

SUCCESSFUL DEMONSTRATION OF USING ENDOBRONCHIAL FORCEPS ALONG WITH A TRADITIONAL SNARE TO SAFELY RETRIEVE TILTED AND/OR EMBEDDED INFERIOR VENA CAVA FILTERS IN THE SETTING OF A LOCAL COMMUNITY HOSPITAL

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ABSTRACT

PURPOSE: Measuring success rates for retrieving tilted and/or embedded IVC filters with a rigid endobronchial forceps along with an endovascular snare in a local community hospital. **TECHNIQUE:** The technique is demonstrated among 18 patients from an inner city community hospital. Retrieval attempts were performed via right internal jugular vein access. A 5 French sheath was placed, through which a guidewire and catheter were placed below the filter and a cavogram was performed. After confirmation of the absence of caval thrombus, a 10 French sheath was placed through the existing access and attempts were made using an 18-30 mm endovascular snare to engage the hook of the filter. If the filter hook could not be engaged, the snare catheter was removed and the sheath was upsized to a 12 French by 40 cm sheath. An endobronchial forceps was then advanced directly through the sheath. The forceps were then used to grasp the filter and reposition it such that the hook would be in a more favorable position for retrieval. The endovascular snare device was then re-inserted and the hook of the IVC filter would be successfully engaged. The 12 French sheath would then be advanced over the filter thus collapsing it while maintaining traction with the endovascular snare and both sheath and filter were successfully retrieved. **CONCLUSION:** Using endobronchial forceps in combination with a traditional endovascular snare can be used safely to retrieve tilted and/or embedded IVC filters in a community based hospital.

Introduction

Thromboembolic disease such as pulmonary embolism is a devastating disease that continues to be a major cause of morbidity and mortality.¹ Patients generally require anticoagulation therapy to treat and prevent another recurrent thromboembolic event. Not all patients are candidates to receive anticoagulation therapy. For example, patients who have had recent surgery, hemorrhagic stroke, significant recent bleeding, or patients who experienced massive pulmonary embolism and have residual DVT, putting

them at risk for a recurrent embolism that would potentially be fatal given their unstable hemodynamic status. For the above reasons patients become candidates for IVC filter placement.

It is recommended that IVC filters be removed once they are no longer needed secondary to complications related to prolonged indwelling filters, like caval wall penetration by filter legs, filter migration, fracture of the legs, infection, and caval thrombosis.² However, a tilted and/or embedded IVC filter becomes a

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challenge for interventional radiologists to retrieve solely using manufacturer's specifically designed kit with an endovascular snare.³ One of the solutions to this challenging problem is to use an endobronchial forceps along with a snare device to retrieve an tilted and/or embedded IVC filter.⁴

Material and Methods

Institutional review board (IRB) approval was granted for this retrospective study. Informed consent was obtained from all patients prior to attempted IVC filter removal. The medical records and imaging studies of patients who underwent IVC filter removal with assistance of rigid reusable endobronchial forceps (Fig. 1) were reviewed from one inner city community hospital from Jan 1, 2014 through Aug 1, 2016.

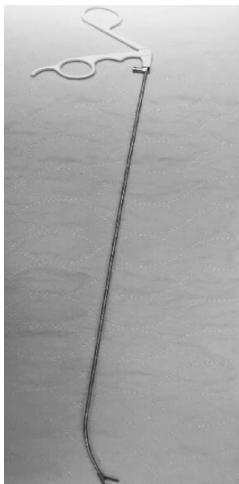


Figure 1: Re-usable rigid endobronchial forceps

During this 31-month interval, 18 patients who presented to the interventional radiology department for IVC filter retrieval. These patients failed attempts with traditional filter retrieval technique using a snare, thus requiring the technique of endobronchial forceps retrieval. The average filter dwelling time was 756 days (range, 40-5867 days). This group included 9 females and 9 males, with a mean age of 54.9 years (range, 37-80 years). Retrieval attempts involving Option Retrievable IVC Filters (n=10), Option Elite Filters (n = 3), Celect Retrievable Filter (n = 2), Bard Filter (n = 1), Gunther Tulip Filter (n = 1) and unknown type filter (n = 1) were made.

Retrieval attempts were performed via right internal jugular vein access. A 5 French sheath was placed, through which a guidewire and catheter were placed below the filter and a cavogram was performed to confirm patency of the IVC and absence of IVC thrombus prior to retrieval (Fig. 2). The cavogram demonstrated that the hook of the filter was embedded

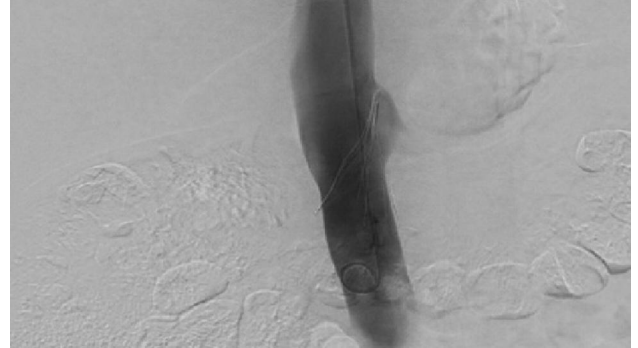


Figure 2: Cavogram demonstrates an embedded IVC filter without a filling defect.

in the caval wall in 8 of 18 patients (44%) and was tilted in the remaining 10 of 18 patients (56%). A 10 French sheath was placed through the existing access and an 18-30 mm snare device was inserted. In all 18 patients, attempts at grasping the filter hook with the snare were unsuccessful (Fig. 3). The 10 French sheath was then exchanged for a 12 French by 40 cm

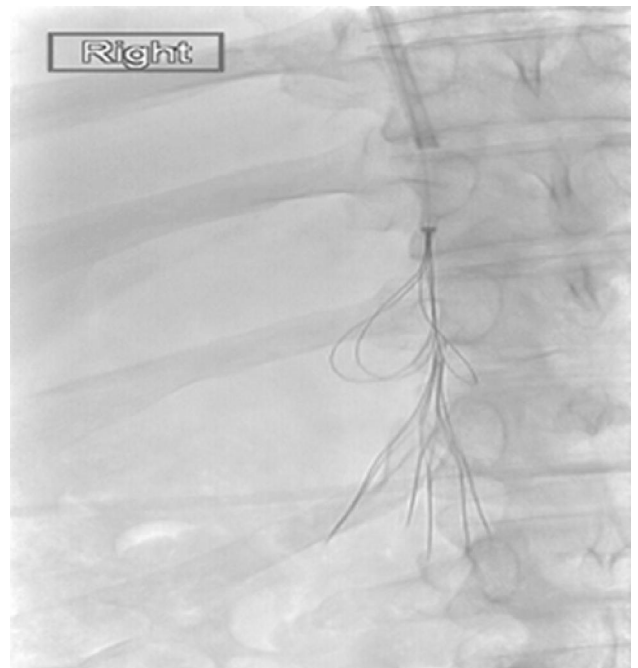


Figure 3: Unsuccessful engagement of the IVC filter hook with the traditional endovascular snare.

sheath to accommodate the endobronchial forceps. An endobronchial forceps was advanced through the sheath and used to grasp the filter hook (Fig. 4) and reposition the hook in a more favorable position within



Figure 4: Right endovascular forceps frees and grasps the IVC filter hook

the IVC (Fig. 5). The forceps was then removed and the snare was reinserted (Fig. 6). In 16 of the 18 cases

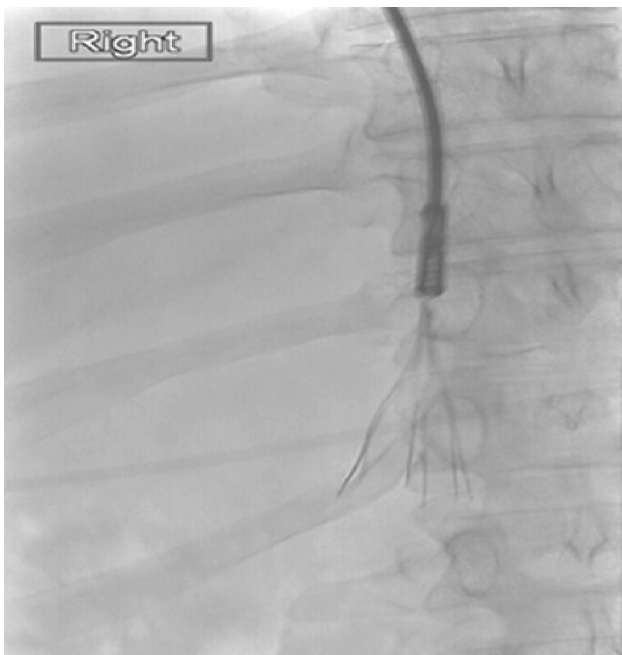


Figure 5: Reposition of the embedded IVC filter hook more centrally.

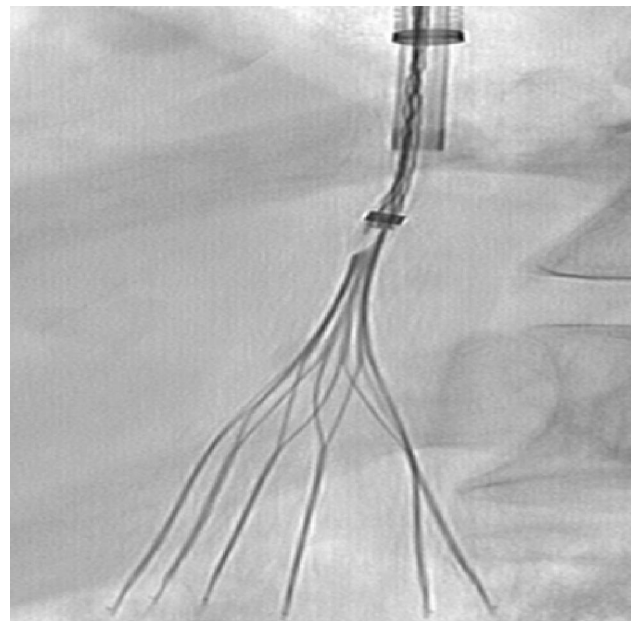


Figure 6: Re-engagement of the snare device with the IVC filter hook once it is in a more favorable position.

the filter hook could now be engaged by the snare. The 12 French sheath was advanced over the filter thus collapsing it, and both filter and sheath were removed (Fig. 7). The average fluoroscopy time was 21.4 minutes (range, 1.5-44.2 min) with an average Air Kerma of 646.6 mGy (range, 42-2296 mGy).



Figure 7: IVC filter successfully retrieved.

Results

15 of 18 filters were successfully removed with incorporation of endobronchial forceps technique. In 1 of these 3 unsuccessful attempts with assistance from an endobronchial forceps, additional nonstandard endovascular repositioning techniques were employed which allowed successful retrieval of the IVC filter eventually. Thus, IVC filter retrieval was successful in 16 of 18 patients, for an 89% success rate. One major complication developed in one patient referred from an outside facility who previously underwent a retrieval attempt, which had resulted in three broken prongs. Two of the prongs were removed at that time, while one broken prong and hook remained embedded in the caval wall. The patient was referred for additional filter debris removal. During this subsequent procedure, the hook of the IVC filter broke off with subsequent corresponding small hyper-density in the right upper lobe felt to possibly represent the hook fragment lodged in a small pulmonary artery. There was no further perioperative complications, patient was discharged and was lost to follow up.

The endobronchial forceps technique was unsuccessful in 3 patients (17%). As mentioned above, in one of these patients despite unsuccessful attempts with endobronchial forceps to reposition the filter, additional endovascular techniques were successful so that the snare could engage the hook and the filter was successfully retrieved eventually. These additional techniques included passing a JB1 catheter and guidewire through the IVC filter, after which a snare device was used to grasp the guidewire below the filter. Gentle traction was placed on the guidewire and snare in tandem which straightened the filter within the IVC. This allowed a standard snare device to engage the filter hook, and the filter was removed via a 12 French sheath.

In 2 patients (11%) who underwent attempted IVC filter removal with assistance from endobronchial forceps, filter removal was unsuccessful. Both filters were Option IVC filters. After multiples attempts using both snares and endobronchial forceps, the procedures aborted. No complications occurred during the failed attempts at retrieval. These patients were subsequently lost to follow up.

Discussion

Given the complications associated with long term indwelling IVC filters, it is recommended that these devices be removed once they are no longer medically necessary. For the past years, many techniques including balloon angioplasty and laser/thermal devices to mention a few have been described to help with complicated IVC filter retrieval. A much more cost effective and safer technique recruiting a rigid endobronchial forceps has been described in the literature. To date this technique has primarily been performed at top academic centers. The above described endobronchial forceps technique was performed in a local community hospital with a retrieval success rate of 89% (16/18) without any major complication. This paper serves to highlight the fact the technique of using an endobronchial forceps to retrieve tilted and/or embedded filters can be successfully performed in a community based hospital. The only requirements are the presence of an IR suite and a skilled Interventional Radiologist.


Conclusion

Thus a community hospital with an interventional unit and a skilled interventional radiologist have the compacity to safely retrieve tilted and/or embedded IVC filter using endobronchial forceps technique in combination with a traditional endovascular snare.

Conflict of interest: Authors declare no conflict of interest.

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