressed completely to ensure proper release of the filter [7].

Use of this suggested method can result in filter tilt for three reasons. First, there is no force centering the filter within the IVC when deployed completely unsheathed. Secondly, without stabilization from the sheath, the introducer/filter hook connection point serves as a pivot point upon release of the filter. This remains true whether or not slight back tension is applied prior to deployment of the completely unsheathed filter. Lastly, there is a natural operator tendency to "push" the filter forward while depressing the blue release button at the time of deployment.

By eliminating these three factors, the potential for filter tilt can be reduced. In order to do so, the filter retrieval hook and filter stem must remain within the sheath at the time of deployment. The sheath itself

Figure 4: Spot radiograph demonstrating position of filter post-deployment.

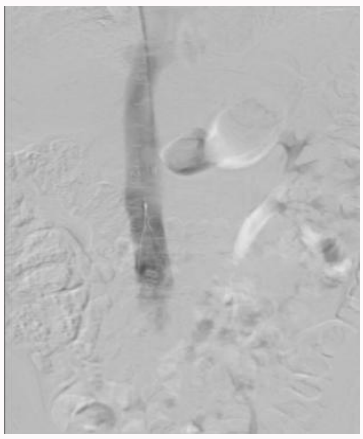

Figure 5: Digital subtraction angiography demonstrating position of the filter within the IVC post-deployment.

serves to center the filter. Furthermore, sheath centered deployment will neutralize inadvertent "push" at the time of deployment by eliminating the filter hook/introducer pivot point (Figure 1). Some advocate applying slight back tension on the introducer during traditional deployment of the completely unsheathed filter to ensure proper release. However, at our institution use of this technique has not been as consistently successful in minimizing tilt as use of sheath centered deployment.

Sheath centered deployment can be properly executed by withdrawing the introducer sheath and protection sheath until just before the protection sheath and handle are connected (Figures 1-3). The protection sheath and handle should never be connected (inset Figure 2). At this point, the filter can be deployed using the red safety and blue release buttons (Figure 4). The filter remains centered within the IVC post-deployment (Figure 5).

Conclusion

Sheath centered deployment of the Günther Tulip filter optimizes filter centering within the IVC by minimizing the potential for filter tilt.

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