

# Unplanned Removal of a Patent Foramen Ovale Closure Device During Retrieval of an Inferior Vena Cava Filter

Marc Agzarian (✉ [marc.agzarian@sa.gov.au](mailto:marc.agzarian@sa.gov.au))

SA Health <https://orcid.org/0000-0002-2562-0340>

Ajay Sinhal

SA Health

---

## Research Article

**Keywords:** Patent foramen ovale closure device, inferior vena cava filter, unintentional removal

**Posted Date:** June 16th, 2021

**DOI:** <https://doi.org/10.21203/rs.3.rs-600270/v1>

**License:**  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

---

# Abstract

This brief communication reports what appears to be the first case of an interaction between an inferior vena cava filter and a patent foramen ovale closure device. During removal of the inferior vena cava filter, the patent foramen ovale closure device was unintentionally removed. This case report serves to highlight the possible interaction of these two devices.

## Introduction

As more medical devices are being developed and implanted within patients, the probability of interaction between devices in-situ increases. Such interactions are often not studied during clinical trials, which typically focus on one device at a time. In this brief communication, we report what appears to be the first case of the interaction between an inferior vena cava (IVC) filter and a patent foramen ovale (PFO) closure device.

## Case Report

A 53 year old woman with a past history of hypertension suffered a left middle cerebral artery territory infarct as a result of paradoxical embolisation of a lower limb deep venous thrombosis likely through a PFO after a long haul international plane flight. She also suffered a pulmonary embolism at this time. She was commenced on Apixaban and had an IVC filter inserted (Günther Tulip, Cook Medical, Bloomington, Indiana, United States of America). After approximately four-and-a-half-months, the patient had her PFO closed successfully using an Amplatzer PFO Occluder (Abbott, Abbott Park, Illinois, United States of America) (Fig. 1). This was deployed via a sheath passed through the IVC filter (Fig. 2).

Eight weeks after her PFO was closed, the patient attended to have her IVC filter retrieved. Given that the retrieval hook of the IVC filter was directed superiorly, a right internal jugular vein approach was used. The IVC filter was firmly embedded in the IVC wall, which was not unexpected as the IVC filter had been in-situ for just over six months. The IVC filter was able to be detached from the IVC however as a result of the firm embedment, the legs of the filter were bent and did not completely retract into the guiding sheath. As the sheath and IVC filter were being withdrawn, a hook at the end of one of the legs of the IVC filter caught on the Amplatzer PFO Occluder and pulled it out of position. The Amplatzer PFO Occluder became lodged in the patient's right subclavian vein (Fig. 3).

The patient required a general anaesthetic and vascular surgical intervention via a right brachial vein cut-down to retrieve the Amplatzer PFO Occluder. A trans-oesophageal echocardiogram showed a PFO but no evidence of injury to any intra-cardiac structure. Her PFO was closed successfully two days later using a second Amplatzer PFO Occluder. Whilst the patient did not suffer a stroke or any other major cardiovascular complication, she did suffer significant psychological trauma and injury and a long scar on her right arm as a result of the unplanned removal of her Amplatzer PFO Occluder.

## Discussion

The complications of IVC filters (1, 2) and of the Amplatzer PFO Occluder (3) have been individually well reviewed in the literature, however, to the best of our knowledge, this is the first case report of the unplanned removal of an Amplatzer PFO Occluder during retrieval of an IVC filter. It is the interaction of these two devices that this case report serves to highlight. In addition to IVC filter retrieval, the right atrium is traversed during transjugular liver biopsy, transjugular renal biopsy and transjugular intrahepatic portosystemic shunt (TIPS) procedures. This case report serves to highlight that in patients with PFO and atrial septal defect (ASD) closure devices such as the Amplatzer PFO Occluder, there exists the potential for intravascular devices passed through the right atrium to catch on the PFO closure device and remove / dislodge it. Thus, particular care should be taken when traversing the right atrium in this situation. Additionally, the risk of unintentional removal of the PFO closure device should form part of the informed consent discussion with the patient.

## Declarations

Funding: This study was not supported by any funding.

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

Ethical approval: For this type of study formal consent is not required.

Informed consent: For this type of study informed consent is not required.

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

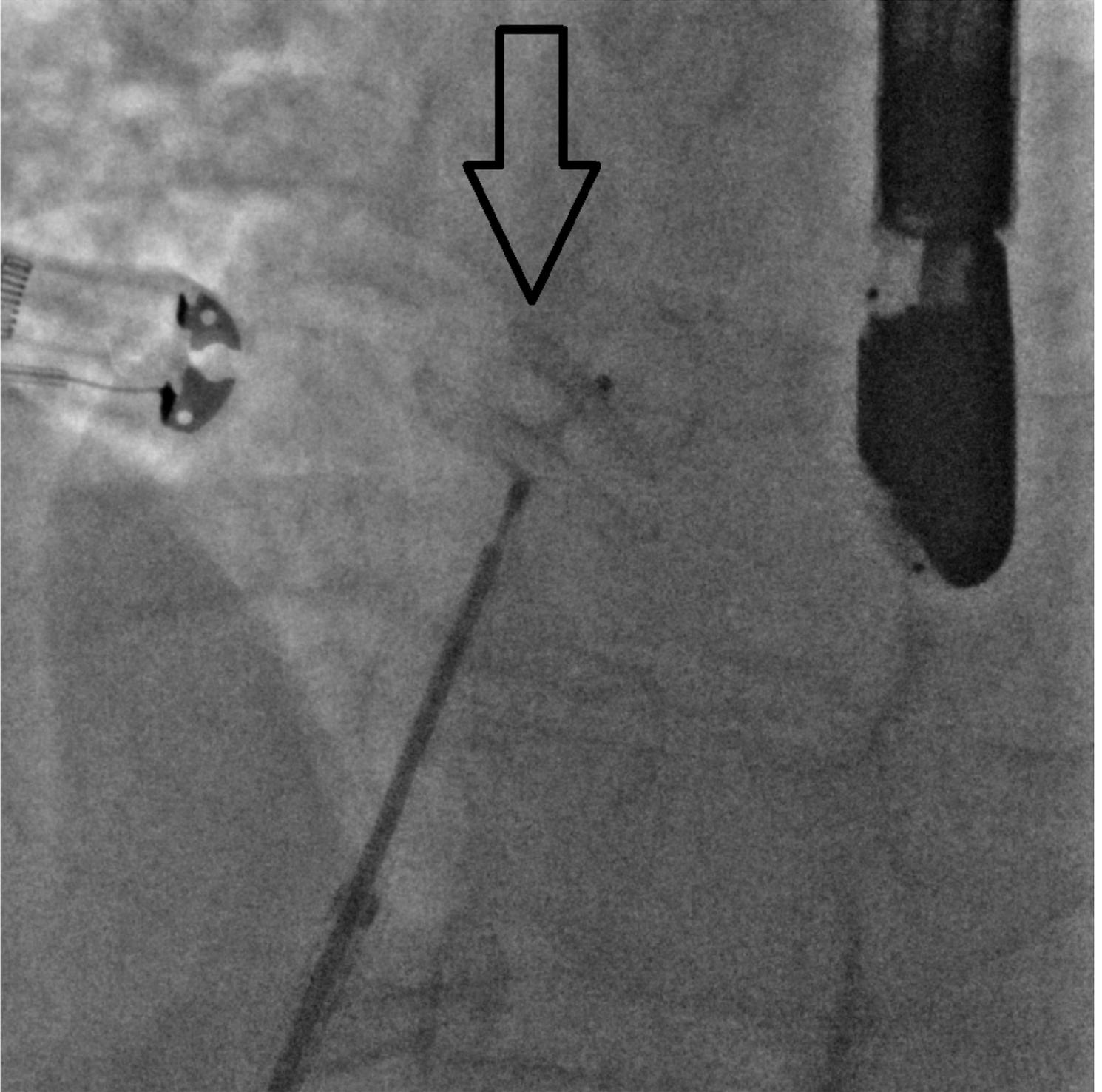
Acknowledgements: none.

Authors' contributions: Marc Agzarian 70% (manuscript writing and figure preparation), Ajay Sinhal 30% (manuscript review)

## References

1. Grewal S, Chamrathy MR, Kalva SP (2016) Complications of inferior vena cava filters. *Cardiovasc Diagn Ther* 6:632–641. <http://dx.doi.org/10.21037/cdt.2016.09.08>
2. Quencer KB, Smith TA, Deipolyi A, Mojibian H, Ayyagari R, Latich I, Ali R (2020) Procedural complications of inferior vena cava filter retrieval, an illustrated review. *CVIR Endovascular* 3:23. <https://doi.org/10.1186/s42155-020-00113-6>
3. Madhkour R, Wahl A, Praz F, Meier B (2019) Amplatzer patent foramen ovale occluder: safety and efficacy. *Expert Rev Med Devices* 16:173–182. <https://doi.org/10.1080/17434440.2019.1581060>

## Figures



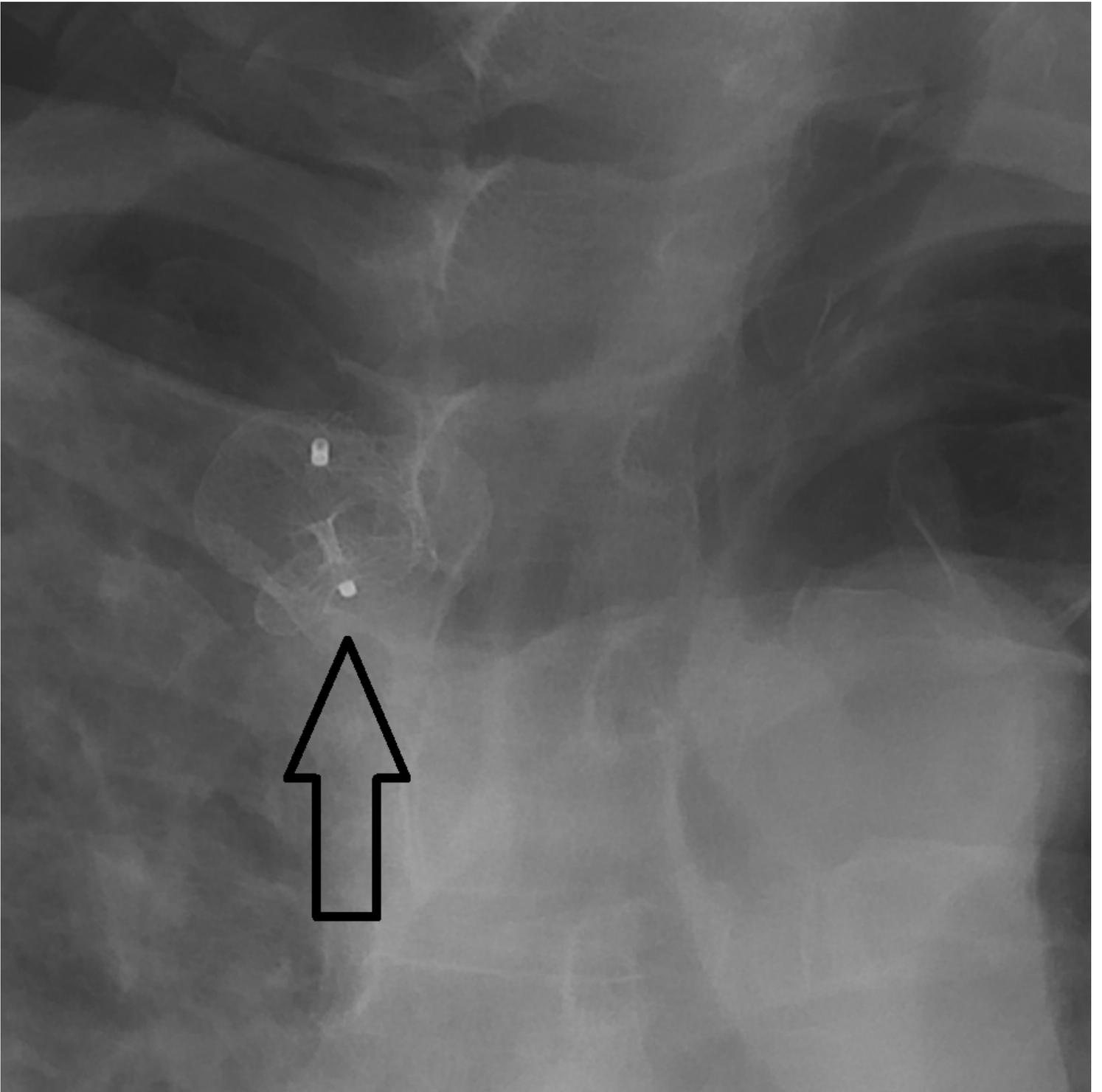
**Figure 1**

angiography image of the Amplatzer PFO Occluder device (black arrow) being deployed across the PFO from the right atrium.



**Figure 2**

angiography image of the sheath used to deliver the Amplatzer PFO Occluder passing through the IVC filter.



**Figure 3**

radiographic image showing the Amplatzer PFO Occluder (black arrow) lodged in the right subclavian vein.