

Fracture of a Tempofilter II: an Initial Case Report

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Tempofilter II is a device that is used for pulmonary embolism prophylaxis. Since the appearance of the Tempofilter II following withdrawal of the Tempofilter I, it has been reported that the Tempofilter II is safe, effective and useful. Here we report on the first case of a fracture of one leg of the filter and this leg was embedded in the inferior vena cava wall in a 62-year-old man with deep vein thrombosis.

Index terms: Filter fracture; Filter complication; Temporary filter; Deep venous thrombosis

INTRODUCTION

Temporary inferior vena cava (IVC) filters are being used for short-term protection in patients who are at a high risk for pulmonary thromboembolism. The Tempofilter II (B. Braun, Boulogne, France) is one of the temporary IVC filters, and this is a second-generation long-duration temporary device that is safe, effective and useful in patients who are in a critical thromboembolic situation (1). Several episodes of atrial migration or upward displacement have been reported for both the Tempofilter I (first-generation device) and the Tempofilter II, but no cases of filter fracture have been reported (1-3). Here we report on the first case of fracture of one leg of the filter and this leg was embedded in the IVC wall in a patient with deep vein thrombosis.

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CASE REPORT

A 62-year-old man presented with a 2-day history of right leg pain and swelling. There was a previous history of stenting for left common iliac vein stenosis five years ago. The axial CT venogram showed a duplicated superficial femoral vein (SFV) and deep venous thrombosis in the right femoral vein, the right popliteal vein and the right calf veins. There was no thrombosis in the infrarenal vena cava and the diameter of the infrarenal vena cava was around 21 mm. Catheter-directed thrombolysis and aspiration thrombectomy were planned as treatment for the patient's DVT. A Tempofilter II was inserted into the inferior vena cava at the infrarenal level under digital subtraction angiography (Fig. 1A), and this was followed by intravenous heparinization. The following afternoon, catheter-directed thrombolysis using 120,000 IU of urokinase was first performed via the catheter inserted from the right popliteal vein and then aspiration thrombectomy was performed without complication. The patient's symptoms of DVT were relieved. One week after the procedure, an axial CT venogram demonstrated some residual thrombus in the right SFV and no radiologically evident complications of the filter were noted. Three weeks after the procedure, removal of the filter was performed, but the fluoroscopic image of the IVC demonstrated upward displacement of the Tempofilter

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(displacement distance: 3 cm) and fracture of one filter leg (Fig. 1B). The one fractured filter leg was embedded in the IVC wall (Fig. 1C). At the time of explantation, we observed that thrombus was present in the filter and the filter was fractured with one missing leg (Fig. 1D). The patient was asymptomatic and he was discharged without surgical removal of the embedded filter leg. The patient has been receiving oral anticoagulant drugs without any complications.

DISCUSSION

Given the long-term complications of permanent filters, the development of a safe and effective temporary filter would be of great benefit for young patients or for patients

with a temporary thromboembolic risk that requires short-term protection against pulmonary thromboembolism. However, some temporary, retrievable filters cannot be removed and so they must be left as permanent, and this maintains the risk of DVT and caval thrombosis (4).

The Tempofilter II is a second generation temporary IVC filter that is introduced and withdrawn by using a tethered catheter with a subcutaneous anchoring device. Unlike other temporary filters, the Tempofilter II has been validated for indwelling times of up to six weeks. The manufacturer validated that retrieval is easy after up to three months without the need for additional equipment (1). Other temporary filters often become irretrievable after only two or three weeks as a result of thrombus formation and endothelialization.

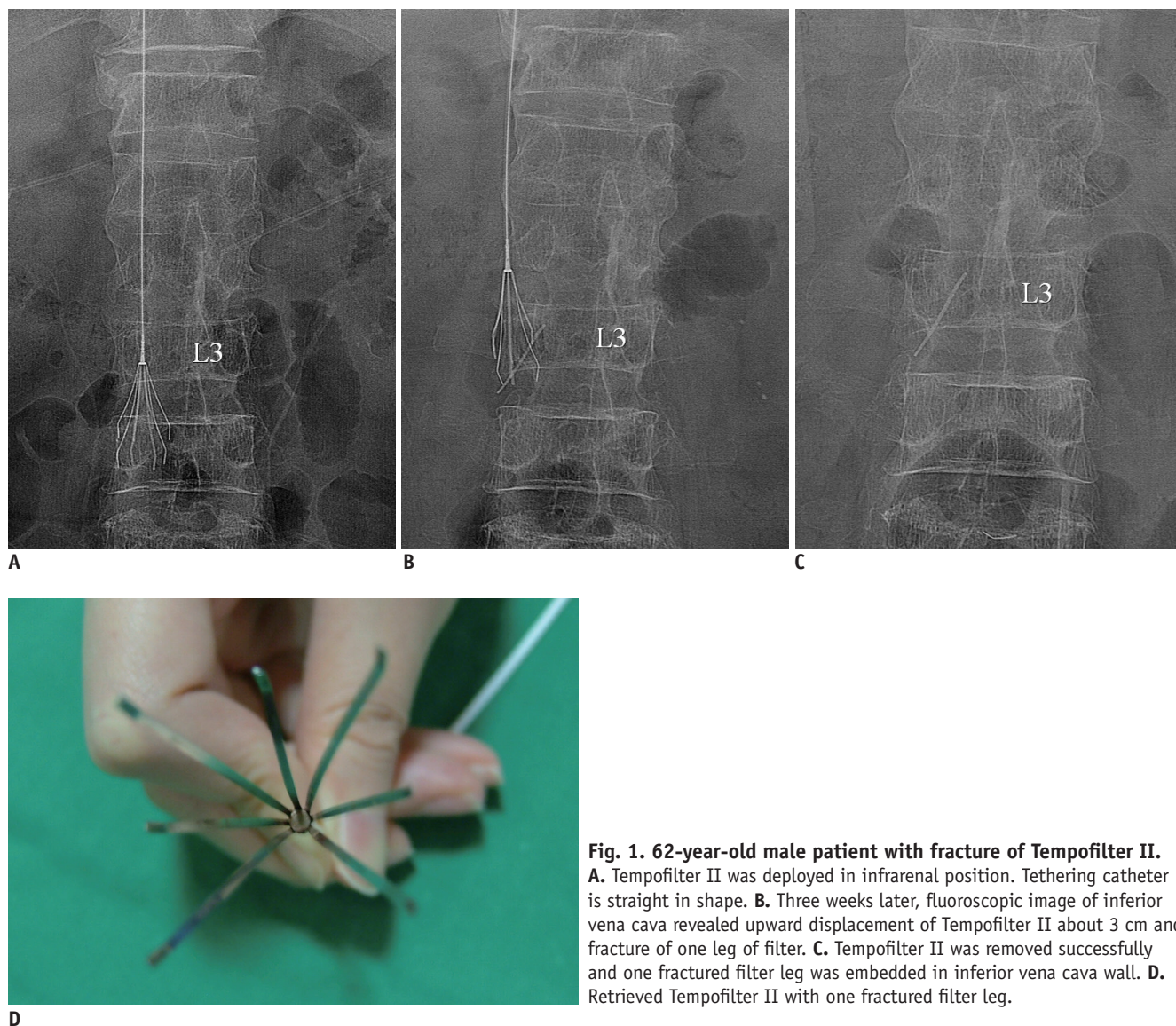


Fig. 1. 62-year-old male patient with fracture of Tempofilter II. **A.** Tempofilter II was deployed in infrarenal position. Tethering catheter is straight in shape. **B.** Three weeks later, fluoroscopic image of inferior vena cava revealed upward displacement of Tempofilter II about 3 cm and fracture of one leg of filter. **C.** Tempofilter II was removed successfully and one fractured filter leg was embedded in inferior vena cava wall. **D.** Retrieved Tempofilter II with one fractured filter leg.

While the initial experience with the first-generation device (Tempofilter I) has been positive (5), several episodes of filter migration to the right atrium due to catheter buckling, one of which was fatal, have suspended further development of this filter (2, 3). The problems related to structural stability were resolved by significant modifications of the filter cone and the tethering catheter. Subsequently, Bovyn et al. (1) reported a prospective 104-case multicenter study with the Tempofilter II and that study confirms the safety and effectiveness of the Tempofilter II. The filters were successfully removed with no complications in all but one case.

While there have been no reported cases of Tempofilter fracture in the English medical literature, we found that one leg of the filter had fractured and was embedded in the IVC wall. Fortunately, the one fractured filter leg was embedded in the IVC wall without migration and no pulmonary thromboembolism was observed. The patient was asymptomatic and he is currently being examined as an outpatient without surgical removal of the embedded filter leg.

Filter fracture is very rare and it has been reported in less than 1% of cases (6-8). A few cases of a fractured IVC filter migrating to the heart and even causing cardiac tamponade have been reported, suggesting that strenuous physical activity and increased intra-abdominal pressure can lead to the fracture and migration of IVC filters (9, 10). We cautioned the patient against making active movement. Our patient didn't have any recognizable precipitating factors. We can postulate that the embedment of one filter leg with constant movement of the tethered catheter can cause fatigue fracture of the embedded filter leg.

In conclusion, this is the first report of one fractured filter leg from a Tempofilter II and the fractured leg was embedded in the IVC wall. This case suggests that this rare complication of Tempofilter II needs to be promptly identified as the consequences of this can be fatal.

REFERENCES

1. Bovyn G, Ricco JB, Reynaud P, Le Blanche AF. Long-duration temporary vena cava filter: a prospective 104-case multicenter study. *J Vasc Surg* 2006;43:1222-1229
2. Kelly IM, Boyd CS. Buckling of the tethering catheter causes migration of a temporary caval filter to the right atrium. *Clin Radiol* 1999;54:398-401
3. Rossi P, Arata FM, Bonaiuti P, Pedicini V. Fatal outcome in atrial migration of the Tempofilter. *Cardiovasc Intervent Radiol* 1999;22:227-231
4. Keeling AN, Kinney TB, Lee MJ. Optional inferior vena caval filters: where are we now? *Eur Radiol* 2008;18:1556-1568
5. Bovyn G, Gory P, Reynaud P, Ricco JB. The Tempofilter: a multicenter study of a new temporary caval filter implantable for up to six weeks. *Ann Vasc Surg* 1997;11:520-528
6. Ballew KA, Philbrick JT, Becker DM. Vena cava filter devices. *Clin Chest Med* 1995;16:295-305
7. Kinney TB. Update on inferior vena cava filters. *J Vasc Interv Radiol* 2003;14:425-440
8. Ray CE Jr, Kaufman JA. Complications of inferior vena cava filters. *Abdom Imaging* 1996;21:368-374
9. Saeed I, Garcia M, McNicholas K. Right ventricular migration of a recovery IVC filter's fractured wire with subsequent pericardial tamponade. *Cardiovasc Intervent Radiol* 2006;29:685-686
10. Chandra PA, Nwokolo C, Chuprun D, Chandra AB. Cardiac tamponade caused by fracture and migration of inferior vena cava filter. *South Med J* 2008;101:1163-1164