Delayed chylous fluid leakage at the surgical site following thoracic corpectomy via a lateral extracavitary approach: illustrative case

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BACKGROUND Chylous fluid leakage following spinal surgery is a rare and potentially difficult-to-manage complication that can lead to wound complications, pain, or nutritional deficiencies. Although the thoracic duct is localized near the thoracic spine, reports of thoracic duct injuries secondary to posterior thoracic spine surgery are rare.

OBSERVATIONS The authors present the case of a 57-year-old male with a known history of metastatic renal cell carcinoma to the thoracic spine who had undergone a thoracolumbar fusion with thoracic corpectomy and presented with concern for a chyle leak almost a year after his surgery. The patient had a complicated oncological history and underwent decompression and fusion to treat his significant thoracic metastatic disease. A year later, he presented with back pain and a significant fluid collection at the surgical site, which was drained and found to be consistent with chyle. The patient was treated conservatively, and imaging of the thoracic duct a few months later demonstrated no direct injury, likely indicating either transient injury or potential obstruction of the thoracic duct from metastatic disease.

LESSONS This case demonstrates a rare, potential complication when treating extensive thoracic metastatic disease as well as the workup and potential treatments when facing thoracic duct injury.

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KEYWORDS chylous leak; chylothorax; thoracic corpectomy; thoracic duct injury

The occurrence of a chylous fluid leak following posterior spinal surgery is an exceedingly uncommon phenomenon.1 Intraoperative injury to the lymphatic system during spine surgery constitutes a rare complication, often associated with anterior cervical surgery following neck dissection2,3 or anterior lumbar surgery resulting in damage to lymphatic channels around the iliac vessels.4 Chylous leakage secondary to thoracic spine surgery is exceedingly rare and is typically seen in the context of spinal trauma leading to secondary injury to the thoracic lymphatic duct. The presentation of lymphatic system injury is related to the location of the leakage and can manifest as surgical site fluid collection or leakage,1,3,5 back pain,6 abdominal pain,1,4 chylothorax,7 and chyloperitoneum.1,8 Early detection and appropriate management are essential to prevent any secondary complications. Management options for chylous leakage are varied and include conservative management, interventional radiology (IR) drainage or embolization, and surgical intervention to ligate the thoracic duct.1,3,8,9

In this article, we report a case of chylous fluid leakage secondary to posterior thoracic corpectomy presenting in a delayed fashion. We have detailed the patient's presentation, diagnostic workup, and management.

Illustrative Case

A 57-year-old male was initially diagnosed with left-sided renal cell carcinoma and underwent a left nephrectomy 2.5 years before his presentation to the neurosurgery team. One year prior to his presentation, he was found to have metastatic lesions to T9 and T10 with evidence of epidural extension and received 5 fractions of external beam radiation for a total of 25 Gy. The patient developed worsening compression fractures at T9–10 and underwent an IR-guided ablation and vertebroplasty.

Approximately 1 month after his vertebroplasty, a surveillance computed tomography (CT) scan revealed a worsening compression
fracture at the T10 level, despite the vertebroplasty. At the time of presentation, he reported experiencing chronic back pain for over 2 years, with a recent exacerbation of his symptoms. He had no other neurological complaints, and his neurological examination was unremarkable. Magnetic resonance imaging (MRI) of his thoracic spine demonstrated significant spinal cord compression with epidural extension of metastatic disease at T10, causing effacement of cerebrospinal fluid (CSF) spaces (Blisky grade 2; Fig. 1). Due to the progression of his disease and the significant spinal cord compression, we recommended that the patient undergo a T9 and T10 corpectomy through a lateral extracavitary approach, along with T6–L1 instrumentation and fusion. The procedure was performed without evidence of intraoperative complications (Fig. 2).

The patient had been doing well from a neurological and oncological perspective until approximately 6 months later. Surveillance imaging demonstrated a fluid collection at the surgical bed as well as a potential recurrence of disease at the corpectomy site. A stereotactic biopsy was performed, which demonstrated recurrence of disease. The patient was asymptomatic; therefore, we elected to monitor the fluid collection while he underwent an additional 5 sessions of stereotactic body radiotherapy for a total of 30 Gy. He tolerated the additional radiotherapy well.

Five months after the second round of radiotherapy, and 11 months after his thoracolumbar fusion, he presented to the emergency department with new-onset midline back pain. CT of the thoracic spine demonstrated a new fluid collection without evidence of hardware failure or disease progression. MRI showed a fluid collection consistent with a seroma or a CSF leak (Fig. 3). Bedside aspiration of the fluid yielded 32 mL of orange-brown fluid.

The culture of the aspirated fluid grew Bacteroides species. Given the concern for infection, the patient underwent a wound washout. During the procedure, yellowish fatty fluid was observed both superficial and deep to the fascia. Given the unusual appearance of the fluid, it was sent for triglyceride analysis alongside the standard infection workup. The fluid culture once again yielded Bacteroides species, and the patient was treated with intravenous cefazolin and oral metronidazole for 6 weeks. However, the triglyceride level returned at 201 mg/dL, concerning for chylous fluid. We elected to treat the fluid collection conservatively, as we thought additional cancer-directed therapy would be sufficient.

However, given the concern for thoracic duct injury and potential recurrence, the patient underwent an IR-guided lymphangiography (Fig. 4). The lymphangiogram did not reveal any injury to the thoracic duct. Moreover, further fluid aspiration performed during lymphangiography indicated a triglyceride level of 93 mg/dL, suggesting an absence of active chyle leakage. It is suspected that drainage and/or active chemotherapy were effective in treating the patient's chyle leak, and no further direct intervention is planned at this time.

Patient Informed Consent
The necessary patient informed consent was obtained in this study.

FIG. 1. Preoperative sagittal T1-weighted postcontrast (A) and T2-weighted (B) MRI demonstrated a contrast-enhancing mass within the T9 and T10 vertebral bodies with epidural extension leading to compression of the spinal cord. Sagittal CT (C) demonstrated collapse of the T10 vertebral body despite evidence of previous vertebroplasty, as well as lucency along the dorsal T9 vertebral body. Axial T1-weighted postcontrast (D) and T2-weighted (E) MRI again demonstrated tumor in the T10 vertebral body with epidural extension leading to significant canal compromise and spinal cord compression.
Discussion

Observations

Here, we present a rare case in which a patient presented in a delayed fashion with a chylous fluid collection that we were able to effectively manage in a conservative manner. Thoracic duct injuries associated with thoracic spine surgery are unusual and typically associated with blunt force polytrauma involving the thoracic spine. The typical presentation of this group is respiratory symptoms from thoracic fluid collections. 

FIG. 2. Postoperative lateral (A) and anteroposterior (B) radiographs demonstrating T6–L1 instrumentation with T9 and T10 corpectomy and good alignment. Of note, the pedicle screws used from T7 to T12 and the corpectomy cage are carbon fiber and therefore lucent on radiographs. This was done to facilitate future MR images.

FIG. 3. Advanced imaging performed nearly a year after surgery demonstrated a significant fluid collection dorsal to the site of the previous surgery, as seen on sagittal T1-weighted postcontrast (A) and T2-weighted (B) MRI, as well as axial T1-weighted postcontrast (C) and T2-weighted (D) MRI. There is no significant contrast enhancement within the corpectomy site or the fluid collection. There is a clear communication of the fluid collection with the corpectomy sites, as can be best appreciated in D.

FIG. 4. IR-guided lymphography. The patient underwent catheter placement bilaterally into the groin lymph nodes, followed by injection of a total of 10 mL ethiodized oil, then radiography over the next 3 hours, without evidence of a chyle leak. Final radiographs taken along the superior (A), middle (B), and inferior (C) aspects of the field of view. No evidence of contrast pooling can be seen near the construct or corpectomy site (B). There is evidence of contrast draining from the thoracic duct into the subclavian vein (red arrow) as well as abundant contrast within the thoracic duct itself (white arrow).
the formation of chylothorax. Although delayed presentations have been reported in the literature, the majority of patients present within 10–15 days of the injury.10

When there is suspicion for a chyle leak, imaging should be performed to localize the fluid collection followed by fluid analysis.1 Chyle typically appears milky white, but a nonmilky appearance is not uncommon.14 In addition to standard analysis, the fluid should also be tested for triglyceride level, cholesterol level, and pH, with typical triglyceride values for chyle being above 200 mg/dL.15 In cases of chylothorax, a triglyceride concentration over 110 mg/dL is generally a reliable diagnostic marker, while values less than 50 mg/dL typically exclude the diagnosis of chylothorax.14 Furthermore, the detection of chylomicrons in lipid electrophoresis serves as the gold standard test to confirm the diagnosis of chylothorax.14

To help localize the etiology of the leak, many imaging modalities are available. Magnetic resonance lymphography with or without intranodal injection of gadolinium or technetium-99m–labeled radiotracer is an effective tool for detecting the site of leakage.16–18 Conventional lymphangiography is considered the gold-standard imaging modality and can allow embolization at the same time if indicated.17,19

Several options exist in the management of chylous fluid leaks, including conservative or invasive treatments. After confirming the diagnosis, asymptomatic patients are closely observed to assess the resolution of their fluid collection. Many of these fluid collections tend to resolve spontaneously over time, though a few may exhibit progression.20 In cases of symptomatic collections, treatment options include aspiration or drainage of the collection, IR-directed embolization, or surgical ligation.1

Lessons
Here, we present a rare case in which a patient was found to have an accumulation of chyle in the surgical bed of his thoracic corpectomy almost a year after the surgery. While this is an uncommon entity, clinical suspicion should be raised due to the atypical presentation and appearance of fluid intraoperatively. Following diagnosis, our patient underwent conservative management, which was sufficient, with no evidence of an active leak on invasive thoracic duct imaging. This case also highlights the importance of considering the lymphatic system in potential complications arising from surgery, malignancy, and radiation, leading to a complex interplay ultimately manifesting in a rare presentation.

References


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Author Contributions
Conception and design: all authors. Acquisition of data: all authors. Analysis and interpretation of data: Treffy, Bakhaidar. Drafting the article: all authors. Critically revising the article: all authors. Reviewed submitted version of manuscript: Treffy, Bakhaidar. Approved the final version of the manuscript on behalf of all authors: Treffy. Administrative/technical/material support: Bakhaidar.

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