Lymphangiography with sclerotherapy: a novel therapy for refractory chylous ascites

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Introduction: *We report the outcomes of a small series of patients with refractory chylous ascites following urologic surgery treated with lymphangiography +/- sclerotherapy.*

Materials and methods: *Retrospective review revealed three patients who underwent lymphangiography for prolonged lymphatic leak following urological surgery. Contrast material is injected slowly into a lymphatic vessel on the dorsum of the foot and serial imaging is used to capture the location and degree of lymphatic leak in order to guide definitive treatment. Demographic and clinical details were collected and are reported.*

Results: *Three patients were identified from 2005-2008 (one following donor nephrectomy and two following retroperitoneal lymph node dissection). All patients presented with abdominal distension within 30 days of surgery. Traditional conservative measures failed in all patients. Lymphangiography localized all leaks (renal hilum, paraspinal, and retrocaval). One patient elected for successful surgical repair after localization. The remaining two patients resolved immediately following lymphangiography; one of these patients underwent percutaneous doxycycline sclerosis. With over 1 year of follow up there have been no recurrences or long term sequelae.*

Conclusions: *Lymphangiography is a valuable management option for the rare patient with chylous ascites refractory to conservative therapy. Prompt resolution of prolonged chylous ascites following lymphangiography should encourage its use in such difficult cases.*

Key Words: sclerotherapy, lymphangiography, chylous ascites

Introduction

Postoperative chylous ascites due to disruption of retroperitoneal lymphatic channels is a rare complication of urologic surgery with an incidence of less than 5% for radical nephrectomy, donor nephrectomy, and retroperitoneal lymph node dissection (RPLND).[1-3] Typically, greater than 75% of affected patients will respond to conservative measures consisting of dietary modification or bowel rest with parenteral nutrition.[4] Those refractory to conservative management can become nutritionally and immunologically debilitated due to constant loss of protein, fat, and lymphocytes. Lymphangiography (LAG) and lymphoscintigraphy have been used to localize chylous fistulae prior to definitive surgical intervention.[5-7] However, there are few reports describing definitive therapy with LAG with or without sclerosis of the damaged lymphatic channels.[8] We report the outcomes of a small series of patients treated with LAG and sclerotherapy following urological surgery.

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Materials and methods

The IRB approved Johns Hopkins Minimally Invasive Urological Surgery database was retrospectively reviewed to identify patients undergoing LAG for prolonged chyloperitoneum after retroperitoneal surgery. All patients received standard monopedal or bipedal LAG performed by a single, highly experienced interventional radiologist. LAG technique has been previously described and is as follows:[9] a 30/70 mixture of methylene blue and epinephrine is injected intradermally into the first three web spaces of both feet. A dorsal pedal lymphatic vessel is then identified, isolated, and cannulated with a 30 gauge lympangiography needle. Slow injection of contrast material (lipiodol or ethiodol) followed by serial radiographs is used to localize the lymphatic leak. Administration of heavy cream through a nasoduodenal tube is used to increase lymphatic flow if difficulty is encountered finding a leak. CT images are obtained after LAG to further localize the injured lymphatic vessel. Fluoroscopic images taken during the LAG are used to guide percutaneous access to the lymphatic fistula, cysterna chyli, or thoracic duct for the occlusion of the lymphatic leak.[9] Occlusion of the leak may be accomplished by coil embolization[10] or with percutaneous administration of sclerotherapy (doxycycline) at the site of leak. Alternatively, ethiodol administered during the lymphangiogram may sclerose the leak closed.

Results

Between 2005 and 2008, three patients were identified who underwent LAG with or without sclerotherapy for chylous ascites following urologic surgery.

Patient 1 is a 31-year-old woman who presented with abdominal distention 25 days after uncomplicated laparoscopic donor nephrectomy. Admission images demonstrated massive ascites, and paracentesis confirmed the diagnosis of chylous ascites. Conservative management including percutaneous drain placement, bowel rest, total parenteral nutrition (TPN), and somatostatin analogues failed to resolve the lymphatic leak. LAG and CT scan performed 31 days postoperatively identified a lymphatic leak near the left renal hilum next to a surgical clip, Figure 1. The patient subsequently underwent exploratory laparotomy and suture ligation of peri-aortic lymphatic tissue centered at the left renal hilum. Of note, this operative procedure was complicated by adhesions extending from the area of previous left donor nephrectomy into the pelvis which were divided sharply without adverse sequella. The leak resolved, and with over a year of follow up there has been no recurrence of her lymphatic leak.

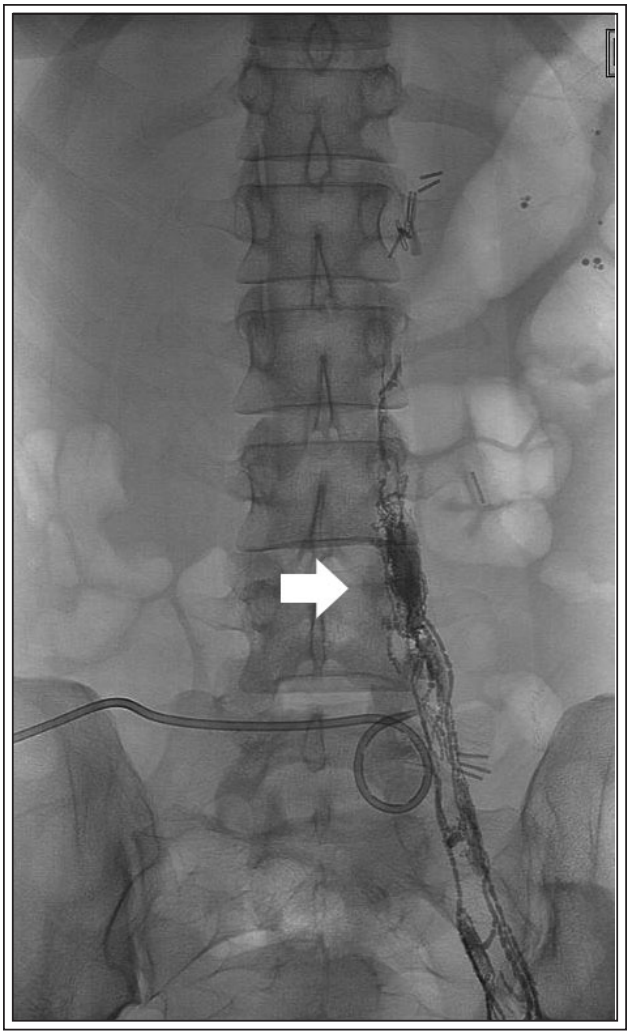

Figure 1. Lymphangiogram obtained 31 days post laparoscopic donor nephrectomy complicated by chylous ascites. Localization of the leak at the left renal hilum led to successful operative ligation of draining lymphatic vessels.

Patient 2 is a 31-year-old man who underwent primary RPLND for a mixed germ cell testicular tumor with lymphatic invasion. On POD 18 the patient presented to the emergency department with abdominal distention. CT scan demonstrated massive ascites consistent with lymphatic fluid. The patient failed conservative management with drain placement, dietary modification followed by bowel rest, somatostatin analogues, and diuretics. The leak persisted and on POD 61 the patient underwent laparoscopic exploration, but a definitive leak could not be identified. As a result, on POD 86 the patient underwent LAG which demonstrated a left, lumbar paraspinal lymphocele. The lymphocele was then accessed percutaneously and successfully sclerosed

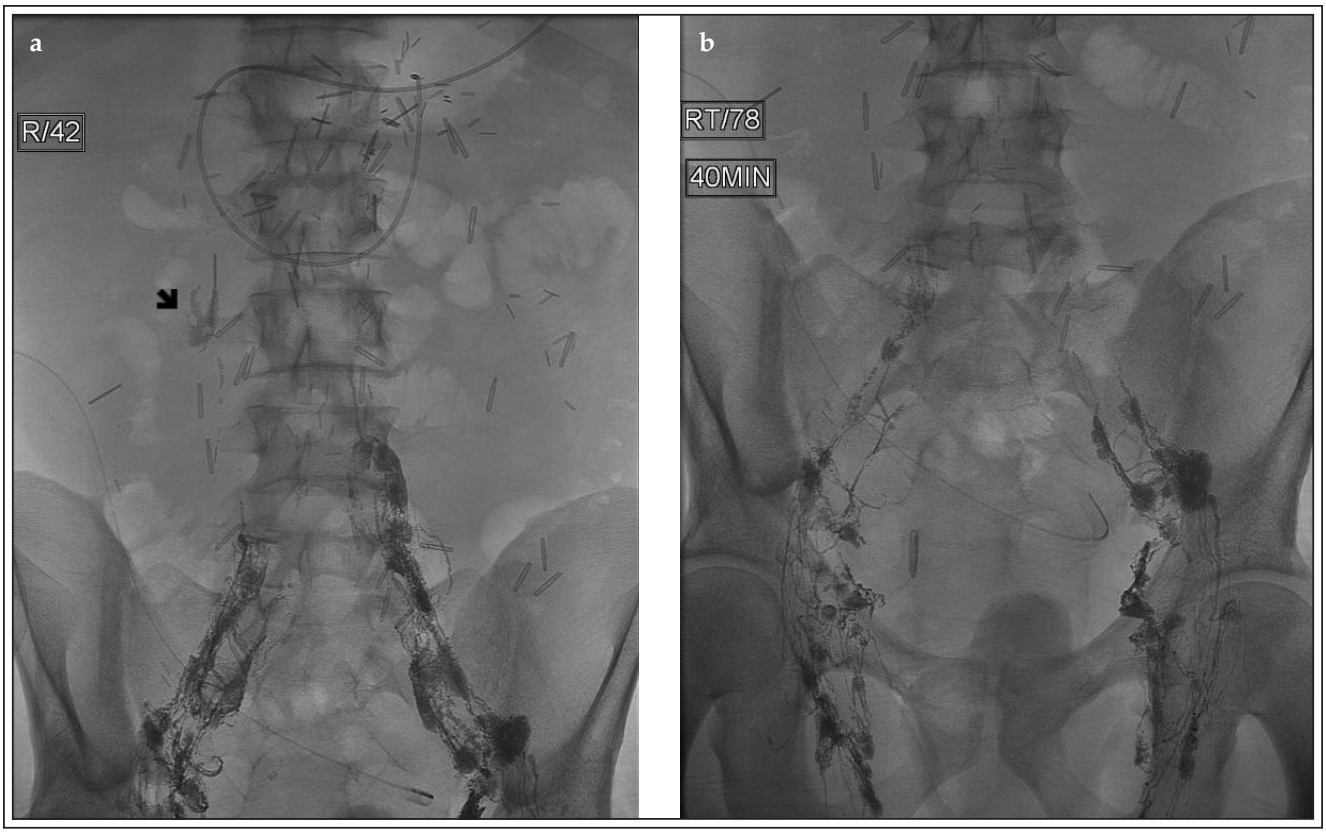

Figure 2. a) LAG demonstrating a normal, intact pelvic lymphatic system. **b)** LAG demonstrating lymphatic leak at the level of the second and third lumbar vertebrae (arrow). The exact location of the leak was further localized to the right and posterior to the inferior vena cava with computed tomography.

with doxycycline. There has been no recurrence of his chylous ascites with over 24 months of follow up.

Patient 3 is a 23-year-old man with a history of testicular cancer who underwent open, post-chemotherapy RPLND for a nonseminomatous germ cell tumor at an outside facility. He subsequently developed chylous ascites which was managed conservatively for 6 months at several large medical centers. Conservative management included dietary modification followed by bowel rest, TPN, somatostatin analogues, diuretics, serial paracentesis, and drain placement. The patient who was nutritionally compromised at this point was admitted to our center where he underwent LAG (utilizing heavy cream via nasoduodenal tube) which demonstrated a lymphatic leak at the level of the L2/L3 vertebral body, to the right and posterior to the inferior vena cava, Figure 2. Given the location of the leak and the lack of a safe percutaneous path, percutaneous access to the lymphatic leak for sclerotherapy was not possible. However, after the LAG the patient's chylous ascites fortunately resolved. There has been no recurrence of his chylous ascites at 30 months.

Discussion

Chylous ascites refractory to conservative management presents a diagnostic and therapeutic dilemma. Various management techniques have been described including laparoscopic surgical repair, percutaneous embolization, and peritoneovenous shunts.[3,8,11-13] The present case series describes successful localization of lymphatic leaks with LAG facilitating percutaneous sclerotherapy or surgical intervention. In one patient LAG proved to be both diagnostic and therapeutic. This is one of the first reports describing a combined LAG - percutaneous sclerotherapy approach to chylous ascites after retroperitoneal urologic surgery.

Lymphatic drainage of the lower extremities, perineum, and external genitalia progresses through the retroperitoneum via the vertical lumbar lymphatic chains. These lymphatic vessels coalesce to form the cisterna chyli which is classically located in the thorax to the right of the aorta in a retrocrural position. The formation of the cisterna chyli marks the beginning of the thoracic duct which will drain lymphatic fluid

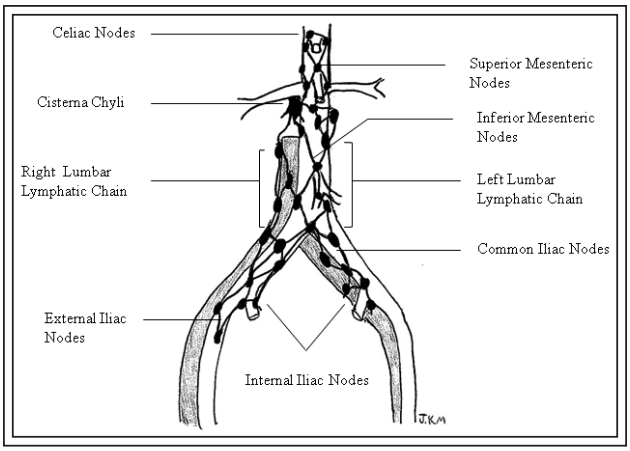

Figure 3. The lymphatic drainage from the lower extremities, external genitalia, and pelvic viscera drain through the retroperitoneum via vertical lumbar lymphatic chains which coalesce to form the cisterna chyli.

from the entire body except the upper right hemi-trunk into the left subclavian vein, Figure 3.[14] Flow through these lymphatics is highly regulated by dietary fat consumption. In fact, a fatty meal increases lymph flow from approximately 1 mL/min to 200 mL/min.[12] Surgical disruption of these channels can have significant mechanical, nutritional, and immunologic consequences with mortality rates ranging from 0%-11%.[12,15]

Postoperative chylous ascites has been described after a variety of vascular, orthopaedic, gastrointestinal, and urologic surgeries. Emergent repair of abdominal aortic aneurysms is considered the most common surgical cause of chylous ascites.[16] Urologic procedures including RPLND, radical nephrectomy, and donor nephrectomy have been implicated in the development of post-operative chyloperitoneum. Large RPLND series from Indiana University and MD Anderson have reported incidences of 1.2% and 7%, respectively.[2,4] Prior chemotherapy has been identified as a risk factor for lymphatic leak following RPLND.[4] The incidence of chylous ascites following radical nephrectomy and donor nephrectomy has been reported as 5.1% and 0.28%, respectively.[1,3] In radical nephrectomy series, lymph node dissection and ureterectomy increases the incidence of chylous ascites.[1]

Diagnosis of chylous ascites in the postoperative patient is characterized by abdominal distention, a large amount of ascites, and high triglyceride and protein content on paracentesis. Initial treatment typically consists of dietary modifications including a medium chain triglyceride, high protein, low fat diet.[17] Further conservative measures include bowel rest with TPN for up to 6 weeks.[12,18] Finally, diuretics and somatostatin analogues have been used with varying degrees of success.[19,20] A combination of the above therapies results in complete resolution in approximately 77% of patients.[4] Considerable uncertainty exists regarding the management of patients with chylous ascites refractory to conservative therapy. Previous series have described resolution with surgical intervention, percutaneous embolization, peritoneovenous shunts, and LAG.[3,8,11,12,21]

LAG has both a diagnostic and therapeutic role in patients with refractory chylous ascites. LAG has been used to localize lymphatic leaks prior to surgical intervention (as in patient 1). Sach et al reported a series of 12 patients in which preoperative LAG facilitated definitive surgical management of chylous fistulae.[5] A case report by Kohnoe et al described a similar approach.[6]

LAG has also been used in conjunction with percutaneous embolization of the cisterna chyli and thoracic duct in patients with persistent chylous fistulae. Cope et al presented a novel technique of percutaneous transabdominal catheterization of the cisterna chyli in patients with postoperative chyloperitoneum or chylothorax. This technique identified all lymphatic leaks (4), and was successfully used to embolize a ligated thoracic duct.[13] Mittleider et al described a technique of accessing the thoracic duct directly from the subclavian vein with subsequent embolization of the cisterna chyli. Unfortunately, the described patient had recurrence of the chylous fistula 10 days after the procedure.[8] To our knowledge there have been no reports of LAG guided, percutaneous sclerosis of a chylous fistula. None of our patients required or underwent percutaneous embolization of the thoracic duct or cistern chyli, since their leaks were more inferior.

Finally, LAG has been demonstrated to lead to spontaneous resolution of lymphatic leaks (as in patient 3). Matsumoto et al reported an 89% resolution rate in nine patients with postoperative lymphatic leak after LAG without any further intervention.[21] A case report by Yamagami et al described a similar phenomenon.[22] This is believed to be due to a number of mechanisms including a regional inflammatory reaction, mechanical obstruction, and embolic effect caused by accumulation of contrast media at the point of leakage.[21,22]

The present study has several notable limitations. It is a case series with a small number of patients. While this may not be generalizable to a large number of patients, refractory chylous ascites is a rare phenomenon following urological surgery, and this

series presents a successful management technique for a difficult clinical scenario. While only one of these patients underwent percutaneous sclerosis of the lymphatic leak the technique and applicability is clearly demonstrated for urological surgery. In general, we recommend a trial of conservative management of approximately 30 days prior to proceeding with any invasive diagnostic or therapeutic interventions as the majority of chlyous leaks resolve with conservative management. After that time, we would recommend LAG first to diagnose and localize the prolonged lymphatic leak. Lymphoscintigraphy is a non-invasive option that can also be used for this purpose, but we feel its resolution precludes pinpointing and targeting the leak adequately. (However, the advantage of initial lymphoscintigraphy is that it can give a general region of leak, confirm the leak, and target the time at which the leak appears. This can aid in planning the LAG). An experienced interventional radiologist may then be able to perform percutaneous sclerosis or embolization. Finally, repeat surgery can be an option if these approaches are not successful. While the three patients presented in this series do not follow that algorithm precisely, they represent the accumulated experience of our team over a number of years and a greater experience of LAG with non-urological cases. Despite these limitations, the present report provides useful information for the diagnosis and management of refractory chylous ascites following urologic surgery.

Chylous ascites is a rare complication following urological surgery. Cases refractory to conservative therapy can have severe nutritional and immunologic consequences. LAG can be used to successfully diagnose and treat chylous fistulae. Prompt resolution of chylous ascites after LAG with or without sclerotherapy should encourage its use in such difficult cases. □

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