



Vascular and International Radiology Case Report

Percutaneous Lymphatic Maceration and Glue Embolization for High-output Chylous Ascites after Robot-assisted Laparoscopic Nephrectomy and Lymphadenectomy

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ABSTRACT

To propose minimally invasive percutaneous techniques in the management of high output chylous ascites, a known potential complication of retroperitoneal surgery associated with significant morbidity and mortality. Management has traditionally been based on successful treatment reported in the literature. However, refractory or high-output leaks often prove difficult to treat and there is little evidence on superior management. We report percutaneous maceration and embolization for the management of high-volume abdominal chyle leak after robot-assisted laparoscopic (RAL) radical nephrectomy and lymph node dissection for renal cell carcinoma. A 68-year-old male with incidentally found renal cell carcinoma underwent RAL radical nephrectomy with paraaortic lymph node dissection. He initially improved after surgery but developed significant abdominal pain and distension approximately 7 weeks postoperative. This proved to be chyloperitoneum. Conservative management was initiated, but after continued high-output (>1 L) fluid drainage, we pursued adjunct intervention involving Interventional Radiological percutaneous procedures. This included lymphatic maceration and glue embolization of leaking lymphatics. The patient tolerated the percutaneous procedures well with significant improvement in drain output ultimately leading to complete resolution of ascites without further complication. Similar interventions have previously been reported in the literature for cases of chylothorax with success. However, there is a lack of reports on utilizing this minimally invasive procedure for chyloperitoneum after retroperitoneal urologic surgery. We report our successful experience with percutaneous lymphatic maceration and embolization for high output chylous ascites after RAL radical nephrectomy with lymphadenectomy. We believe that early initiation utilizing these percutaneous techniques can achieve timely resolution and should be considered in the management of these patients.

Keywords: Chyle leak, Chylous ascites, Postoperative complications, Lymphangiography, Radical nephrectomy

INTRODUCTION

Refractory chylous ascites is a rare, but potentially life-threatening complication following retroperitoneal surgery, including urologic surgery. There is little data in the literature to suggest superior management when it comes to high output refractory chylous ascites. To the best of our

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knowledge, this is the first report of postoperative refractory chylous ascites following robot-assisted laparoscopic (RAL) radical nephrectomy and lymphadenectomy for renal malignancy managed by lymphangiography followed by lymphatic maceration and embolization. We describe our successful experience with minimally invasive percutaneous techniques that we believe can be used to achieve timely resolution of lymphatic leakage, when traditional conservative measures may not be sufficient.

A 68-year-old male was being evaluated for a lower extremity fracture after falling from a ladder. Workup incidentally found an 11.2 cm enhancing left renal mass with enlarged paraaortic lymph nodes measuring 2.2 cm on computed tomography (CT) of the abdomen and pelvis. He underwent left RAL radical nephrectomy with paraaortic lymph node dissection. Pathology was notable for grade 4 clear cell carcinoma with perirenal fat involvement and lymphovascular invasion with negative resection margins. 19/19 paraaortic lymph nodes were negative for metastatic carcinoma (pT3aN0).

The patient progressed well after surgery and was discharged home on postoperative day 2 in stable condition. He was doing well at his 2-week postoperative visit with no concerns.

Approximately 7 weeks after initial surgery, the patient presented to the Emergency Department with a 2-week history of abdominal pain with associated constipation and early satiety. Physical examination revealed significantly distended and rigid abdomen with minimal tenderness.

CT scan showed large volume abdominopelvic ascites believed to be chylous in origin [Figure 1]. Abdominal paracentesis produced milky-white thin ascitic fluid found to have elevated triglyceride level (2,898 mg/dL).

The patient was admitted to the Urology service and underwent Interventional Radiology (IR) drain placement with subsequent drainage of 5 L. Octreotide and low-fat diet were initiated.

Over the next few days, daily drain output continued to exceed 1 L so a right-sided peripherally inserted central catheter was placed for total parenteral nutrition (TPN) and clear liquid diet was ordered. After IR consult, consent was obtained for the percutaneous procedure. Bilateral inguinal lymph nodes were identified and accessed with 21-gauge needles using ultrasound guidance [Figure 2] (Philips, EPIQ 7, Netherlands). After confirming appropriate needle positioning, Lipiodol (Guerbet LLC, France) was injected slowly at a rate of 1 mL/5 min for a total volume of 20 mL (10 mLs per inguinal lymph node). Opacification of the lymphatic channels in the retroperitoneum [Figure 3a] was confirmed with serial spot radiographic images.

Active extravasation from a small lymphatic channel overlying the left psoas muscle was identified after

approximately 1 h of the injection [Figure 3b]. This was confirmed by cone-beam CT [Figure 4] (Siemens Artis Zee, Erlangen, Germany).

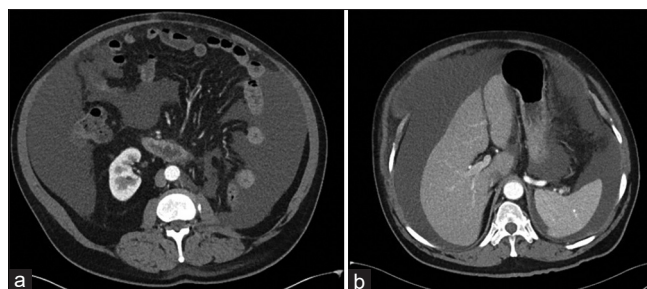


Figure 1: (a and b) A 68-year-old male with abdominal pain and distension after radical nephrectomy diagnosed with chylous ascites. Two Axial CT images revealing large volume abdominal chylous ascites.

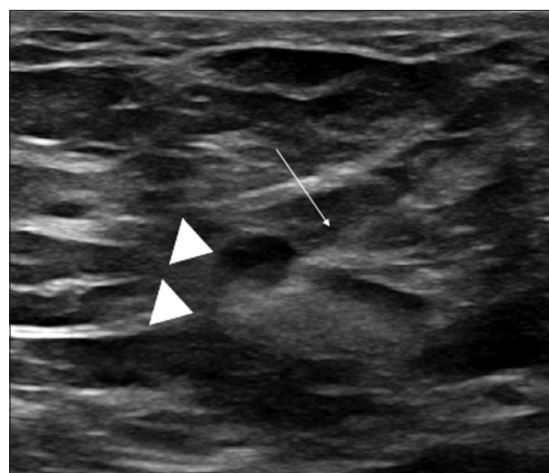


Figure 2: Ultrasound image of the right groin showing a normal lymph node (white arrowheads) being accessed using a 21-gauge needle (white arrow) for the purposes of the lymphangiogram.

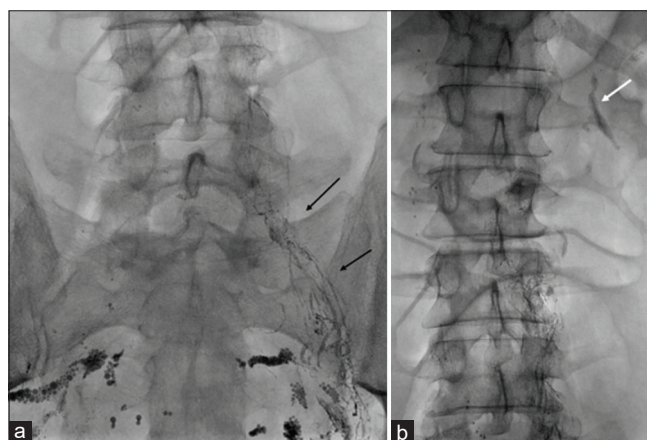


Figure 3: (a) Single spot image of the pelvis following Lipiodol injection into the groin lymph node showing pelvic lymphatics (black arrows). (b) Spot image of the abdomen showing a linear radio-opacity in the left upper quadrant corresponding to the area of lymph node dissection with chylous leak (white arrow).

The lymph channels below the leak were then macerated with a 21 g needle under fluoroscopic guidance to reduce the amount of flow into the area of the leak. The patient was placed on low-fat diet and observed for 7 days. Following this, the patient's diet was advanced to include fatty food. At this point there was increased output from the abdominal drain, hence a decision was made to glue embolize the localized leak in the left lumbar region. The patient was placed prone on the CT table and a preliminary CT was performed. The leak was identified by the persistent lipiodol accumulation from the prior injection. This area was targeted with a 21 g needle. Once CT confirmed appropriate needle location, 4 cc of 1:1 mixture of n-butyl cyanoacrylate (Cordis Neurovascular, Inc., Miami Lakes, FL) and Lipiodol was injected into the focal leak [Figure 5].

Post-procedure CT imaging confirmed the localization of the embolic agent within the leak. Follow-up CT 1 month later showed complete resolution of ascites and persistent glue cast in the localized leak in the retroperitoneum [Figure 6].

The next day, drain output was recorded at 245 mLs with a fluid triglyceride level of 75 mg/dL.

The following 2 days, the patient continued to progress appropriately with <100 mL of drain output recorded. He was ultimately discharged on hospital day 18 in stable condition with his drain in place. TPN, a low-fat diet, and Octreotide were to be continued at home.

At outpatient follow-up 10 days after discharge, patient reported daily drain output <100 mLs while continuing on TPN and low-fat diet. Patient was advised to discontinue TPN and continue on the low-fat diet and Octreotide. His drain and PICC line were left in place.

He was seen again in clinic 1 week later. Drain output continued to be low so the drain and PICC line were removed. He was advised to continue on Octreotide for another week and to continue on low-fat diet for 3 weeks before slowly transitioning to a regular diet.

Patient was seen back in clinic 2 months later with a CT scan, which showed resolution of prior fluid collection.

DISCUSSION

Accumulation of chylous fluid in the peritoneum is an uncommon postoperative complication. Inadvertent disruption of lymphatic channels/ducts or inadequate lymphostasis intraoperatively can result in persistent leakage of chyle into the abdominal cavity. Chyloperitoneum has been reported in various abdominal and retroperitoneal surgeries and there is variable data on the incidence of chylous ascites after urologic surgery with reported incidences ranging from <1% to almost 6%.^[1] Some studies go on to suggest that this incidence is higher in laparoscopic cases.^[2] This is thought

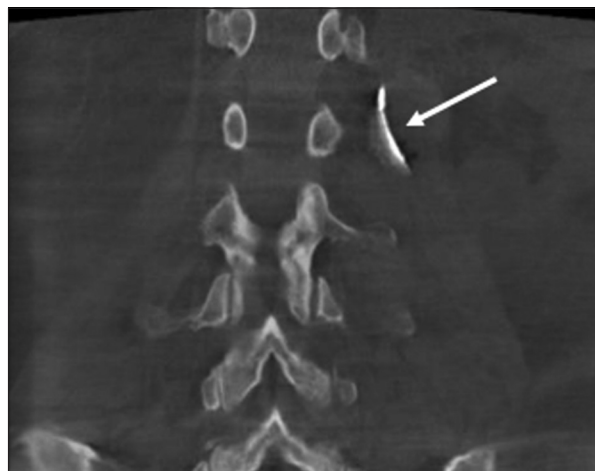


Figure 4: Coronal reconstruction Cone-beam CT obtained during the lymphangiogram confirming the leak (white arrow) in the left paravertebral region.



Figure 5: CT guidance for glue injection (white arrow) into the focal area of chyle leak identified by the lymphangiogram.



Figure 6: Axial contrast-enhanced CT of the abdomen following glue embolization shows retention of glue (white arrow) in the area of the focal chyle leak. Note the complete resolution of ascites.

to be due to the difficulties inadequate tying of tissues, in which monopolar or bipolar cautery are commonly used to achieve immediate stasis of lymph but can ultimately necrose and result in persistent chyle leak.^[2,3] Therefore, intraoperative management may affect the later development of chyloperitoneum. On the other hand, thorough clipping of tissue around vessels was associated with a decreased incidence of chylous ascites after laparoscopic nephrectomy in one study.^[2]

Guidelines regarding the management of chyloperitoneum have been largely based on the experiences reported in the literature, in which the current consensus favors conservative measures for initial management. Typically, this involves a high protein, low fat, medium chain triglyceride diet with or without TPN, and somatostatin analog Octreotide.^[4] Several reports of chyle leak after nephrectomy reported complete resolution with one or some combination of these interventions.^[5,6] Paracentesis is also commonly utilized in treatment for both diagnostic and therapeutic purposes.^[4] However, repeat paracentesis is associated with its own risks that can further complicate one's clinical course, including malnutrition and infection.^[7]

Intensive management requiring surgical intervention is typically reserved for severe or refractory cases with some studies suggesting 6–8 weeks of conservative management before invasive surgical intervention.^[2]

One recent study suggests taking patients for surgery if drain output is 1000 mLs or more over 48 h.^[1] While our patient met these criteria of high output drainage over several days, we opted for a less invasive approach, utilizing IR procedures to address the leak. There is a paucity of literature discussing this approach as an early intervention in the setting of chyloperitoneum after nephrectomy. However, embolization of the thoracic duct for chylous effusion has been extensively described and report high success rates with low morbidity.^[8,9] Chylous ascites on the other hand is a difficult problem as there is typically no dominant lymph ducts that can be targeted to control the leak. There are few case reports of embolization of smaller lymphatic channels within the abdomen using percutaneous fenestration technique. To the best of our knowledge, glue injection into a chyle leak following nephrectomy with lymphadenectomy for renal malignancy has not been previously described. One report by Itou *et al.*, describes a comparable technique involving glue embolization from outside the lymph vessel for treatment of lymphocele-like extravasation in which intravessel administration of glue was not possible.^[10] In addition, they pursued this intervention only after more than 2 weeks of failed conservative management.^[10] We utilized percutaneous lymphatic intervention within the 1st week of treatment in the setting of high output chyle leak.

CONCLUSION

Chylous ascites, although rare, is a known complication of urologic surgery including nephrectomy. As more nephrectomy cases are being performed with a robotic technique, surgeons need to be prepared to promptly recognize and treat abdominal chyle leak. With our experience of chylous ascites after RAL radical nephrectomy and lymphadenectomy for renal malignancy, we propose that percutaneous embolization and needle interruption/maceration could be an alternative for repeat surgery in the case of high-output or refractory chyle leak after nephrectomy. This can likely provide potential long-term solutions with low risk of complications for such cases of chylous ascites.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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