Error by Distraction

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An expert is a person who has made all the mistakes that can be made in a very narrow field. - Niels Bohr (1885–1962)

Although some medical errors are due to poor judgment or lack of knowledge, sometimes complications can occur even when operators know exactly what they are doing. Distraction by outside stimuli can cause even experienced operators to make basic errors. This case illustrates such a scenario.

Case Report

The patient is a 74-year-old man who was originally admitted because of head trauma. During this admission he developed other problems including respiratory failure, an ischemic leg requiring a surgical thrombectomy, and renal failure. A screening lower extremity Doppler ultrasound examination revealed deep vein thrombosis. Because of his head trauma, he was not a candidate for anticoagulation, and an inferior vena cava (IVC) filter was requested. He had a history of prior cerebrovascular accident and multiple prior falls, and given his age and multiple medical problems, it was felt that he would be best served by a permanent filter.

Although my preferred access is the right internal jugular vein, the patient had a cervical support collar in the way; thus it was decided to use a right femoral vein access. The primary operator was a third-year resident with the author (an interventional radiologist with >25 years experience) first assisting. After performing a cavagram (**Fig. 1**), a VenaTech permanent filter (B. Braun Medical; Boulogne, France) was loaded into the delivery sheath (by the attending, not the less experienced resident) and was pushed into the appropriate position and delivered.

While the filter placement was occurring, one of the fellows was in the doorway of the angio suite, telling the attending about a case that needed to be done urgently. It was late afternoon during a very busy day, the interventional section still had a large number of cases to do, all the angio suites were

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occupied, and many patients were in the holding area waiting for their procedures. I was the on-call attending and so was responsible for trying to work out the optimal triage strategy.

After deploying the filter, it was immediately recognized that the filter had been deployed upside down. Given the type of filter that had been used, retrieval was not felt to be an option. Because the cone of the existing filter pointed downward, it was not believed to be optimal geometry for capturing the clot while preserving caval patency. An inverted cone configuration diverts thrombi up against the caval wall, which leads to increased stagnation of flow and a reduced chance of clot lysis.¹ Also, because the major fixation barbs were pointed the wrong direction, there was concern that if a large clot impacted on the filter, it could dislodge the filter and cause migration to the heart. The existing filter was just below the renal veins; therefore placing a second filter above the first one would require suprarenal placement. For all these reasons, I therefore decided to place another filter below the initial filter (**Fig. 2**). This was accomplished without further difficulty.

The complication was disclosed to the family and referring physicians. The patient was in the hospital for another 2 months during which time he had no problems with lower extremity edema or any other sequela from the filters. He had an abdominal radiograph (**Fig. 3**) and computed tomography (CT) scan 1 month after filter placement that showed the filters to be unchanged in position and with a patent vena cava.

Discussion

Although this is a fairly minor complication with no negative short-term consequences for the patient, this case nicely illustrates how multitasking and diversion of one's attention can lead to complications. At the time of this case, I had done 638 IVC filter insertions during the preceding 18 years at the Mallinckrodt Institute, plus many other cases done during the 4 years of fellowship and a prior faculty job. Inverted insertion of a filter can occur as a result of unfamiliarity with a device.² However, the VenaTech filter is one that had used for many years at our institution, so there was no issue with lack of familiarity. The filter comes loaded in a bidirectional capsule, and one has to choose whether to insert it with a jugular

Figure 1 Preinsertion cavagram performed with carbon dioxide because of renal failure demonstrates a long infrarenal segment of inferior vena cava.

Figure 2 Spot film showing the properly oriented filter deployed caudal to the upside-down filter.

Figure 3 Abdominal radiograph 1 month later showing no change in position of the inferior vena cava filters.

approach or femoral approach orientation. Given that the vast majority of filters are placed from a jugular approach at our institution, the autopilot action was to load the filter for a jugular approach. Had attention been paid to the case at hand instead of trying to coordinate the emergency case, it would have been extremely easy to recognize that because femoral access was being used, the filter needed to be loaded the opposite of what is normally done. However, placing a filter was a very routine case, which led to a false sense of security, but the emergency case the fellow was discussing was going to be a complex, difficult case. So attention was diverted, and the operators were essentially doing the filter case in autopilot mode while thinking about the other case.

Although many physicians pride themselves on being able to multitask, it has been shown that in complex procedures like laparoscopic surgery, cognitive distraction has a definite negative impact on performance.³ Familiarity with a procedure is not an assurance of safety. In fact, an analysis of 133 cases of surgical technical errors revealed that the vast majority occurred during routine operations performed by experienced surgeons.⁴ Interruption or distraction has been implicated as particularly relevant to technical errors compared with errors in judgment.⁵ Thus although it might be impossible to eliminate outside distractions, one should try to minimize them and be aware of their potential negative impact.

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