

# Catheter-Directed Retrieval of an Infected Fragment in a Vietnam War Veteran

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**Background:** Shrapnel injuries are commonly encountered in war zones. The severity of these injuries depends on the initial damage and both the anatomical and immune response at the time of injury or at more remote times in the case of reactivation.

**Case Presentation:** A veteran sustained a shrapnel injury to his left lower abdomen while serving in the Vietnam War. Nearly 50 years later, the patient presented with a recurrent retroperitoneal abscess associated with a residual fragment. In cooperation between interventional radiology and surgery, traditional endovascular techniques and devices were used

to relocate an extravascular, secondarily infected fragment to an area more suitable for a minor surgical approach in the left inguinal region. Subsequent surgical excision and removal required only a superficial incision as opposed to a large retroperitoneal dissection, minimizing recovery time and allowing quick and full healing of the patient.

**Conclusions:** This case demonstrates a multidisciplinary approach to transforming an otherwise large retroperitoneal dissection to a minimally invasive and technically efficient abscess drainage and foreign body retrieval.

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Shrapnel injuries are commonly encountered in war zones.<sup>1</sup> Shrapnel injuries can remain asymptomatic or become systemic, with health effects of the retained foreign body ranging from local to systemic toxicities depending on the patient's reaction to the chemical composition and corrosiveness of the fragments in vivo.<sup>2</sup> We present a case of a reactivating shrapnel injury in the form of a retroperitoneal infection and subsequent iliopsoas abscess. A collaborative procedure was performed between surgery and interventional radiology to snare and remove the infected fragment and drain the abscess.

## CASE PRESENTATION

While serving in Vietnam, a soldier sustained a fragment injury to his left lower abdomen. He underwent a laparotomy, small bowel resection, and a temporary ileostomy at the time of the injury. Nearly 50 years later, the patient presented with chronic left lower quadrant pain and a low-grade fever. He was diagnosed clinically in the emergency department (ED) with diverticulitis and treated with antibiotics. The patient initially responded to treatment but returned 6 months later with similar symptoms, low-grade fever, and mild leukocytosis. A computed tomography (CT) scan during that encounter without IV contrast revealed a few scattered colonic diverticula without definite diverticulitis as well as a metallic fragment embedded in the left iliopsoas with increased soft tissue density.

The patient was diagnosed with a pelvic/abdominal wall hematoma and was discharged with pain medication. The patient reported recurrent attacks of left lower quadrant pain, fever, and changes in bowel habits, prompting gastrointestinal consultation and a colonoscopy that was unremarkable. Ten months later, the patient again presented to the ED, with recurrent symptoms, a fever of 102 °F, and leukocytosis with a white blood cell count of  $11.7 \times 10^9/L$ . CT scan with IV contrast revealed a large left iliopsoas abscess associated with an approximately 1-cm metallic fragment (Figure 1). A drainage catheter was placed under CT guidance and approximately 270 mL of purulent fluid was drained. Culture of the fluid was positive for *Escherichia coli* (*E coli*). Two days after drain placement, the fragment was removed as a joint procedure with interventional radiology and surgery. Using the drainage catheter tract as a point of entry, multiple attempts were made to retrieve the fragment with Olympus EndoJaw endoscopic forceps without success.

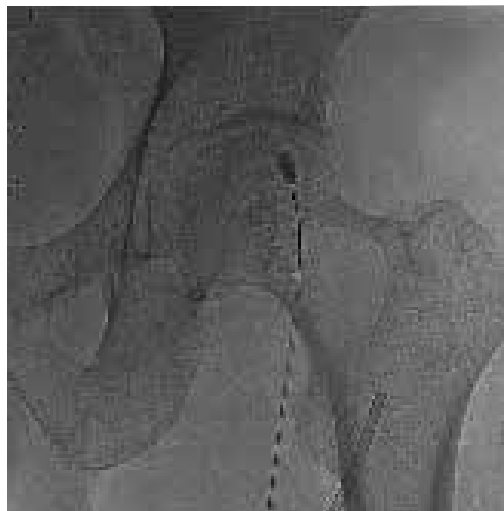
Ultimately a stiff directional sheath from a Cook Medical transjugular liver biopsy kit was used with a Merit Medical EnSnare to relocate the fragment to the left inguinal region for surgical excision (Figures 2, 3, and 4). The fragment was removed and swabbed for culture and sensitivity and a BLAKE drain was placed in the evacuated abscess cavity. The patient

**FIGURE 1** Axial Computed Tomography of Foreign Body



Image at the time of abscess drainage demonstrates the left-sided retroperitoneal abscess containing the metallic fragment.

**FIGURE 3** Retrieval of Foreign Body



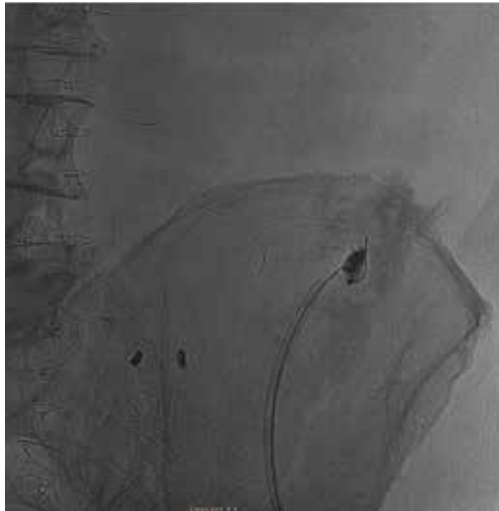
Fragment was repositioned to the inguinal region for surgical cutdown.

tolerated the procedure well and was discharged the following day. Three days later, culture and sensitivity grew *E coli* and *Acinetobacter*, thus confirming infection and a nidus for the surrounding abscess formation. On follow-up with general surgery 7 days later, the patient reported he was doing well, and the drain was removed without difficulty.

### DISCUSSION

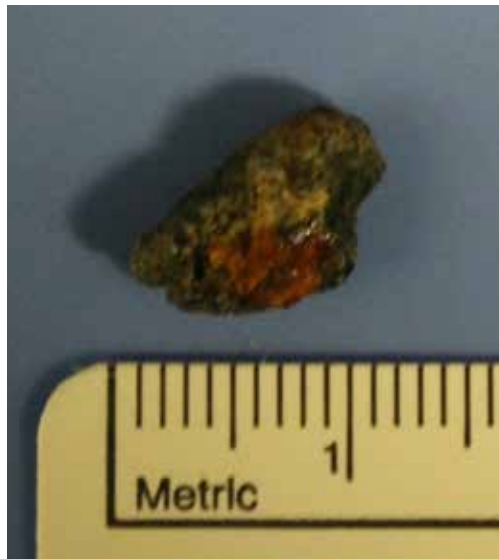
Foreign body injuries can be benign or debilitating depending on the initial damage, anatomical location of the foreign body,

**FIGURE 2** Catheter-Directed Retrieval



Retrieval was performed through the abscess drain tract.

**FIGURE 4** Excised Shrapnel



composition of the foreign body, and the patient's response to it. Retained shrapnel deep within the muscle tissue rarely causes complications. Although many times embedded objects can be asymptomatic and require no further management, migration of the foreign body or the formation of a fistula is possible, causing symptoms and requiring surgical intervention.<sup>1</sup> One case involved the formation of a purulent fistula appearing a year after an explosive wound to the lumbosacral spine, which was treated with antimicrobials. Recurrence of the fistula several times after

treatment led to surgical removal of the shrapnel along with antibiotic treatment of the osteomyelitis.<sup>3</sup> Although uncommon, lead exposure that occurs due to retained foreign body fragments from gunshot or military-related injuries can cause systemic lead toxicity. Symptoms may range from abdominal pain, nausea, and constipation to jaundice and hepatitis.<sup>4</sup> The severity has also been stated to correlate with the surface area of the lead exposed for dissolution.<sup>5</sup> Migration of foreign bodies and shrapnel to other sites in the body, such as movement from soft tissues into distantly located body cavities, have been reported as well. Such a case involved the spontaneous onset of knee synovitis due to an intra-articular metallic object that was introduced via a blast injury to the upper third of the ipsilateral thigh.<sup>1</sup>

In this patient's case, a large intramuscular abscess had formed nearly 50 years after the initial combat injury, requiring drainage of the abscess and removal of the fragment. By snaring the foreign body to a more superficial site, the surgical removal only required a minor incision, decreasing recovery time and the likelihood of postoperative complications that would have been associated with a large retroperitoneal dissection. While loop snare is often the first-line technique for the removal of intravascular foreign bodies, its use in soft tissue retained materials is scarcely reported.<sup>6</sup> The more typical uses involve the removal of intraluminal materials, such as partially fractured venous catheters, guide wires, stents, and vena cava filters. The same report mentioned that in all 16 cases of percutaneous foreign body retrieval, no surgical intervention was required.<sup>7</sup> In the case of most nonvascular foreign bodies, however, surgical retrieval is usually performed.<sup>8</sup>

Surgical removal of foreign bodies can be difficult in cases where a foreign body is anatomically located next to vital structures.<sup>9</sup> An additional challenge with a sole surgical approach to foreign body retrieval is when it is small in size and lies deep within the soft tissue, as was the case for our patient. In such cases, the surgical procedure can be time consuming and lead to more trauma to the surrounding

tissues.<sup>10</sup> These factors alone necessitate consideration of postoperative morbidity and mortality.

In our patient, the retained fragment was embedded in the wall of an abscess located retroperitoneally in his iliopsoas muscle. When considering the proximity of the iliopsoas muscle to the digestive tract, urinary tract, and iliac lymph nodes, it is reasonable for infectious material to come in contact with the foreign body from these nearby structures, resulting in secondary infection.<sup>11</sup> Surgery was previously considered the first-line treatment for retroperitoneal abscesses until the advent of imaging-guided percutaneous drainage.<sup>12</sup>

In some instances, surgical drainage may still be attempted, such as if there are different disease processes requiring open surgery or if percutaneous catheter drainage is not technically possible due to the location of the abscess, thick exudate, loculation/septations, or phlegmon. In these cases, laparoscopic drainage as opposed to open surgical drainage can provide the benefits of an open procedure (ie, total drainage and resection of infected tissue) but is less invasive, requires a smaller incision, and heals faster.<sup>13</sup> Percutaneous drainage is the current first-line treatment due to the lack of need for general anesthesia, lower cost, and better morbidity and mortality outcomes compared to surgical methods.<sup>12</sup> While percutaneous drainage proved to be immediately therapeutic for our patient, the risk of abscess recurrence with the retained infected fragment necessitated coordination of procedures across specialties to provide the best outcome for the patient.

## CONCLUSIONS

This case demonstrates a multidisciplinary approach to transforming an otherwise large retroperitoneal dissection to a minimally invasive and technically efficient abscess drainage and foreign body retrieval.

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### Disclaimer

The opinions expressed herein are those of the authors and do not necessarily reflect those of *Federal Practitioner*, Front-line Medical Communications Inc., the US Government, or any of its agencies.

### Ethics and consent

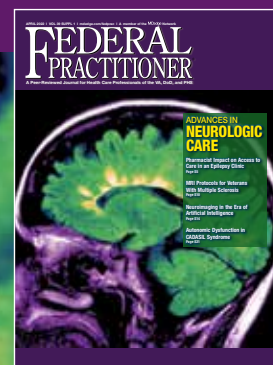
No identifiable information or patient photographs included in this case report. The patient gave consent to have the radiographic and foreign body images published.

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