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CHYLOPERITONEUM: DIAGNOSTIC AND THERAPEUTIC OPTIONS

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ABSTRACT

Chyloperitoneum is not rare and is often associated with other chylous disorders particularly in more complex clinical conditions. An accurate diagnostic study is indispensable to plan the correct therapeutic approach, and we examined the long-term outcomes of our experience in the management of primary and secondary chyloperitoneum in fifty-eight patients (50 adults and 8 children; 34 primary and 24 secondary forms). Diagnostic assessment consisted of paracentesis, whole body lymphoscintigraphy, lymphangio-MR, and lymphangio-CT (LAG-CT). The management of chyloperitoneum consisted initially of non-operative procedures (MCT diet, TPN, octreotide). Surgical treatment was performed in patients not responsive to conservative methods and involved different options using surgical and microsurgical approaches. Microsurgical techniques included chylous-venous shunts connecting chyliferous vessels and mesenteric veins. Fibrin glue or platelet gel injection at the site of the chylous leakage was also used to treat one case of refractory secondary chyloperitoneum. Patients were followed clinically and instrumentally (echography and labs tests) for 6 months to over 5 years. We found that LAG-CT was the primary diagnostic modality to provide precise topographic information concerning the site, cause, and extension of chylous pathology, all of which allowed proper planning of therapeutic procedures. Thirty-four patients did not have a relapse of the chyloperitoneum and 22 patients had a persistence of a small quantity of ascites with no protein imbalance. We observed early relapse of chylous ascites in 2 cases that required a peritoneal-jugular shunt leading to good outcomes. An accurate diagnostic study (above all LAG-CT) and a microsurgical approach proved to represent an effective management of chyloperitoneum refractory to non-operative treatment.

Keywords: chyloperitoneum, chylous ascites, chylous reflux, chylous vessels, imaging, lymphangio-MR, CT-lymphangiography, treatment, chylo-venous anastomosis

The origins of primary forms of chyloperitoneum are correlated with congenital dysplastic alterations of chyliferous vessels, cisterna chyli, and the thoracic duct (1,2), and it is not easy to determine incidence due to a lack of an international registry. These conditions account for approximately 70% of all cases of chylous ascites. Pathophysiologically, these malformation-related dysplastic alterations act as actual obstacles to antigravity lymph drainage just like mechanical obstruction. Primary forms are often associated with other clinical features, such as mono- or bilateral chylothorax,

TABLE 1
Demographic Data

	ADULTS	PEDIATRIC PATIENTS	TOTAL
No. of Patients	50	8	58
Etiology			
Primary forms	26	8	34
Secondary forms:			
After urologic cancer	15		
After cholecystectomy	2		
After colon cancer	3	0	24
After esophageal cancer	1		
After laparohysterectomy	1		
After enterocystoplasty	1		
After chemotherapy	1		
Age (mean, range)	36 yrs (23-59 yrs)	8 yrs (7m-12 yrs)	

chylous cysts, mediastinal chyloma or chylo-mediastinum, chylopericardium, chyluria, chylo-colpometrorrhea, chyloedema of external genitalia and/or of one or both lower limbs (with chylo-l ymphostatic verrucosis and chylo-lymphorrhea, chylous joint effusion), and protein-losing enteropathy (3).

"Secondary" forms of chyloperitoneum due to mechanical causes or obstructions of various types or disruptions, including trauma, are less common. The reported incidence of chylous ascites following abdominal surgery ranges from 0.17% to 1.1% (4-6) with recent studies reporting an incidence of chylous ascites of 0.17%-6.5% after colorectal surgery (7,8), 4.17% after gastrectomy (4), and 0.9%-9% after gynecologic surgery (9,10). The reported incidence following liver transplantation varies from 0.6% to 4.7% (5,6). Following retroperitoneal, esophageal, or cytoreductive surgery, the postoperative incidence is even higher (7%-7.4%) (4,5,11,12). A recent Cochrane systematic review (13) confirms that we cannot ignore the incidence of chylous ascites after major abdominal operations. We report our long-term outcomes in the management of primary and secondary chyloperitoneum.

MATERIALS AND METHODS

Fifty eight patients with chyloperitoneum refractory to conservative treatment were studied and treated by the Unit of Lymphatic Surgery at San Martino-IST IRCCS Hospital in Genoa. Patients included both primary (34 patients) and secondary forms (24 patients) and ages ranged from 23 to 59 years in adults and 7 months to 12 years in children. All 8 cases in children were primary forms. Among the secondary cases in adults, our registry included: 15 cases after urologic cancer, 2 cases after cholecystectomy, 3 after colon cancer, and 1 each after esophageal cancer, hysterectomy, enterocystoplasty, and chemotherapy (*Table 1*).

For diagnosis, paracentesis (to confirm the nature of the leakage), whole body lymphoscintigraphy (for a functional study of the disorder), and LAG-CT were performed in all patients, and lymphangio-MR in 42 cases. LAG-CT was performed under local anesthesia with blue dye injected in the first

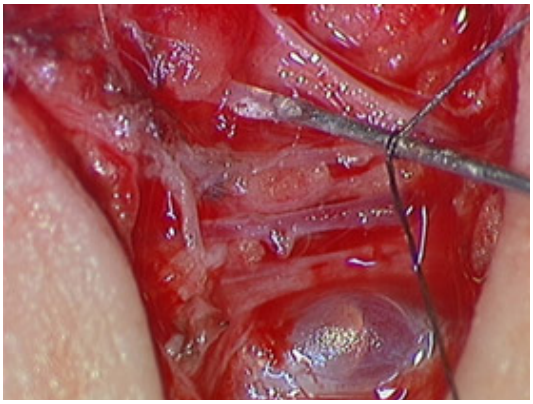

Fig. 1: Cannulation of lymphatic vessel at the dorsum of the foot with microsurgical technique for CT-Lymphangiography.

two interdigital spaces of the foot bilaterally and after cannulation of the lymphatic with microsurgical technique (*Fig.1*) at the inter-malleolar region; injection of Ultrafluid liposoluble contrast medium was performed manually to avoid damage to the lymphatic structures. Progress was followed under radioscopic control and a CT scan was carried out at the end of the contrast medium injection (*Figs. 2,3*).

All patients were non-responsive to initial treatment by standard non-operative procedures (MCT diet, TPN and Octreotide) (9,14) and underwent surgical treatment using different modalities (*Table 2, Fig. 4*). To better identify the site(s) of leakage for operation, patients were administered a fatty meal (60 g of butter in a cup of milk) 4-5 hours before operation (15).

RESULTS

Patients were followed clinically and instrumentally (echography and lab tests) from 6 months to over 5 years. All data were prospectively collected in a database and retrospectively analyzed.

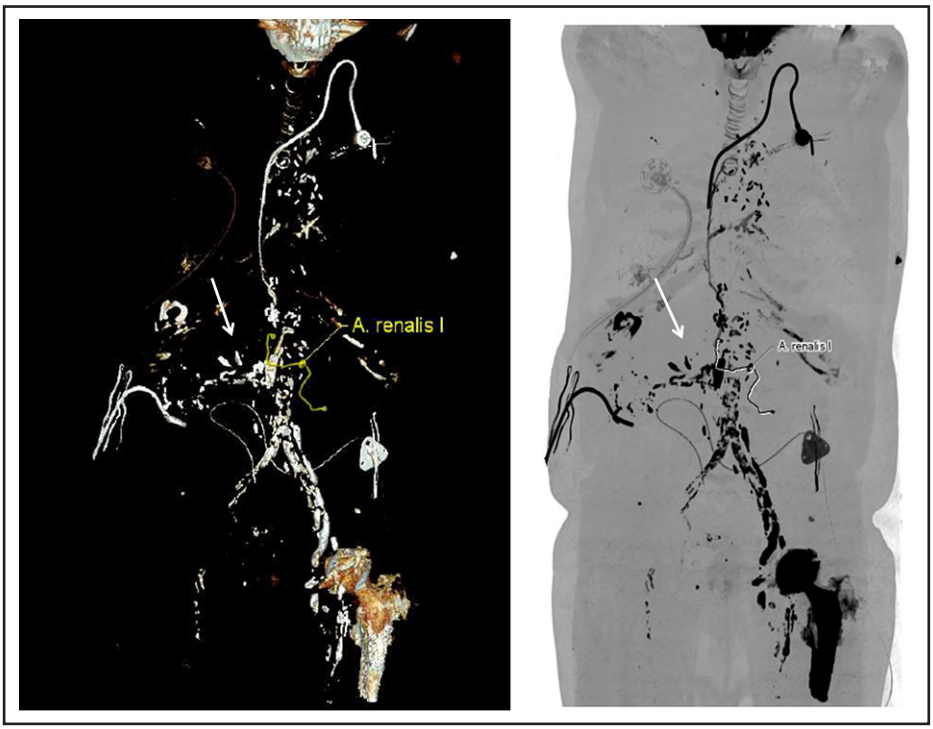

Fig. 2: LAG-CT in a patient with chyloperitoneum due to the treatment of an esophageal cancer allowed the localization of the site of the leakage (arrows).

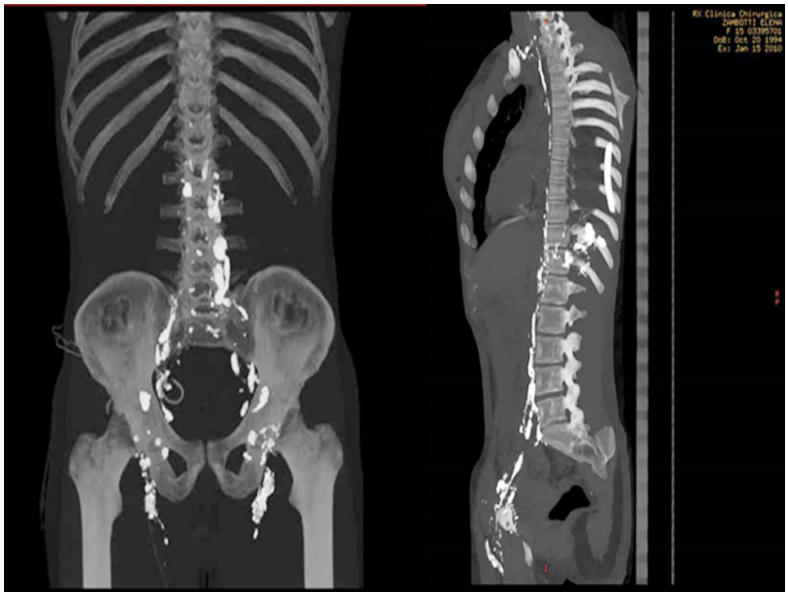

Fig. 3: LAG-CT displays dysplastic lymphatic system at the iliac-lumboaortic region in a case of primary chyloperitoneum

TABLE 2
Surgical Procedures for Unresponsive Cases of Chyloperitoneum

OPERATIVE TREATMENT	No. CASES
Drainage of chyloperitoneum	58
Identification and treatment of endo-abdominal chylorrhagic sites	58
Antigravitational ligatures of ectatic and incompetent collectors for the treatment of chylous reflux syndrome / CO_2-Laser (cut & scarring effect)	58
Removal of lymphangectastic-lymphangiodysplastic tissues / sclerotherapy treatment	48
Chylous/lympho-venous shunts	31
Treatment of chylous cysts	27
Peritoneo-venous shunt (Denver-LeVeen)	2
Platelet gel / Fibrin glue	1

LAG-CT was the primary diagnostic investigation that provided precise topographic information about the site, cause, and extension of chylous pathology and allowed proper planning of therapeutic procedures.

Thirty-four patients did not have a relapse of the chyloperitoneum and 22 patients had a persistence of a small quantity of ascites with no protein imbalance. We observed early relapse of chylous ascites in 2 cases that required a peritoneal-jugular shunt which led to a good outcome (*Table 3*).

A laparoscopic approach was performed in 27 cases with 5 of these being completely carried out through laparoscopy.

DISCUSSION

Chyloperitoneum represents a serious clinical condition that requires an accurate diagnostic work-up in order to properly assess the disease/complication and plan a proper therapeutic approach.

Standard lymphangiography coupled with a CT scan provided a more accurate assessment of disease extension as well as the

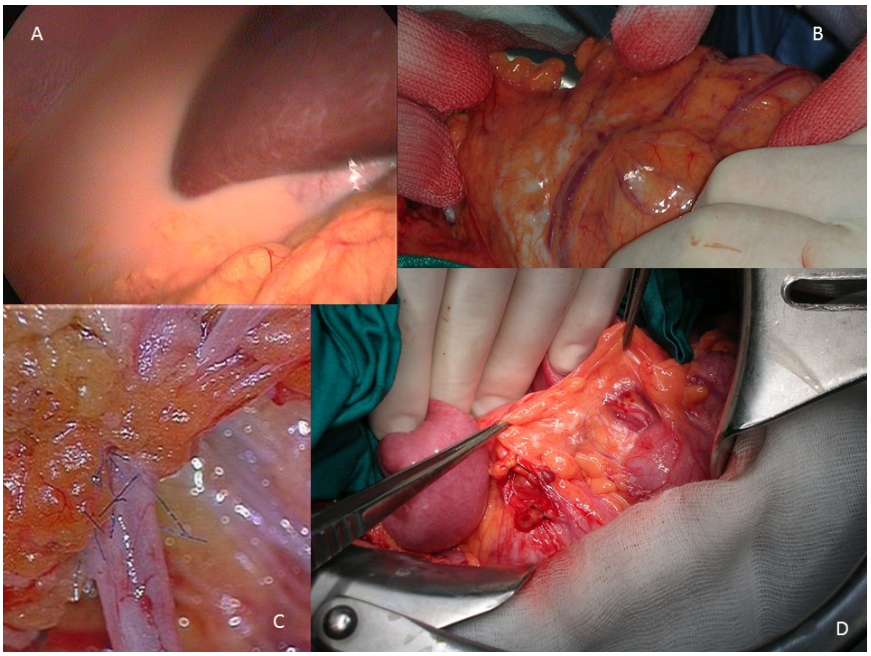

Fig. 4: Laparoscopic view of chyloperitoneum (A). Treatment options for dysplastic chyliferous vessels of mesentery (B) include multiple chylo-venous microsurgical anastomosis (C) and chylous ligatures (D).

TABLE 3
Results

	ADULTS	PEDIATRIC PATIENTS	TOTAL
No relapse of chyloperitoneum	29	5	34
Small quantity of ascites with no protein imbalance	19	3	22
Early relapse of chylous ascites (and use of peritoneal-jugular shunt)	2	0	2
No. of patients	50	8	58

site(s) of obstruction and source of chylous leakage. Lymphangiography can also have sclerosing effects on lymphatics resulting in closure of lymphatic fistulas in patients with chylous ascites. As reported in the literature (16,17), this effect could be related to an inflammatory and granulomatous reaction during Lipiodol extravasation and in two of our cases chylothorax was resolved after lymphangiography.

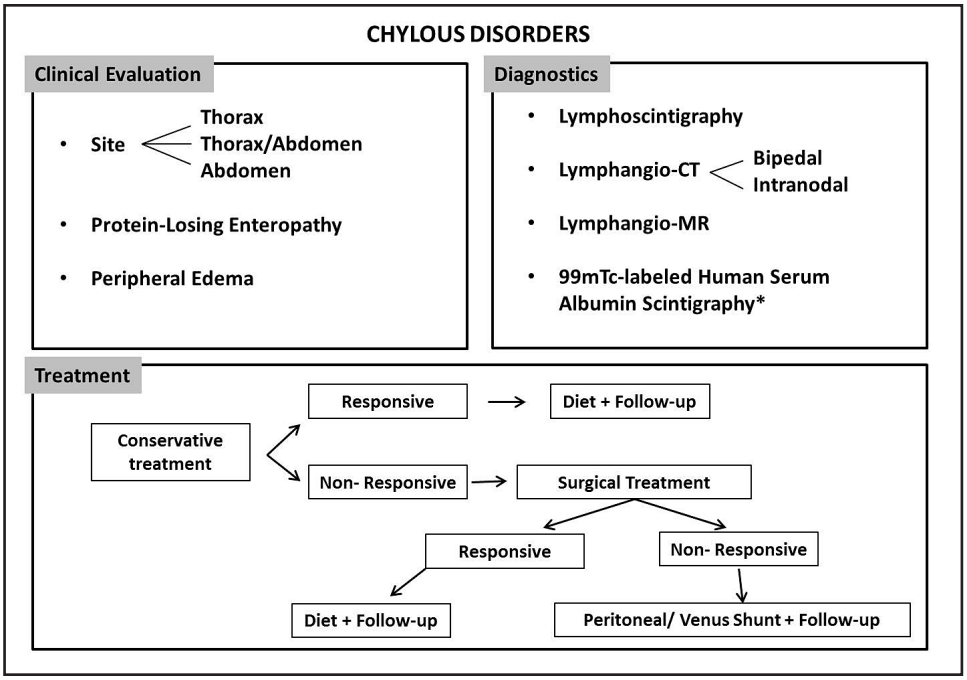

Fig. 5: Proposed algorithm for management of chylous disorders.

Chylous ligatures and chylous-venous microsurgical anastomoses represent the main therapeutic surgical procedures. Antigravitational ligatures of ectatic and incompetent collectors for the treatment of chylous reflux syndrome were performed in all cases, and CO_2-LASER was used in 27 patients resulting in elimination of chyliferous vessels due to the scarring effect of LASER. In 31 cases with no excessive dysplastic chyliferous vessels, chylous-venous shunts were carried out by microsurgical technique using an 8/0 nylon suture material.

Recently with our colleagues in the Transfusion Center, we developed the role and importance of platelets in the mechanisms of tissue repair mediated by fibrin glue and obtained significant results with local application of homologous hyper-concentrated platelet gel (18,19). Use of platelet gel allowed proper healing of tissues and also reduced postoperative pain, lymphatic complications, time of persistence of surgical drain, and hospital stay. Platelets can be obtained in a very inexpensive manner with a manual procedure (20). In one case of chyloperitoneum occurring after oesophagectomy for cancer, we used only fibrin glue for oncological reasons. It was introduced both locally and afterwards through the surgical drainage and allowed complete stoppage of the condition. Fibrin glue or platelet gel injection at the site of the chylous leakage was also used to correct one case of refractory secondary chyloperitoneum.

Based on our experience, we developed a flow chart to use for diagnosis and treatment of patients with chylous ascites (*Fig. 5*).

CONCLUSIONS

Chylous leakage is a significant clinical problem that can lead to an increased length of stay and healthcare costs. CT-Lymphangiography represents the main diagnostic investigation that can supply precise topographic information about the site and cause of the pathology. Surgical and

interventional approaches should be reserved for cases that are refractory to conservative treatment. It is almost impossible to treat the whole malformation, and we need to aim our efforts to manage the symptoms by procedures tailored to the specific etiology.

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REFERENCES

1. Campisi, C, C Bellini, C Eretta, et al: Diagnosis and management of primary chylous ascites. J. Vasc. Surg. 43 (2006), 1244-1248.
2. Boccardo, F, CC Campisi, L Molinari, et al: Diagnosis and treatment of chylous disorders. EJLRP 65 (2012), 15-19.
3. Elluru, RG, K Balakrishnan, HM Padua. Lymphatic malformations: Diagnosis and management. Semin. Pediatr. Surg. 23 (2014), 178-185.
4. Lu, J, ZQ Wei, CM Huang, et al: Small-volume chylous ascites after laparoscopic radical gastrectomy for gastric cancer: Results from a large population-based sample. World J. Gastroenterol. 28 (2015), 2425-2432.
5. Yilmaz, M, S Akbulut, B Isik, et al: Chylous ascites after liver transplantation: Incidence and risk factors. Liver Transpl. 18 (2012), 1046-1052.
6. Ijichi, H, Y Soejima, A Taketomi, et al: Successful management of chylous ascites after living donor liver transplantation with somatostatin. Liver Int. 28 (2008), 143-145.
7. Matsuda, T, H Fujita, Y Kunimoto, et al: Chylous ascites as a complication of laparoscopic colorectal surgery. Asian J. Endosc. Surg. 6 (2013), 279-284.
8. Baek, SJ, SH Kim, JM Kwak, J Kim. Incidence and risk factors of chylous ascites after colorectal cancer surgery. Am. J. Surg. 206 (2013), 555-559.
9. Zhao, Y, W Hu, X Hou, Q Zhou. Chylous ascites after laparoscopic lymph node dissection in gynecologic malignancies. J. Min. Invasive Gynecol. 21 (2014), 90-96.
10. Solmaz, U, V Turan, E Mat, et al: Chylous ascites following retroperitoneal lymphadenectomy in gynecologic malignancies: incidence, risk factors and management. Int. J. Surg. 16 (2015), 88-93.
11. Evans, JG, PE Spiess, AM Kamat, et al: Chylous ascites after postchemotherapy retroperitoneal lymph node dissection: Review of the M. D. Anderson experience. J. Urol. 176 (2006), 1463-1467.
12. Steinemann, DC, D Dindo, PA Clavien, et al: Nocito. Atraumatic chylous ascites: Systematic review on symptoms and causes. J. Am. Coll. Surg. 212 (2011), 899-905.
13. Weniger, M, JG D'Haese, MK Angele, et al: Treatment options for chylous ascites after major abdominal surgery: A systematic review. Am. J. Surg. 211 (2016), 206-213.
14. Reyes-Figueroa, A, P Gil-Martínez, A Borque-Fernando, et al: Management of chylous fistulas, a rare complication after urologic surgery. Arch. Esp. Urol. 68 (2015), 183-186.
15. Servelle, M, B Pourrias, J Soulie, et al: Malformations of the lacteals. Phlebologie 33 (1980), 65-70.
16. Kawasaki, R, K Sugimoto, M Fujii, et al: Therapeutic effectiveness of diagnostic lymphangiography for refractory postoperative chylothorax and chylous ascites: Correlation with radiologic findings and preceding medical treatment. Am. J. Roentgenol. 201 (2013), 659-666.
17. Lee, EW, JH Shin, HK Ko, et al: Lymphangiography to treat postoperative lymphatic leakage: A technical review. Korean J. Radiol 15 (2014), 724-732.
18. Marx, RE, ER Carlson, RM Eichstaedt, et al: Platelet-rich plasma: Growth factor enhancement for bone grafts. Oral Surg. Oral Med. Oral Pathol. Radiol. Endod. 85 (1998), 638-646.
19. Zimmermann R, R Jakubietz, M Jukubietz, et al: Different preparation methods to obtain platelet component as a source of growth factors for local application. Transfusion 41 (2001), 1217-1224.
20. Boccardo F, S Dessalvi, C Campisi, et al: Microsurgery for groin lymphocele and lymphedema after oncologic surgery. Microsurgery 34 (2014), 10-13.

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