Cardiovasc Intervent Radiol (2019) 42:160–162
https://doi.org/10.1007/s00270-018-2042-9

LETTER TO THE EDITOR

Uncomplicated Removal of a Günther-Tulip Inferior Vena Cava Filter 15.5 Years After Placement

Courtney A. Woodfield[1] · Anthony M. Hall[1] · Hans Y. Kim[1]

Received: 5 July 2018 / Accepted: 17 July 2018 / Published online: 23 July 2018

Dear Editor,

We are writing to share our unique recent experience with the complete removal of a Günther-Tulip inferior vena cava (IVC) filter 15.5 years after placement without the need for advanced techniques and without complications prior to, during, or after filter removal. An increasing number of the IVC filters now being placed are retrievable-type filters, removed once the risk of pulmonary embolus is no longer present. Ramaswamy et al. [1] recently reported on the technical retrieval success rate of three different IVC filters with average dwell times of 86.0–131 days: the Denali, Tulip, and Option filters. In this study, they found a significantly higher filter retrieval failure rate with the Option filter (11.6%) compared to the Denali (0.9%) and the Tulip (5.1%) filters. In addition, a higher rate of advanced retrieval techniques was reported for the Option filter (21.1%) compared to the Denali (0.9%) and the Tulip (10.8%) filters [1].

We also found a retrievable-type Günther-Tulip IVC filter to be readily amenable to removal using standard technique, but in our case the filter dwell time was exceptionally long at 15.5 years. Based on a review of the current medical literature, our retrieval of an IVC filter 15.5 years after initial placement may be the longest reported IVC filter dwell time prior to uncomplicated filter removal.

In our case, a 41-year-old female presented to our hospital in December 2017 for removal of a Günther-Tulip IVC filter that had been placed in June 2002 for the prophylactic prevention of pulmonary embolus in anticipation of prolonged immobility following lumbar spine surgery. The patient was referred to our Interventional Radiology Department in December 2017 by her primary care physician following an outpatient unenhanced CT of the abdomen and pelvis that revealed the presence of a retrievable-type IVC filter in the infrarenal IVC. At the time of incidental discovery of the patient's retained IVC filter, it was determined that the filter was no longer required for pulmonary embolus prophylaxis and that the patient was asymptomatic from the long dwelling IVC filter. Following review of the risks and benefits of retrieving the IVC filter at this time, the patient underwent nonemergent removal of the IVC filter in our Interventional Radiology Department on December 7, 2017.

The IVC filter removal procedure was performed with the patient under intravenous conscious sedation. Initial sonographic imaging demonstrated patency of the patient's right internal jugular vein. The right internal jugular vein was then accessed under direct dynamic ultrasound guidance with a micropuncture system. A wire was subsequently advanced into the IVC and changed for a flush catheter. Contrast injection of the catheter was then performed and digital subtraction cavagram images were obtained. The cavagram images were obtained in a steep oblique in order to offset the lumbar spine hardware which was otherwise superimposed over the IVC and IVC filter. The IVC was seen to be free of caval thrombus, and no thrombus was seen within the filter (Fig. 1). Based on the initial cavagram images, a sheath was placed, and the snare catheter from a Cook Günther-Tulip filter retrieval set was

Courtney A. Woodfield and Hans Y. Kim have contributed equally to this work.

✉ Courtney A. Woodfield
Courtney.woodfield@jefferson.edu

[1] Department of Radiology, Abington Hospital – Jefferson Health, 1200 Old York Road, Abington, PA 19001, USA

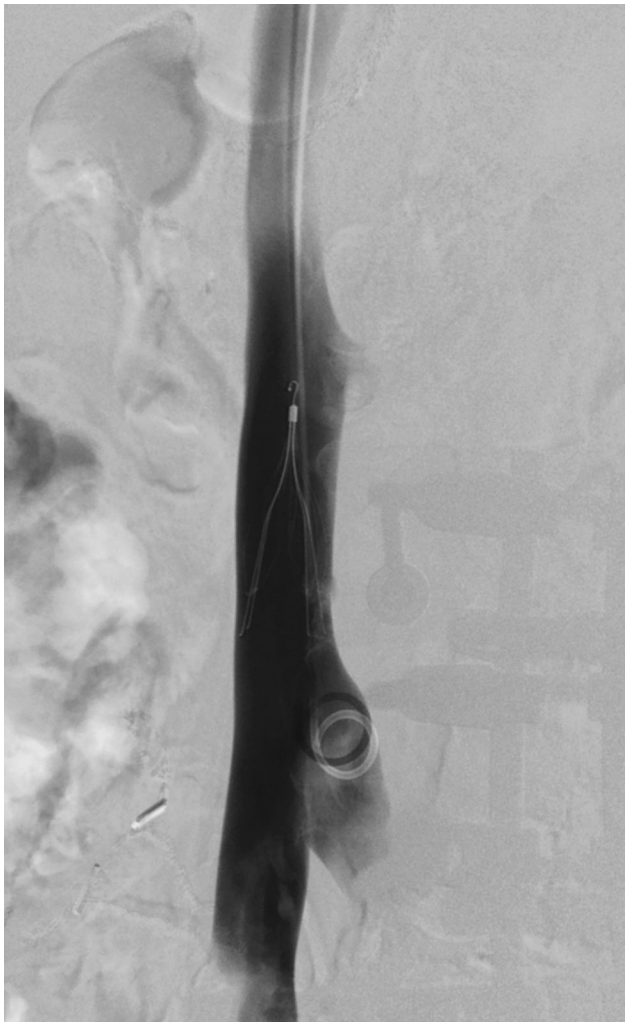

Fig. 1 Initial digital subtraction vena cavagram reveals a retrievable Günther-Tulip (Cook Medical, Bloomington, Ind) IVC filter in normal position without filter malposition, filter or caval thrombus

advanced through the sheath. The hook of the filter was secured with the snare, and the filter was removed through the sheath (Fig. 2). The filter was visually and manually inspected and found to be completely intact with robust fibrin overgrowth (Fig. 3).

A post-cavagram was then performed, confirming that the IVC was intact without thrombus or extravasation (Fig. 4). The caval wire, catheter, and sheath were then removed, and hemostasis was achieved with manual compression at the right neck puncture site. The total fluoroscopy time for the procedure was 4.5 min, and a total of 100-ml nonionic intravenous contrast was used during the procedure. Following our standard post-procedural observation of 4–6 h, the patient was discharged from the Interventional Radiology Department in stable condition the same day.

A prior report in 2016 described the removal of a Günther-Tulip IVC filter after 4753 days (approximately

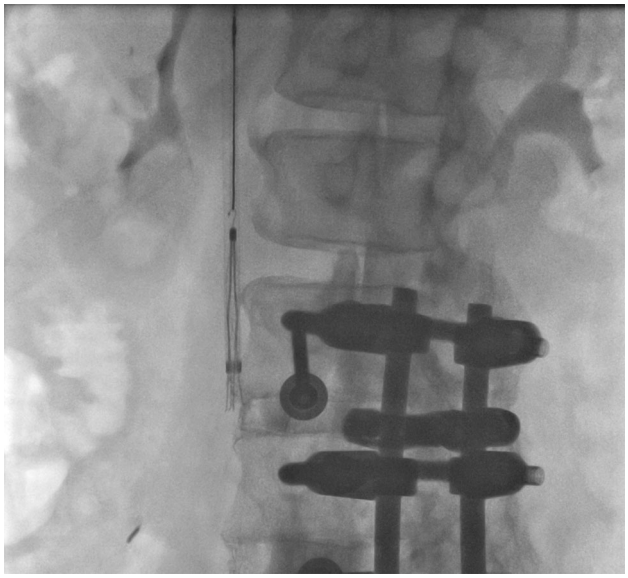

Fig. 2 Digital subtraction venogram during IVC filter removal shows the snared filter fully within the transjugular caval sheath

Fig. 3 Photograph of the IVC filter post-removal demonstrates the filter to be fully intact

13.3 years) of dwell time [2]. In contrast to our removal of a long dwelling Günther-Tulip filter using standard technique, these 4753 days to retrieval of a Günther-Tulip filter were described as being complicated by symptomatic, chronic, post-thrombotic iliocaval obstruction that required complex management with IVC filter removal and stent reconstruction [2]. Removal of a Vena Tech LGM filter

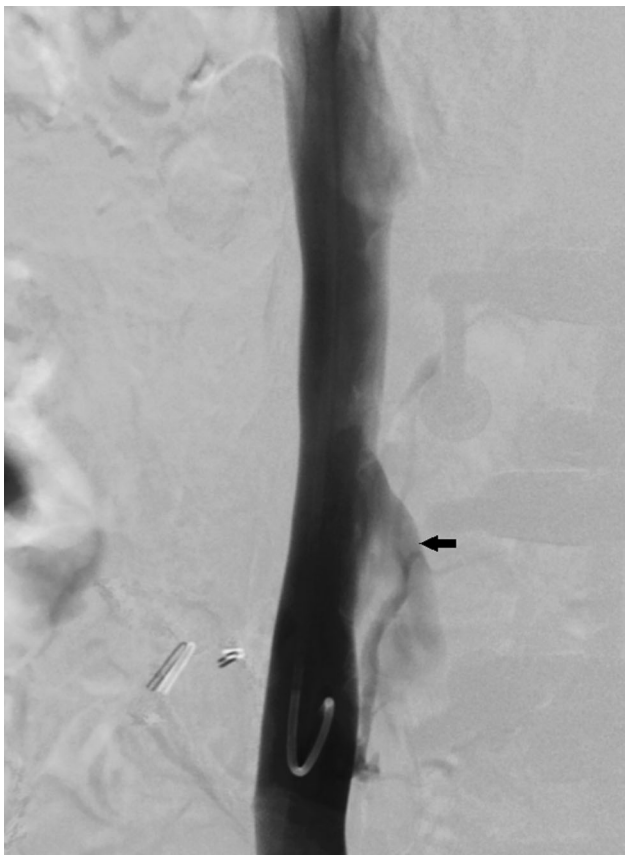

Fig. 4 Digital subtraction venogram immediately after filter removal demonstrates patency of the IVC without luminal thrombus or caval perforation. Left common iliac vein (arrow)

16 years after implantation has also been described, but also required advanced techniques with intentional mechanical fracturing and piecemeal removal of the filter [3].

Overall, the reported retrieval success rate of IVC filters has been reported to decrease while the complexity of filter removal increases with the duration of filter implantation. Prolonged IVC filter dwell times (> 9 weeks) have been reported to have filter retrieval failure rates up to 17%, as well as an increased requirement for advanced removal techniques [4, 5]. Our case serves to illustrate that not all long dwelling IVC filter removals are complicated and that the dwell time limit prior to successful removal of a Günther-Tulip IVC filter may be much longer than anticipated from original recommendations and reports.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its latest amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Consent for Publication Consent for publication was obtained for every individual person's data included in the study.

References

1. Ramaswamy RS, Jun E, van Beek D, Mani N, Salter A, Kim SK, Akinwande O. Denali, Tulip, and option inferior vena cava filter retrieval: a single center experience. Cardiovasc Interv Radiol. 2018;41:572–7.
2. Doshi MH, Narayanan G. Late endovascular removal of Günther-Tulip inferior vena cava filter and stent reconstruction of chronic post-thrombotic iliocaval obstruction after 4753 days of filter dwell time: a case report with review of literature. Radiol Case Rep. 2016;11:348–53.
3. Kuo WT, Robertson SW, Odegaard JI, Hofmann LV. Complex retrieval of fractured, embedded, and penetrating inferior vena cava filters: a prospective study with histologic and electron microscopic analysis. J Vasc Interv Radiol. 2013;24:622–30.e1.
4. Uberoi R, Rapping CR, Chalmers N, Allgar V. British society of interventional radiology (BSIR) inferior vena cava (IVC) filter registry. Cardiovasc Interv Radiol. 2013;36:1548–61.
5. Kuo WT, Cupp JS, Loui JD, Kothary N, Hofmann LV, Sze DY, et al. Complex retrieval of embedded IVC filters: alternative techniques and histologic tissue. Cardiovasc Interv Radiol. 2012;35:588–97.