Loop-Snare Technique for Difficult Inferior Vena Cava Filter Retrievals

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Retrievable inferior vena cava (IVC) filters are generally retrieved without difficulties. However, when filters are tilted against the IVC wall, engaging the tip or hook of the filter can be difficult with the use of standard techniques. This report describes an alternative method of successful IVC filter retrieval by creating a wire loop between the filter legs, including the tip of the filter. This loop snare was successfully applied in eight cases after filter retrieval failed with the Recovery Cone or simple snare technique.

J Vasc Interv Radiol 2007; 18:1315–1318

Abbreviations: IVC = inferior vena cava

RETRIEVABLE inferior vena cava (IVC) filters are increasingly used in patients with temporary contraindication to anticoagulation. High technical success rates for IVC filter retrieval (71%–100%) have been reported (1–5). The most common reason for failed retrieval is a filter tilted against the IVC wall, which precludes capture of the top of the filter with standard retrieval techniques. A filter tilted against the IVC wall was responsible for 100% of retrieval failures described by Kuo et al ($n = 4$) (6), Lam et al ($n = 2$) (2), and Grande et al ($n = 1$) (3), and for one of three failures in the series by Terhaar et al (4).The present report describes an alternative technique that can be used when standard methods fail.

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From the SIR 2007 Annual Meeting.

None of the authors have identified a conflict of interest.

DOI: 10.1016/j.jvir.2007.07.002

MATERIALS AND METHODS

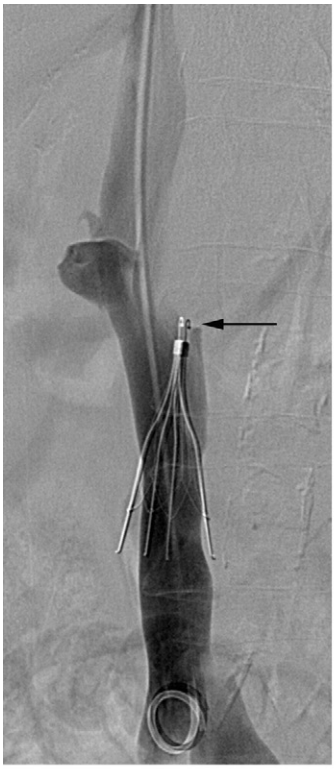
Patients

A total 102 consecutive attempted IVC filter retrievals over a 3-year period were analyzed in a retrospective fashion at a single institution. The local institutional review board approved this retrospective review. The average patient age was 59 years (range, 17–82 y); 54 were men and 48 were women. Indications for filter placement were prophylactic for patients with increased risk for thromboembolic disease ($n = 69$), for postoperative thromboembolic disease ($n = 26$), for complications of anticoagulation ($n = 3$), for massive pulmonary embolism ($n = 2$), or for protection during catheter-directed thrombolysis ($n = 2$). The indication for filter retrieval was discussed in a multidisciplinary approach. In all attempted retrievals, the indication of an IVC filter was no longer present. The following filter types were used: Recovery ($n = 72$; Bard Peripheral Vascular, Tempe, Ariz), Günther Tulip ($n = 28$; Cook, Bloomington, Ind), and OptEase ($n = 2$; Cordis, Miami, Fla). The average dwell time was 122 days (range, 2–408 d).

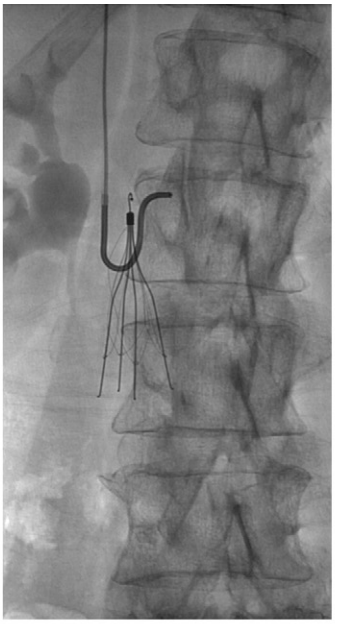
Loop-Snare technique

Standard retrieval technique was attempted first in all patients. The Recovery Cone removal system (Bard Peripheral Vascular) was used to remove the Recovery filter (1). For the Günther Tulip and OptEase filters, a snare—the Amplatz Goose Neck (ev3, Plymouth, MN) or EnSnare device (Interventional Medical Device Technology, Gainesville, Fla)—was used (4). In cases in which the standard technique failed because the filter tip was against the IVC wall (**Figure, part a**), the loop snare technique described herein was applied.

First, the access site was increased in size to a 16-F, 40-cm-long sheath (Cook). A 5-F reverse-curve catheter (Sos; Angiodynamics, Queensbury, NY) was then formed in the IVC below the level of the filter. The reverse-curve catheter was then pulled cranially, making sure to engage two struts for the Tulip filter (**Figure, part b**) or at least two legs for the Recovery filter. Through the catheter, an exchange-length Bentson wire (0.035 inches, 260 cm; Cook) was advanced until the tip of the wire was above the tip or hook of the filter. The wire was then snared with an Amplatz Goose Neck snare (ev3) or an EnSnare device (Interventional Medical Device Technology; **Figure, part c**). The snared Bentson wire was then withdrawn through the sheath until both ends of the wire were outside the sheath. This maneuver was done with the reversed cath-



a.



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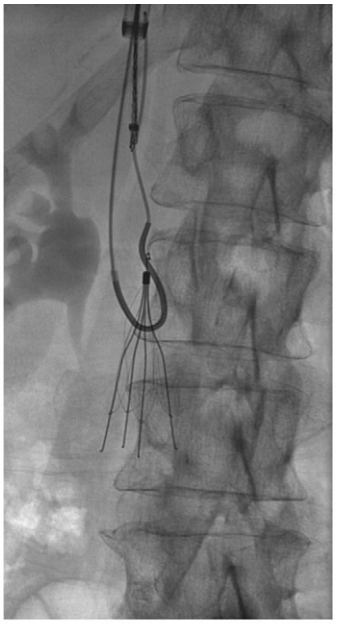

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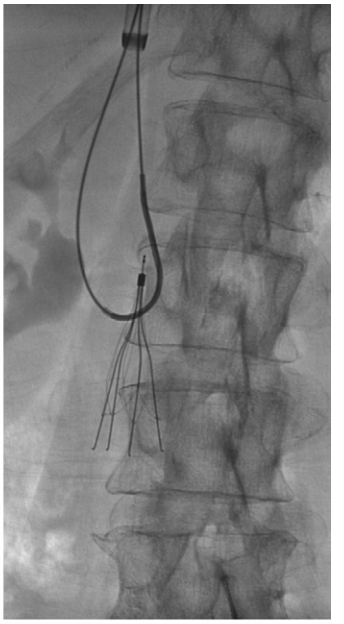

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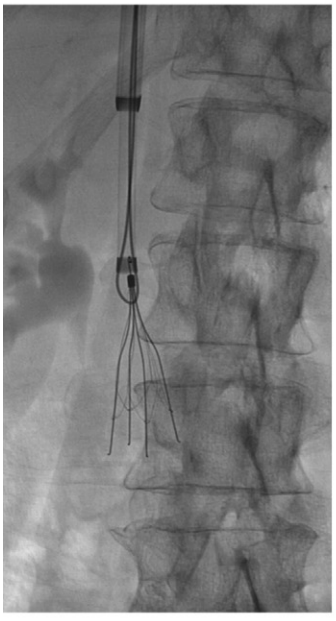

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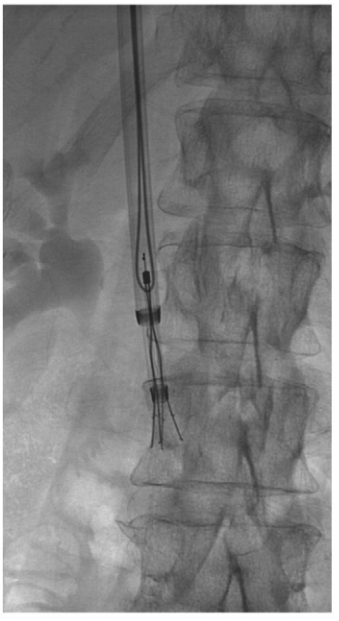

f.

g.

h.

Figure. Venography **(a)** shows no contrast medium around the hook of a Günther Tulip filter, which is consistent with the filter tip against the IVC wall (arrow). Attempts to snare the hook from above were not successful. A reversed-shape catheter was formed caudal to the filter and then pulled cranially to engage the filter **(b)**. The tip of an exchange-length wire is snared above the filter **(c)**. The wire is pulled through the sheath leaving the catheter in place to avoid entangling of the wire within the filter **(d)**. An 8-F sheath is advanced over both wire ends and placed over the hook of the Günther Tulip filter **(e)**. The 8-F sheath is further advanced to the level at which the secondary wires are wrapped around the filter legs **(f)**. The coaxial 8-F sheath increases the "pushability," which facilitates freeing the filter from the IVC wall while advancing the 16-F sheath over the entire filter to remove it **(g)**. Venography after removal shows mild narrowing at the level of the filter (similar to venography before retrieval), but no damage to the IVC or extravasation **(h)**.