Chylous ascites : diagnosis, causes and treatment

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Abstract

Chylous ascites is a rare form of ascites and generally associated with a poor outcome since it is often secondary to neoplasms. Its true incidence is not well established in the general medico-surgical population. Any source of lymph vessels obstruction or leakage can potentially cause chylous effusions in the peritoneal or retroperitoneal cavities. Any type of cancer and lymph node involvement may be associated with this uncommon type of ascites. Traumatic, and mainly surgical, vessels leakage is the second most common source of chylous effusions. Other even more rare underlying conditions have been described as leading to chyloperitoneum. Large fluid volume losses together with proteins, and lymphocytes can induce additional morbidity in a previously debilitated population or severely ill patients. This includes organ dysfunction related to volume and electrolytes losses, but mainly secondary infections due to impaired immunity by antibodies and lymphocytes depletion. Even if a vast majority of chylous effusions shall heal spontaneously, early and full treatment has to be initiated in order to reduce morbidity and mortality associated with this condition. Adapted oral diet is to be introduced to reduce lymph flow. Low lipid, high medium-chain triglycerides alimentation is the first measure to implement. Total parenteral nutrition is to be reserved to failures of oral diet. In addition, paracentesis is indicated to improve patient comfort, reduce intra-adbominal pressure and secondary renal dysfunction. Somatostatin analogues have been demonstrated to be effective in reducing lymphorragia and may be proposed prior to consider the surgical approach. Direct lymph vessels ligation can be indicated for large lymph vessels leakage demonstrated by radiologic techniques and when medical treatment has failed. Peritoneo-venous shunt becomes a less common technique in refractory chylous effusion because of its high morbidity. Herein, the other causes of chylous effusions are reviewed as the diagnostic procedures. A treatment algorythm is proposed. (Acta gastroenterol. belg., **2000**, 63, **260-263**).

Key words : lymph, chylous ascites, triglycerides, somatostatin, surgery.

Anatomical and physiological considerations

Lymphatic vessels in the abdominal cavity are located in the omentum, the diaphragm and the small intestine-wall.

The initial lymphatics, adjacent to blood capillaries, are recognised in the serosal-muscular layer of the small intestine and diaphragm. They consist in saccular structures from an interconnecting system of collecting endothelial tubes (1).

The collecting lymphatics possess smooth muscles in the intervalvular regions. Cholinergic and adrenergic nerve fibres terminate in contact with smooth muscle cells.

Abdominal lymphatic vessels converge to form the cisterna chyli lying usually anterior to the first and second lumbar vertebra around the posteromedical aspect of the aorta at the level of the renal arteries.

A true cisterna chyli may be absent but replaced by a retroperitoneal lymphatic plexus that merges into the thoracic duct. In addition, an intricate and extensive lymphatic collateral system exists. Intercommunicating vessels link the diaphragmatic vessels with those on the peritoneal surface.

Lymph collected in small vessels moves down to larger lymphatics and exists to the venous system near the junction of the left internal jugular and subclavian veins.

Lymph propulsion is provided by extrinsic forces acting on the wall of the vessels and rhythmic contractions of muscular lymphatics (2).

Receptors for catecholamines are found on lymphatic smooth muscles, i.e. α and β receptors. The stimulation of α receptors induces muscle contractions. The contractile response is higher with noradrenaline than dopamine (2).

The daily volume of lymph ranges from 1500 to 2400 ml. The type of diet or underlying conditions influence the lymph flow : starvation reduces the flow while long chain triglycerides enhances it (3). In acute necrotising pancreatitis patients in whom thoracic duct drainage was performed, daily lymph volume could reach 3500 ml (4).

Aetiology of chylous ascites

Any lymph vessel obstruction or rupture can potentially cause chylous ascites. Extensive collaterals and numerous intercommunicating vessels limit the occurrence of chylous effusion. The aetiology of chylous ascites can be divided in four categories ; malignancies, trauma, idiopathic and miscellaneous (5). In addition, clinical presentation can be acute or chronic. Table 1 gives the various causes of chylous ascites. Malignancy is the predominant cause of chronic chylous effusions and account for more than half of the cases. In this group, lymphomas represent nearly 80%. All types of cancers are susceptible to cause chyloperitoneum. Abdominal and retroperitoneal surgical procedures represent the second cause and in particular, oesophageal en bloc resection (6) and retroperitoneal lymphadenectomy with an incidence of chylous ascites of up to 20% (7).

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Table 1. — **Aetiology of chylous ascites**

A. Chronic	B. Acute
1. Neoplasms : • Lymphoma • Pancreas, stomach, ovary, testicular, colon... 2. Cirrhosis Hepatic and portal veins thrombosis 3. Tuberculosis Mycobacterium 4. Idiopathic 5. Lymphangioleiomyomatosis 6. Pancreatitis 7. Yellow nail syndrome 8. Heart failure (ischemic or valvular) 9. Chronic ambulatory peritoneal dialysis.	1. Traumatic – surgery • Oesophagectomy • retroperitoneal lymphadenectomy • aortic surgery • liver transplantation • TIPS 2. Acute necrotising pancreatitis

This complication can rarely be observed after aortic surgery, liver transplantation and TIPS placement (8,9).

Miscellaneous medical conditions are associated with chylous ascites such as chronic and acute necrotising pancreatitis (10), tuberculosis and other mycobacterium infections (11), heart failure (12), lymphangioleimyomatosis (13) and the yellow nail syndrome (14).

Cirrhosis is a more common cause of chylous effusion. It can be observed in up to 0,6% of cirrhotic patients with ascites. Furthermore, the presence of chylothorax in cirrhosis with little or no ascites does not rule out its abdominal origin. Multiple communications between the abdominal and pleural cavities, with a lower intrathoracic pressure facilitate lymph flow to the pleural space (15).

Similar mechanisms can be encountered in cases of hepatic or portal veins thrombosis. In liver transplantation, chylous ascites is extremely rare and probably iatrogenic due to dissection around the superior mesenteric vein and aorta with disruption of mesenteric lymphatics (16).

Chronic peritoneal dialysis has been described as a cause of chylous ascites. In the vast majority of the cases, an underlying pathology known to be associated with chylous effusion was present but for some patients the origin was unknown. Lymph vessels microtrauma due to the Tenckhoff catheter is suspected (17).

Diagnosis

The appearance of a grossly milky fluid in the abdominal drains after surgery is highly suggestive of chylous effusion. The diagnosis can be delayed because the abdominal fluid has initially a serosal aspect unless postoperative oral feeding is reintroduced and since daily fluid volume is limited.

In non-surgical patients, progressive non-specific abdominal distension and discomfort can be the presenting symptoms and paracentesis is the ultimate diagnostic test. In addition, the clinical presentation can be misleading as adbomino-pleural communications through the diaphragm can lead predominantly to pleural effusion. This has been frequently observed in portal hypertension. In patients with cirrhosis and ascites, hydrothorax is present in up to 6 percent of the cases (15). A lower pressure gradient in the pleural space facilitates the lymph flow from the abdominal cavity. The abdominal source of a chylothorax can be demonstrated by intraperitoneal injection of a radioisotope such as 99mTc-sulfur colloid (15). The exact site of the lymphatic vessel leaks is often difficult to identify. Lymphography is the proposed technique but is not available in all centres and is technically demanding. Furthermore, poor mixing between chyle and the contrast medium may render complete visualisation of all lymphatic vessels in the abdominal cavity inaccurate. Lymphography should be limited to preoperative identification of fistula when medical treatment has failed. Recently, direct percutaneous transabdominal catheterisation of the cisterna chyli has been proposed to diagnose and treat postoperative chyle leakage (18). Although the experience is still limited, the technique is promising for large vessels leakage around the cisterna chyli or involving the thoracic duct and might avoid risky surgery.

Finally, diagnosis of chylous ascites is based on its chemical content (Table 2). The lipid content of the fluid is greater than serum. Ascites triglycerides is > 110 mg/dl, triglycerides ascites / serum ratio is > 1 and cholesterol ascites / serum ratio < 1 (19). The protein content of the fluid is higher than 50% of the serum value and represents an important source of protein loss. This exsudate profile may not be observed in cirrhotic patients with chyloperitoneum in which chyle is diluted in transudative ascites (15). Chyle cell content is mainly represented by lymphocytes, with a predominance of T-cells (20). A daily lymphocyte loss from chylous effusion can range from 10^9 to 50.10^9.

Table 2. — **Diagnosis of chylous ascitis**

1. *clinical* : grossly milky fluid
2. *chemistry* :
   - Lipid fluid content > serum level
   - Protein fluid content > 50% serum content
   - Ascites triglycerides > 110 mg/dl
   - Triglycerides ascites/serum ratio > 1
   - Cholesterol ascites/serum ratio < 1
   - Cellularity : predominance of lymphocytes (≥ 70%)

Morbidity

Morbidity and mortality associated with chylous ascites are primarily related to the underlying conditions. More than half of the cases are observed in the context of neoplasms with a rather poor outcome. In non-malignant illness, chyloperitoneum of traumatic and non-traumatic origin induces additional morbidity. High output fistulas are associated not only with large volume losses, hemodynamic instability and renal impairment but also with denutrition and increased susceptibility to infection.

When daily chyle output exceeds one liter, due to its high protein and lipid content, depletion of 20-30 g/day of protein and 5-30 g/day of fat are observed.

When this chylous leak is not controlled within a few days, total parenteral nutrition is not able to compensate for the protein loss added to the basal energy needs. This leads rapidly to denutrition in a previously debilitated population. Furthermore, humoral and cellular immunity is impaired due to the large quantity of lymphocytes present in the chyle (20).

Peripheral lymphocyte count achieves basal equilibrium after 4 weeks of drainage but requires about 15 weeks to return to normal levels (20). This exposes the patient to an increased risk of opportunistic and fungal infections.

Lymphocytes depletion through thoracic duct drainage was previously used as an immunosuppressive tool after organ transplantation (21).

Treatment

Most chylous effusions heal spontaneously after a period of one to two weeks by introducing a low lipid diet rich in high medium-chain triglycerides. Simultaneously, chyle output has to be compensated by fluid, electrolytes and proteins. This shall limit the risks of hemodynamic instability and renal failure, especially in postoperative patients with a contracted intravascular volume. If this procedure fails to control chylous production, enteral modified feeding is to be suspended and total parenteral nutrition is to be introduced. Starvation is expected to reduce lymph flow. Paracentesis may be indicated because of patient discomfort. This shall also reduce intraabdominal pressure and may improve renal function by reducing venous pressure. In rare situations such as pancreatitis, peritoneal dialysis has been proposed as adjunctive treatment (10).

If persistent chylous ascites production is observed despite all previous manoeuvres, somatostatin analogues have been effective in controlling lymph effusions (Table 3). Octreotide 100 µg daily up to 100 µg t.i.d. (s.c.) was able to reduce or stop chylous ascites within a few days in yellow nail syndrome or after liver transplantation (14,16). Somatostatin continuous infusion of 6 mg/day was also effective in other situations of lymphatic leaks such as thoracic and mediastinal surgery (22,23,24). Somatostatin analogues were maintained for 4 to 7 days after chylous effusion has ceased. No significant side effect was described. The use of vasoactive medications with an α-agonist activity has been reported in case of massive persistent chylothorax of abdominal origin after oesophageal surgery (25,26).

Etilefrine continuous infusion was given to a dose of 5 to 10 mg/hour and controlled chylous production within 2 days. No hypertension was noted. Etylefrine may represent a potential alternative therapy for chyloperitoneum. Surgery has to be considered when complete medical treatment is ineffective and high chylous effusion is persistent for more then 2 weeks. Laparotomy and direct lymph vessels ligation can be performed if vessel leakage has been identified by lymphography. This may be particularly indicated for large vessels. Multiple small vessels leaks and diffuse chyle oozing can lead to incomplete surgical control (25).

Peritoneo-venous shunt is a proposed alternative to laparotomy and more often indicated in patients with poor condition with no demonstrated leak site. This technique although easily performed, carries a significant morbidity with secondary infections and vascular thrombosis.

Interventional radiology has recently been evaluated in a limited number of patients with chyloperitoneum and chylothorax (18). Direct percutaneous transabdominal catheterisation of the cisterna chyli and secondary lymph vessels opacification with aqueous control medium was achieved in 5 patients. In one patient, lymph vessels were successfully embolised. This technique seems promising but requires further evaluation.

Table 3. — **Chylous ascites : treatment algorythm**

1. Losses compensation (fluid + electrolytes + proteins)
2. Enteral nutrition : low lipid, high medium-chain triglycerides diet
3. Paracentesis : if clinically indicated
4. Total parenteral nutrition : if failure of enteral diet
5. Somatostatin analogues, if previous treatment failed Octreotide : 100 to 300 µg daily (s.c.) Somatostatin : 6 mg/day continuous infusion Duration : till 3-5 days after cessation of losses Alternative : Etilefrine : 5-10 mg/hour continuous infusion
6. Surgery : if failure of medical treatment (> 2 weeks) a. Direct lymph vessels ligation when feasible. b. Peritoneo-venous shunt.
7. Perspective : interventional radiology lymph vessels opacification and embolisation

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