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PRESSURIZED CONTRAST INJECTION IN A LYMPHOCELE CAN REVEAL AN EMBOLIZABLE LYMPHOPSEUDOANEURYSM IN POSTSURGICAL CHYLOUS ASCITES

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ABSTRACT

This report describes the technique of lymphopseudoaneurysm (LPA) detection by pressurized contrast injection into a lymphocele, followed by image-guided embolization.

A 37-year-old man with pancreatic neuroendocrine tumor, portal cavernoma, and liver metastasis underwent pancreaticoduodenectomy, right hepatectomy, lymphadenectomy, and left portal vein reconstruction. Postoperative course was complicated by refractory chylous ascites. Computed Tomography (CT) revealed a centrally located lymphocele in the abdominal cavity. Direct puncture of the lymphocele, followed by pressurized contrast injection revealed a tubular connection to a smaller retroperitoneal collection near the surgical site, which was considered to be the culprit LPA. After catheter directed embolization of this LPA with N-butyl-cyanoacrylate glue, chylous ascites ceased and abdominal drainage catheters were removed 12 days later.

Keywords: Lymphopseudoaneurysm, Lymphocele, Chylous ascites, Embolization

INTRODUCTION

Chylous ascites (CA) results from the leakage of lipid-rich chyle into the peritoneal cavity. Surgical procedures near the cisterna chyli or its tributaries can lead to intraperitoneal leakage of large amounts of chyle, resulting in complications such as dehydration, malnutrition, electrolyte imbalance, and immune suppression. Less frequently, CA can induce acute chylous peritonitis, mimicking other causes of acute peritonitis (1,2).

Recent advancements in lymphangiography and lymphatic interventions have enabled minimally invasive, image-guided treatments for various lymphatic leaks. However, in CA radiologic detection and treatment of the site of leakage is particularly difficult since the contrast injected in inguinal lymph nodes cannot reach mesenteric lymphatic trunks upstream from the cisterna chyli (3).

A lymphopseudoaneurysm (LPA) is defined as a small leakage adjacent to the leaking lymph vessel, contained by surrounding tissues before draining in larger cavities such as a lymphocele or the peritoneal cavity. Direct image-guided glue embolization of an LPA is a minimally-invasive and effective treatment for CA. However, many patients with CA cannot benefit from this treatment as an LPA is not always detectable on conventional imaging.

In this case we present pressurized contrast injection in a lymphocele as a novel imaging tool to detect an embolizable LPA in

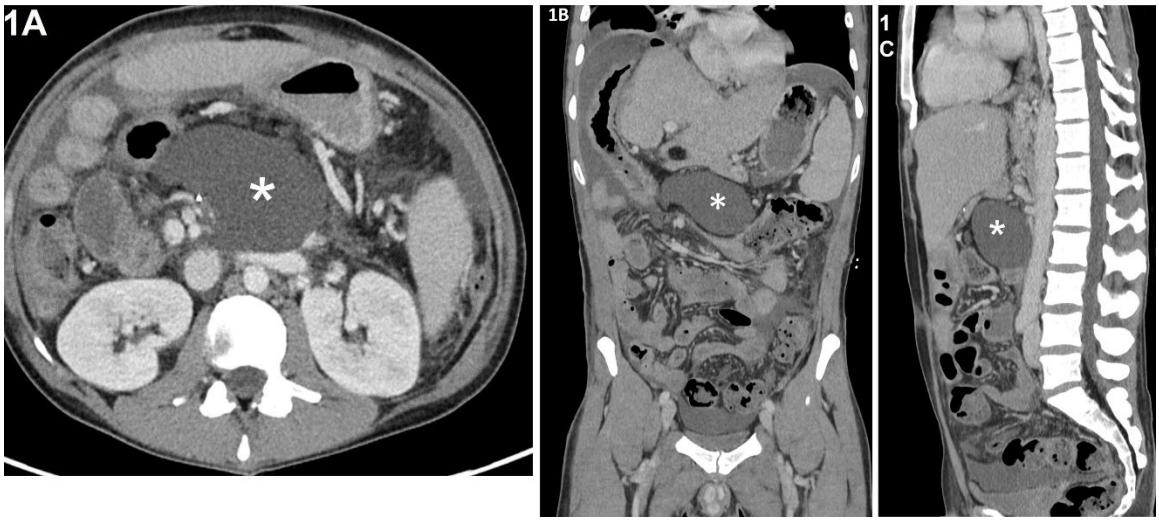

Fig. 1. *Computed tomography image showing the large central abdominal lymphocele (asterisk) in axial plane (A), coronal plane (B) and sagittal plane (C).*

postsurgical CA.

LYMPHOPSEUDOANEURYSM DETECTION

A 37-year-old man with a history of neuroendocrine tumor in the head of the pancreas, complicated by portal vein tumor thrombus and with a large solitary metastasis in the right liver lobe, underwent a pancreaticoduodenectomy with local lymphadenectomy, portal vein resection, right hepatectomy, and left portal vein reconstruction. Postoperatively, the patient presented with chylous ascites, which initially improved with a diet rich in medium-chain triglycerides. The last peritoneal drain was removed on postoperative day (POD) 21. No other conservative (i.e. TPN or somatostatin) were attempted.

However, a CT-scan on POD 25 revealed a large encapsulated central abdominal collection and diffuse intraperitoneal fluid, suggesting recurring CA, confirmed after paracentesis (*Fig. 1*).

On POD 36, an intranodal lymphangiography with Lipiodol (Guerbet, Villepinte, France) was performed, showing a normal lymphatic anatomy from the groins to the lymphovenous junction without lymphatic leak (Fig. 2).

The decision was made to puncture the retroperitoneal collection under CT-guidance using a trans-omental approach, performed on POD 40, revealing chylous ascites. Based on this finding, an attempt for sclerotherapy of the lymphocele in an analogous way as lymphatic malformations was performed. A total of 900 mg of doxycycline mixed with iodinated contrast was injected under pressure. The total injected volume exceeded the total volume of evacuated chyle. Although, this procedure had no effect on chylous drain output, the injection under pression revealed a tubular connection from the lymphocele to a smaller collection located just anterior to the inferior vena cava, near the surgical site. This smaller collection, considered to be the LPA, was not clearly visible on the prior CT-scan (*Fig. 3*).

LYMPHOPSEUDOANEURYSM EMBOLIZATION

Embolization of the LPA was performed under general anesthesia in an angiography suite on POD 48 (*Fig. 4*). Using cone beam CT guidance, the lymphocele was punctured with

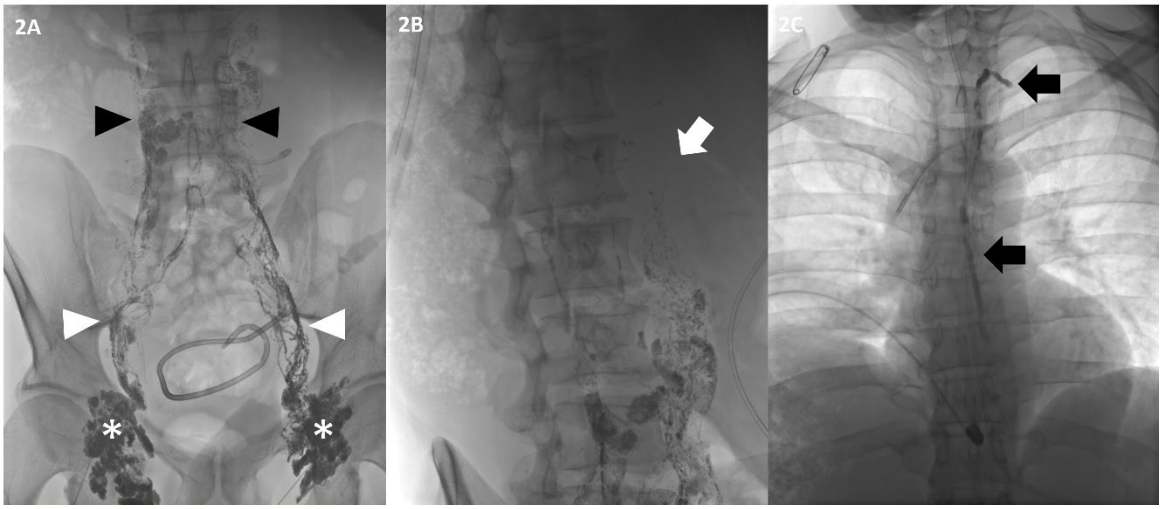

Fig. 2. *Intranodal lymphangiography performed on postoperative day 36. (A) Bilateral inguinal nodal injection site (asterisk) with iliac (white arrowhead) and lower lumbar lymphatic vessels (black arrowhead). (B) Sagittal view of the lumbar lymphatic drainage without any contrast leakage anteriorly into the peritoneal cavity at the level of the postoperative clips (white arrow). (C) Thoracic duct and lymphovenous junction (black arrow).*

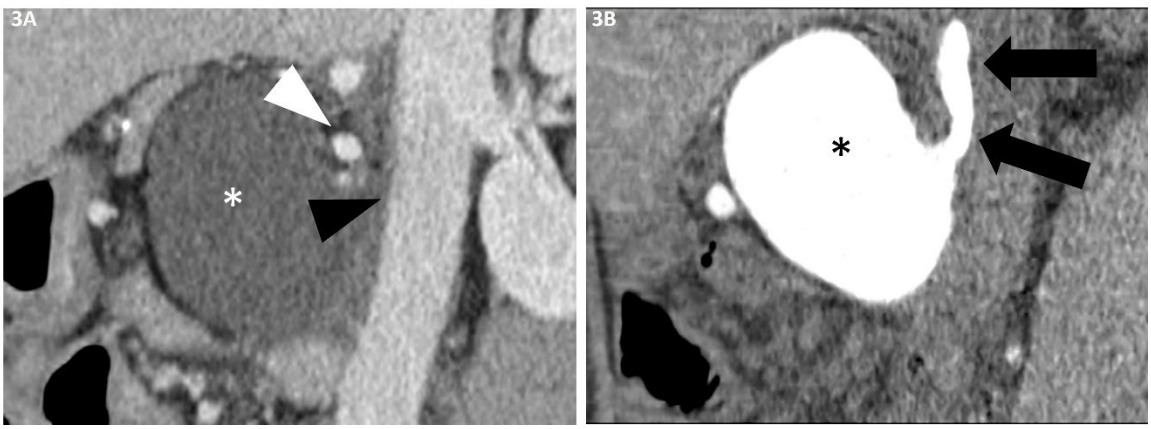

Fig. 3. *(A) CT scan performed on postoperative day 40 before pressurized contrast injection in the lymphocele (*). The tubular connection located between the superior mesenteric artery (white arrowhead) and inferior vena cava (black arrowhead), was barely filled with fluid and remained unnoticed. The lymphocele is shown in the sagittal plane on CT scan. (B) After pressurized contrast injection through a trans-omentally placed catheter (not shown), a lymphopseudoaneurysm (black arrows) draining into the lymphocele (*) close to the location of the surgery becomes visible.*

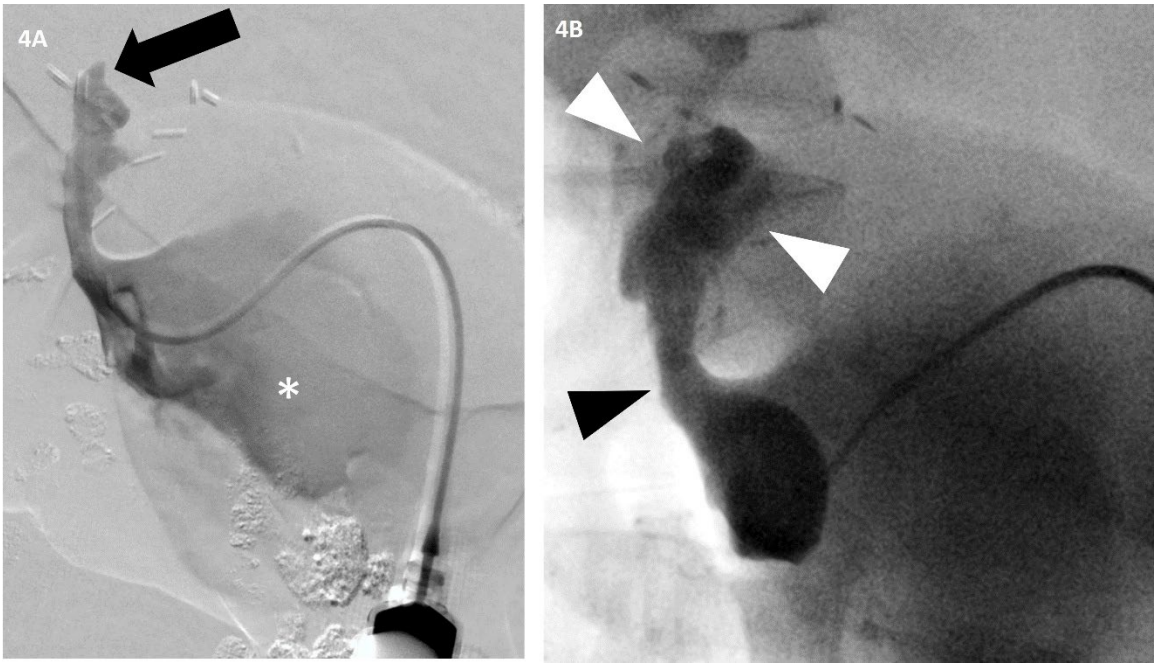

Fig. 4. *(A) Digital subtraction radiography showing a catheter placed in the lymphocele (black arrow) through the lymphopseudoaneurysm (asterisk). (B) Fluoroscopic image showing the presence of NBCA-glue mixture with Lipiodol in the LPA (white arrowheads) and in its connection with the lymphocele (black arrowheads).*

a 21 G needle using a transhepatic approach. Subsequently, a 6 Fr sheath (MAK-NV, Merit Medical, South Jordan, Utah) was placed. After contrast injection, an LPA was identified, catheterized using a 4 Fr Cobra catheter (Cordis, Santa Clara, California) and filled with a mixture of n-butyl-2-cyanoacrylate (Histoacryl, Braun, Barcelona, Spain) and Lipiodol. Following the procedure, drainage output decreased and the peritoneal drainage catheter was removed on POD 61 (13 days post-embolization). Follow-up CT-scan 30 days post-embolization (Fig. 5A) and approximately 1 year post-embolization (Fig. 5B) confirmed a glue filled LPA with a partially and complete involution of the lymphocele and CA.

DISCUSSION

Postsurgical CA can lead to severe complications including dehydration, malnutrition, electrolyte imbalance, and immune suppression. It occurs in up to 2.6% of patients following pancreatic resection, and typically manifests after dietary resumption (4-6).

Initial treatment is conservative, includes nutrition substitution such as a low-fat diet of medium-chain triglyceride, somatostatin analogues, or total parental nutrition. However, in cases of CA refractory to conservative treatment, identifying and treating the source of the chyle leak is necessary to avoid high morbidity and mortality. This is particularly challenging in postsurgical CA, as the detection rate of chyle leaks using intranodal lymphangiography is lower compared to chylothorax (7). This is because contrast injected into groin lymph nodes follows the retroperitoneal lumbar lymphatic trunks to the cisterna chyli and thoracic duct, whereas bowel-derived chyle moves through mesenteric trunks, often placing the leak upstream of the contrast pathway.

Several other strategies have been pro-

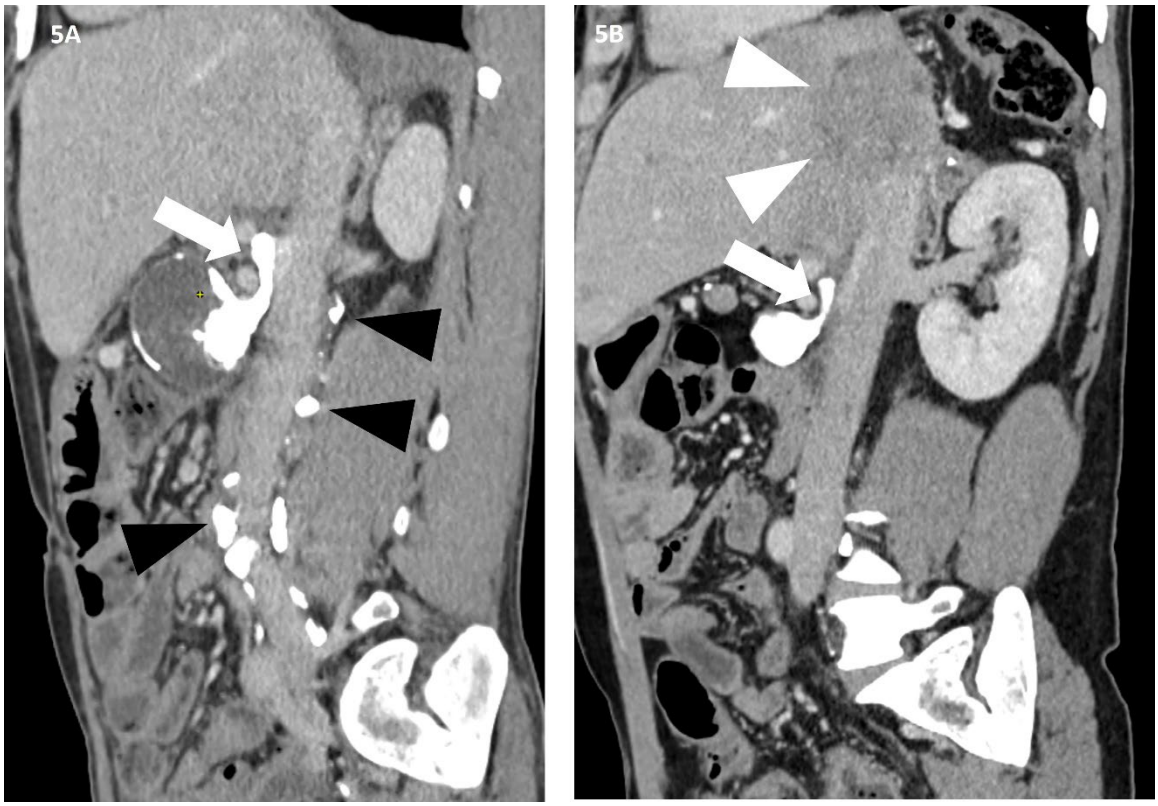

Fig. 5. *Follow-up CT scan after 1 month (A) and 1 year (B) showing absence of ascites and remnants of glue (white arrows) as well as partial (A) and complete (B) resolution of the lymphocele. Note the retroperitoneal lymph nodes filled with Lipiodol after lymphangiography (black arrowheads, A) and the hepatic tumor recurrence after 1 year (white arrowheads, B).*

posed for detecting and treating abdominal chyle leaks outside of the lumbar contrast pathway. One technique involves the catheterization of the thoracic duct through the lymphovenous junction, followed by balloon-occluded retrograde abdominal lymphangiography (BORAL) and subsequent embolization (BORALE). While this technique has shown to be successful in a few cases, it is technically a very challenging procedure (8). Other diagnostic procedures include mesenteric lymphangiography by intraoperative or percutaneous puncture of a mesenteric lymph node. However, this technique is more invasive and the exact location of the leak within the contrast pathway may remain unclear (9).

The concept of an LPA has been described in several case series (3). In case of CA after retroperitoneal surgery, a potential space may form near the leaking lymphatic vessel, partially enclosed by retroperitoneal tissues and filling with chyle. This space, referred to as the LPA, can either drain directly into the peritoneal cavity or first accumulate within a larger collection known as a lymphocele. When the LPA drains slowly, it becomes filled with chyle, making it visible on conventional cross-sectional imaging. Eventually, it can be accessed via percutaneous puncture or catheterized and treated with glue embolization.

However, when the LPA empties rapidly, it may remain undetectable on imaging. By performing pressurized contrast injection into a lymphocele, contrast can be pushed against

chylous flow, thus identifying a previously occult LPA. Once identified, the LPA can be catheterized and embolized with glue, which can offer a definitive treatment for postsurgical CA as demonstrated in this case.

This technique enhances LPA detection in postoperative CA with a lymphocele, otherwise more technically challenging in endolymphatic procedures such as BORALE and mesenteric intranodal lymphangiography.

If no lymphocele is detected in patients with CA after retroperitoneal surgery, it is plausible that the LPA drains directly into the peritoneal cavity, making this technique impractical. CT-peritoneography, a diagnostic technique primarily used in the evaluation of peritoneal dialysis complications, may help in identifying abnormal connections between the peritoneal cavity and the surgery site, potentially exposing a treatable LPA (10). To our knowledge this technique has never been described before in this patient population.

Further research is needed to clarify the role of pressurized contrast injection into a lymphocele (or in the peritoneal cavity) followed by LPA embolization in the treatment of CA after retroperitoneal surgery.

CONCLUSION

Pressurized contrast injection into a lymphocele can potentially reveal a previously undetected LPA in postsurgical patients with CA. This approach expands the potential for minimally invasive LPA embolization as a definitive treatment for a wider patient population.

CONFLICT OF INTEREST AND DISCLOSURE

The authors declare no competing financial interests exist.

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