

## An unusual case of a persistent, infected retroperitoneal fluid collection 5 years after anterior lumbar fusion surgery: illustrative case

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**BACKGROUND** Anterior lumbar fusion procedures have many benefits and continue to grow in popularity. The technique has many potential approach- and procedure-related complications. Symptomatic retroperitoneal fluid collections are uncommon but potentially serious complications after anterior lumbar procedures. Collection types include hematomas, urinomas, chyloperitoneum, cerebrospinal fluid collections, and deep infections.

**OBSERVATIONS** The authors present an unusual case of a patient with persistent symptoms related to a retroperitoneal collection over a 5-year period following anterior lumbar fusion surgery. To the authors' knowledge, no similar case with such extensive symptom duration has been described. The patient had an infected encapsulated fluid collection. The collection was presumed to be a postoperative lymphocele that was secondarily infected after serial percutaneous drainage procedures.

**LESSONS** When retroperitoneal collections occur after anterior retroperitoneal approaches, clinical clues, such as timing of symptoms, hypotension, acute anemia, urinary tract infection, hydronephrosis, elevated serum creatinine and blood urea nitrogen, low-pressure headaches, anorexia, or systemic signs of infection, can help narrow the differential. Retroperitoneal collections may continue to be symptomatic many years after anterior lumbar surgery. The collections may become infected after serial percutaneous drainage or prolonged continuous drainage. Encapsulated, infected fluid collections typically require surgical debridement of the capsule and its contents.

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**KEYWORDS** anterior lumbar fusion; ALIF; spinal infection; chyloperitoneum; lymphocele

The anterior lumbar interbody fusion (ALIF) is a well-established surgical technique and is routinely used by many spine surgeons.<sup>1</sup> The indications for ALIF are diverse and include degenerative, deformity-related, iatrogenic, infectious, and oncological pathologies.<sup>2-6</sup> The procedure has many advantages, such as avoidance of direct manipulation of the neural elements, indirect neural decompression,<sup>7-9</sup> high fusion rates in excess of 95%,<sup>2,10,11</sup> and significant improvement in desired sagittal radiographic parameters.<sup>12</sup> In addition, the ALIF technique has been associated with significant improvement in commonly used patient-reported outcome measures, including the total visual analog scale, Oswestry Disability Index, and Scoliosis Research Society-22 scale.<sup>9,11-14</sup>

Overall, the complication rates for ALIF are relatively low. A recent meta-analysis on complications in anterior lumbar surgery that included 76 articles and 11,410 collective cases revealed a complication rate of 14.1%, including minor and major complications. The most

common complications, such as venous injury and retrograde ejaculation, occurred less than 3% of the time.<sup>15</sup>

Other ALIF complications that have been described include ureter injury, neurological injury, postoperative ileus, colonic pseudoobstruction, superficial infection, urinary tract infection, sepsis, subsidence, pseudarthrosis, instrumentation failure, adjacent segment disease, sacral fractures, and retroperitoneal fluid collections.<sup>10,16-24</sup> Retroperitoneal fluid collections are an uncommon cause of delayed symptoms following an ALIF procedure. Various etiologies include hematomas, urinomas, chyloperitoneum, cerebrospinal fluid (CSF) collections, and deep infections.

We present an unusual case with a contained, retroperitoneal, infected fluid collection in a patient 5 years after an ALIF procedure. Management and key learning points are discussed. To our knowledge, no similar case has been described.

**ABBREVIATIONS** ALIF = anterior lumbar interbody fusion; CSF = cerebrospinal fluid; CT = computed tomography; MRI = magnetic resonance imaging.

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## Illustrative Case

A 71-year-old male with a history of obesity, type 2 diabetes mellitus, prostate cancer status post resection and radiation, and an L4–5 and L5–S1 ALIF procedure 5 years earlier presented with abdominal discomfort and fullness that had been present since the ALIF procedure. He had intermittent episodes of sharp, left-sided abdominal pain. Over several years, he had undergone multiple aspiration procedures at outside medical facilities to drain the retroperitoneal fluid collection. Unfortunately, fluid analysis reports were not available for review. He denied acute low-back pain, fever, lower extremity pain, or other acute neurological symptoms at the time of presentation.

On examination, he was a well-developed male who appeared his stated age. He had a well-healed paramedian surgical incision on his left abdomen consistent with the prior ALIF approach. There was no erythema surrounding the incision; however, there was some fullness in the left lower quadrant and minimal abdominal tenderness was noted.

An abdominal magnetic resonance imaging (MRI) study was obtained that revealed a  $7.6 \times 12.1 \times 12.1$ -cm retroperitoneal fluid collection with mixed signal in the left lower quadrant of the abdomen (Fig. 1). The collection was in the same plane as the prior retroperitoneal ALIF approach, although there was no direct communication with the spinal hardware. There was faint enhancement around the periphery of the collection and necrotic-appearing debris along the posterior margin. There were no abnormalities with other abdominal organs. Specifically, there was no hydronephrosis, pancreatitis, cirrhosis, lymphadenopathy, intestinal abnormality, or vascular abnormality.

Serum laboratory analysis demonstrated a normal leukocyte count ( $6.4 \times 10^9/L$ ) and normal values on basic metabolic panel.

A computed tomography (CT)-guided drain was placed, and fluid was sent for analysis. The hazy, red fluid contained 5,556 nucleated cells/ $\mu L$  (87% neutrophils). A Gram stain revealed rare white blood cells, and bacterial cultures were negative. Triglycerides were 234 mg/dL, although laboratory notes commented that the specimen was hemolyzed, which could interfere with test results. Several days

later, CT imaging showed complete drainage of the fluid cavity. A sclerotherapy procedure was performed using doxycycline prior to drain removal.

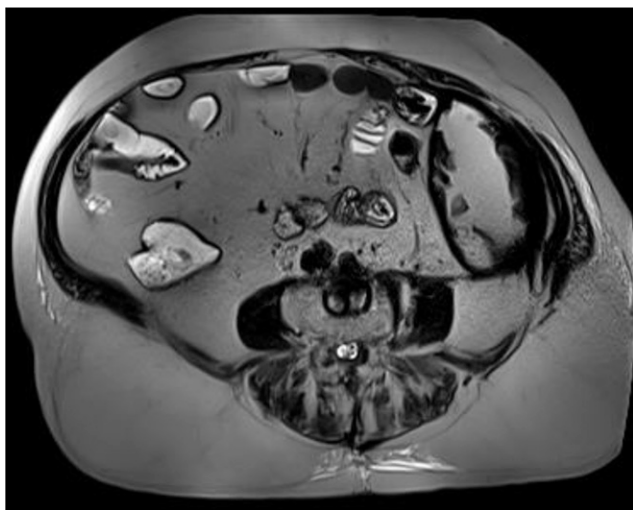
A follow-up CT scan of the abdomen approximately 2 months later demonstrated recurrence and enlargement of the abdominal fluid collection (Fig. 2). The patient was subsequently taken for open surgical debridement. Intraoperatively, a thickened, well-organized capsule surrounding the fluid collection was encountered in the lateral extraperitoneal space. The capsule was incised sharply, resulting in immediate evacuation of a large amount of thin, beige-colored, opaque fluid, which was sent for analysis. The cavity contained a large amount of semisolid, necrotic material, and no frank purulent material (Fig. 3). The cavity did not communicate with the peritoneum or the spinal hardware. A thorough debridement was performed and all necrotic material was removed. A large-caliber closed suction drain was left in place. The drain was maintained for 10 days to ensure daily output was less than 30 ml. Gram stains were positive for gram-positive cocci, and aerobic bacterial culture grew *Staphylococcus epidermidis*. Remaining cultures and beta-2 transferrin testing were negative. After susceptibility testing for the bacterium, the patient was treated with a 10-day course of Augmentin (Mylan Pharmaceuticals), 875 mg twice daily.

Follow-up CT imaging 6 months later demonstrated minimal residual, benign-appearing fluid in the retroperitoneal plane (Fig. 4). The patient reported resolution of abdominal pain and discomfort. He had no signs or symptoms of local or systemic infection.

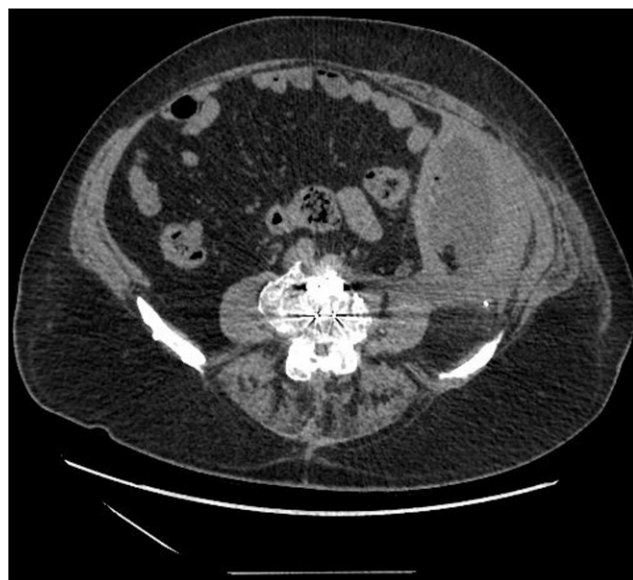
## Discussion

### Observations

Secondary to the many benefits of ALIF surgery, the number of ALIF procedures performed in the United States has continued to grow steadily.<sup>1,12</sup> Therefore, it is important for surgeons performing these procedures to be aware of potential complications. One possible complication is a retroperitoneal fluid collection. Potential types of



**FIG. 1.** T2 MRI demonstrating a 12-cm left-sided retroperitoneal fluid collection with mixed signal.



**FIG. 2.** CT demonstrating recurrence of a left-sided retroperitoneal fluid collection after percutaneous drainage.



**FIG. 3.** Cystic fluid and internal necrotic debris collected during open debridement.



**FIG. 4.** CT of the abdomen 6 months after surgery revealing a minimal residual retroperitoneal fluid collection.

retroperitoneal fluid collections include hematoma; CSF collection; urinoma; chyloperitoneum; and encapsulated, infected fluid collection.<sup>23,25–30</sup> We suspect the patient in this case had a lymphocele that was secondarily infected following his ALIF. Lymphoceles can result from dissection of the aorta and iliac vessels, causing disruption of lymphatic vessels. The lymphatic leak was probably unrecognized because lymphatic flow can be as slow as 1 ml/min.<sup>26,31</sup> Development of a symptomatic lymphocele after spine surgery is uncommon and is more frequently reported after transplant or major gynecological surgery.<sup>32,33</sup> Nonetheless, symptomatic lymphoceles can occur after anterior lumbar surgery, and a recent review article identified 33 cases in the literature.<sup>26</sup>

Because symptomatic lymphatic collections after anterior lumbar surgery are rare, management strategies are not well described in the literature. The previously mentioned review article proposes a management protocol for chyloperitoneum after anterior lumbar surgery.<sup>26</sup> The authors endorse prolonged percutaneous drainage in conjunction with sclerosing agents such as doxycycline, bleomycin, OK-432, povidone-iodine, and ethiodized oil. The use of sclerosing agents likely shortens the necessary duration of drainage.<sup>34</sup> Refractory cases require laparoscopic fenestration, allowing drainage into the peritoneum, or open surgical treatment.<sup>26</sup>

Following a systematic approach, we were able to successfully manage the symptomatic retroperitoneal collection in this case. Based on the patient's history and examination, CT and MRI scans were obtained to rule out pathologies other than the fluid collection, which was suspected based on prior history. For diagnostic and therapeutic purposes, percutaneous drainage and injection of a sclerosing agent were performed. Fluid specimens were analyzed with cell counts, triglycerides, and cultures for infectious agents.<sup>26,27</sup> If urinoma had been suspected, the fluid's creatinine and urea would have been analyzed and compared to serum levels. When the fluid collection recurred, we performed open debridement of the thick capsule and its contents. In this case, infection was identified after open debridement, and antibiotics were administered for definitive treatment.

### Lessons

We believe there are several aspects of this case that are instructive. When retroperitoneal collections occur after anterior retroperitoneal approaches, clinical clues, such as timing of symptoms, hypotension, acute anemia, urinary tract infection, hydronephrosis, elevated serum creatinine and blood urea nitrogen, low-pressure

headaches, anorexia, or systemic signs of infection, can help narrow the differential. Retroperitoneal collections may continue to be symptomatic many years after ALIF surgery. To our knowledge, no similar case with such extensive symptom duration has been described. Furthermore, a recent review analyzing 33 published cases of chyloperitoneum after anterior lumbar surgery did not identify any cases with secondary infections after drainage procedures.<sup>26</sup> Clinicians should consider that retroperitoneal fluid collections may become infected after serial percutaneous drainage or prolonged continuous drainage. Also, clinicians must maintain suspicion for infection, despite false-negative culture results after percutaneous drainage. Encapsulated, infected fluid collections typically require surgical debridement of the capsule and its contents.

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#### Disclosures

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

#### Author Contributions

Conception and design: Neal, Kalani, Davila. Acquisition of data: Neal, Curley, Kalani. Analysis and interpretation of data: Neal, Curley, Lyons. Drafting the article: Neal, Curley, Richards, Lyons. Critically revising the article: Neal, Curley, Richards, Lyons, Davila. Reviewed submitted version of manuscript: all authors. Approved the final version of the manuscript on behalf of all authors: Neal. Administrative/technical/material support: Curley.

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