Günther-Tulip inferior vena cava filter removal 3334 days after placement

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The Günther-Tulip inferior vena cava filter (Cook Medical Inc, Bloomington, Ind) was one of the first inferior vena cava (IVC) filters to be approved by the U.S. Food and Drug Administration for retrieval. Clinical experience has documented that these IVC filters may be safely removed after 12 weeks of implantation. Recent reports have shown that the longer the indwelling time, the higher the retrieval failure rate. We present a case of a successful retrieval of a Günther-Tulip IVC filter 3334 days after implantation. Removal of the Günther-Tulip IVC filter is technically feasible, even after a prolonged indwelling time. (J Vasc Surg Cases 2015;1:39-41.)

The Günther-Tulip inferior vena cava (IVC) filter (Cook Medical Inc, Bloomington, Ind) was one of the first IVC filters to be approved by the U.S. Food and Drug Administration for retrieval.[1] Initial clinical experience reported that these filters could be successfully removed after a mean of 8.6 days after implantation, with a maximal implantation time of 13 days.[2] Subsequent clinical experience showed that these filters could be retrieved successfully >12 weeks after implantation[3,4]; however, retrieval difficulty increases with IVC filter dwell time.[5]

Recent publications have documented the association of complications with retrievable IVC filters, including deep vein thrombosis, filter fracture, filter migration, and perforation of the IVC wall, potentially damaging or penetrating surrounding structures.[6] It is now advisable to remove retrievable IVC filters as soon as filtration is no longer necessary.[5,6]

We present a case of a successful retrieval of a Günther-Tulip IVC filter 3334 days after implantation. The key aspect of this case is the safe removal of a Günther-Tulip IVC filter after an indwelling time beyond the manufacturer's recommendations.[7,8] The patient consented to the publication of her case.

CASE REPORT

The patient was a 53-year-old woman with history of psychiatric problems, alcohol abuse, and non-compliance with medical advice. She was admitted on December 12, 2004, with alcohol intoxication and right hip pain. An abdominal computed tomography scan disclosed an IVC thrombus. Given her history, it was decided to place an IVC filter. A Günther-Tulip IVC filter was placed on December 17, 2004. The patient was again admitted in 2006 with alcohol intoxication. No IVC filter removal attempts were conducted because it was thought that the window for safe removal had been exceeded.

The patient returned in February 2014 complaining of diffuse, nonspecific abdominal pain and hematuria. Her initial workup included a computed tomography scan that confirmed the presence of an infrarenal IVC filter tilted anteriorly, with its tip embedded in the wall of the IVC and two filter prongs perforating beyond the wall of the IVC. One prong appeared to be penetrating into the duodenum and the other was close to the right proximal ureter. The case was discussed in the multidisciplinary endovascular conference and the consensus was to offer Günther-Tulip IVC filter removal.

The urology service was consulted before the procedure, and a retrograde right-sided ureteral catheter was placed in case of ureter laceration during retrieval attempts. Occlusion balloons and stent grafts were available in the operating room in case of IVC injury during attempted removal.

Technique. The patient was admitted on February 17, 2014. Given her history, it was agreed to perform the IVC filter removal under general anesthesia. Access was obtained under real-time ultrasound guidance within the right internal jugular and the right common femoral veins. A 16F, 45-cm sheath (Cook Inc) was placed in the right internal jugular vein and a 10F sheath (Terumo, Tokyo, Japan) was placed within the right common femoral vein.

An initial venogram confirmed the presence of IVC filter limbs protruding outside the caval wall. Attempts to grasp the filter cone with a 25-mm Amplatz snare (ev-3, Minneapolis, Minn) and a 50-cm biopsy forceps (#505020, Pilling, Altena, Germany) were unsuccessful. A SOS select angiographic catheter (Angiodynamics, Queensbury, NY) and a stiff glidewire (Terumo) were then used to manipulate the cone of the filter and dislodge it off the wall of the IVC.

Once it was evident that maneuvers to dislodge the IVC filter cone had been successful, the leading end of the stiff glidewire was captured with a snare from the femoral venous access, creating a through-and-through access (Fig 1). The 50-cm biopsy forceps

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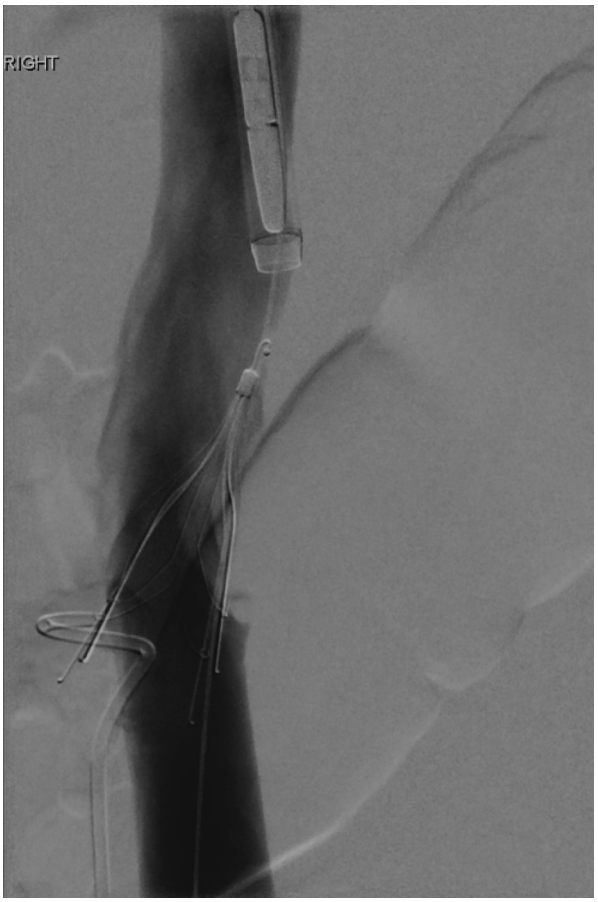

Fig 1. Digital subtraction venogram performed during inferior vena cava (IVC) filter removal attempt shows at least two of the filter limbs protruding beyond the caval wall and close to the right-sided double-J stent.

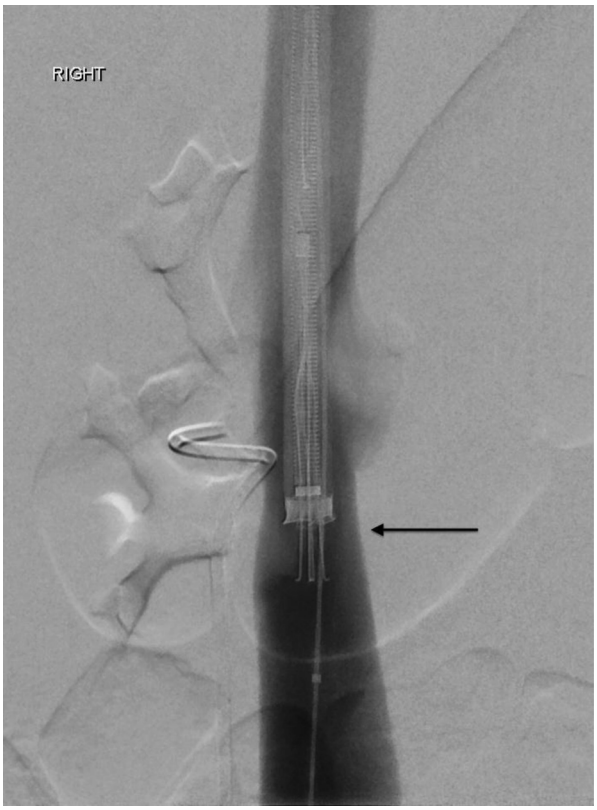

Fig 2. In this digital subtraction venogram during Günther-Tulip (Cook Medical, Bloomington, Ind) inferior vena cava (IVC) filter removal attempt, most of the IVC filter is seen within the 16F transjugular sheath; however, the lower aspect of the filter is still outside the sheath. The venogram was obtained during retrieval attempts. An Amplatz snare (ev-3, Minneapolis, Minn) was used to forcefully pull the filter within the sheath, and a 6-mm angioplasty balloon was used to push the filter within the sheath. Notice the subtle retraction of the caval wall during these maneuvers (*black arrow*). The thought was that the filter prongs were still caught within the caval wall.

was then used to capture the cone of the IVC filter and pull it into the 16F jugular vein sheath. This maneuver was performed with minimal effort. Once the cone of the IVC filter was within the 16F sheath, it was difficult to remove the IVC filter in its entirety. A 10-mm Amplatz snare was then used to snare the hook of the cone of the filter to pull the filter further within the sheath. The IVC filter still could not be removed, and the IVC filter prongs were thought to be embedded or somehow attached to the wall of the IVC.

The next maneuver attempted was to "push" the IVC filter into the 16F sheath using the femoral venous access. A 6-mm angioplasty balloon was advanced from the right common femoral venous access and partially inflated within the lower aspect of the IVC filter (Fig 2). Then, in a coordinated fashion, a combination of pushing from the femoral venous end and pulling from the jugular venous end finally dislodged the IVC filter so it could be completely captured within the 16F sheath. The IVC filter was successfully removed, and a postremoval cavagram showed an intact IVC (Fig 3). The fluoroscopy time was 35 minutes, and the calculated radiation exposure dose was 1018 mGy. The patient was discharged in stable condition on February 19, 2014.

DISCUSSION

To the best of our knowledge, this is the first report of a successful Günther-Tulip IVC filter removal >9 years after implantation. This patient's symptoms were thought to be related to the filter, and this was the main indication to pursue filter removal.[4,7] The patient had adverse factors that could complicate removal attempts, including a prolonged indwelling time, filter tilting with cone embedded within the wall of the IVC, and IVC perforation by filter prongs.[5]

The European registry reported a mean dwell time for Günther-Tulip IVC filters at 39.5 days, with a maximal dwell time of 101 days before retrieval.[5] Findings of this registry indicated that retrieval success diminished with duration of implantation.[5] The failure rate for Günther-

Fig 3. Digital subtraction venogram immediately after filter removal shows a patent and intact inferior vena cava (IVC). No perforation or extravasation is identified.

Tulip filters was 25% for this registry.[5] Kuo et al[7] were successful in all attempted cases of complex IVC filter removal. The mean implantation time in their report was 815 days, and the removed filter with the longest dwell time before retrieval was 2599 days, which amounts to a little over than 7 years. In their series, however, no Günther-Tulip filters were retrieved.[7]

The present case is interesting because, as described by other authors, as many as 20% to 40% of filters cannot be removed because the filters become embedded along the vessel wall.[7] A considerable amount of endovascular experience is required to remove these filters.[7] The key to the present case was careful planning.[9] The most interesting aspect about this case is the safe and technically successful IVC filter retrieval after an indwelling time way beyond manufacturer's recommendations.

CONCLUSIONS

The case illustrates the safe removal of a Günther-Tulip IVC filter after 3334 days of implantation. Evaluation of the imaging studies and careful procedure planning were essential factors in the successful filter retrieval.[7,9,10]

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