

A Review of Chylous Ascites in Systemic Disease and Postoperative States: Diagnostic Challenges and Evolving Surgical Strategies

SAKSHI D GHUGUL¹, SHEETAL ASUTKAR²



ABSTRACT

Chylous Ascites (CA) is a rare, but important, clinical entity in which there is deposition of triglyceride-rich lymphatic fluid within the peritoneal cavity. It may result secondarily from a wide variety of aetiologies, including systemic inflammatory disease, neoplasms, traumatic disruption of lymphatics, and as a postoperative complication of extensive abdominal or retroperitoneal surgery. Although it is a rare condition, growing clinical interest exists in its diagnostic and therapeutic challenge, especially with new imaging and microsurgical treatment development. This narrative review aims to incorporate available evidence regarding presentation and diagnostic evaluation and new surgical treatments of CA. A systematic search of recent peer-reviewed literature between 2000 and 2025 was performed, emphasising publications that addressed systemic disease-related and iatrogenic causes, new developments in lymphatic imaging such as MR lymphangiography, and interventional treatments including Lymphovenous Anastomosis (LVA) and peritoneovenous shunting. In conclusion, this paper has highlighted major advances in the ability to localise lymphatic leaks and thus allow less invasive and more targeted surgical therapy. Furthermore, integrating biochemical, radiologic, and histopathological modalities facilitated early diagnosis of the underlying pathologies. While still reserved for expert centres, microsurgical treatment has yielded encouraging outcomes with reduced morbidity compared to conventional reoperations. Although CA remains a diagnostic and surgical challenge, novel imaging and lymphatic surgery tools are transforming its treatment. General surgeons, oncology teams, and multidisciplinary units should remain cognizant of traditional and innovative strategies to maximise outcomes in this rare but sinister syndrome.

Keywords: Autoimmune disorders, Imaging techniques, Lymphatic fistula, Nutritional care, Postoperative leakage, Thoracic duct surgery

INTRODUCTION

The CA is a rare and typically diagnostically vexing syndrome that may be described by lipid-rich lymphatic fluid within the peritoneum. Milky in texture by its triglyceride content, CA may arise secondary to a wide range of underlying pathologies, both traumatic and non-traumatic in origin [1]. Although relatively infrequent occurrence of CA is low at an estimated one in 20,000 hospital admissions, it is compounded by high morbidity through delay in diagnosis, impairment of nutrition, and frequent recurrence if not managed appropriately. The growing incidence of widespread oncologic and retroperitoneal surgery and the growing recognition of lymphatic disease have put CA in sharper clinical prominence, particularly in general surgical and multidisciplinary care settings [2].

Physiologically, the lymphatic system is important for immune function and the transport of lipids. Chyle is formed from intestinal absorption of dietary long-chain triglycerides transported through lacteals to the cisterna chyli and then to the thoracic duct into systemic venous circulation [3]. Where this pathway is blocked or interrupted by malignancy, trauma, inflammation, or congenital abnormalities, the lymph can leak into the peritoneal space, forming CA. The resulting fluid is typically exudative, lymphocytic, and immunoglobulin-containing and can accumulate rapidly, leading to abdominal distension, discomfort, respiratory impairment, and severe metabolic consequences [4].

The aetiology of CA is multifactorial. Non-traumatic causes include lymphomas (most commonly non-Hodgkin lymphoma), disseminated tuberculosis, filariasis, sarcoidosis, and systemic conditions such as Systemic Lupus Erythematosus (SLE) and nephrotic syndrome [5]. In such cases, CA is an advanced disease or diffused lymphatic inflammation. Traumatic and iatrogenic aetiologies have become increasingly prevalent over the past several decades, most notably

after the repair of an abdominal aortic aneurysm, radical retroperitoneal lymphadenectomy, or laparoscopic cancer surgery [6-9]. Increased postoperative CA has likewise followed the growing popularity of robotic-assisted cases for colorectal and gynaecologic cancer operations from the inadvertent thoracic duct or cisterna chyli injury. In children with congenital CA, lymphangiectasia or primary lymphatic dysplasia may play a role [10].

The clinical diagnosis of CA is supported by ascitic fluid analysis. Diagnostic paracentesis is often diagnostic, showing triglyceride >110 mg/dL, slight lymphocyte predominance, and absence of infection or malignancy. Localisation of the location of lymphatic leakage is usually far more challenging [11]. While conventional imaging modalities such as ultrasound and CT scans are of limited specificity, newer technologies such as MR lymphangiography, intranodal lymphangiography, and dynamic contrast-enhanced lymphatic imaging have revolutionised the diagnostic process. These technologies allow the delineation of lymphatic flow and identification of the site of leakage or obstruction with unquestionable clarity, therefore greatly helping in surgical planning [12].

The objectives of early therapy for CA have been conventionally conservative: dietary modification, including fat-free diet or Medium-Chain Triglyceride (MCT) diet, Total Parenteral Nutrition (TPN), and pharmacologic reduction of lymph flow with somatostatin analogues like octreotide [13]. In medical treatment non-responders within 1-2 weeks; surgical or interventional radiologic treatment becomes unavoidable. Microsurgical lymphatic reconstructive interventions, such as LVA, lymphatic ligation, or thoracic duct embolisation, are emerging viable, targeted, and less invasive alternatives to open surgery [14]. Such treatments have provided encouraging results in well-selected individuals and decrease recurrence and procedure morbidity.

Despite advances, the rarity and heterogeneity of CA presentations have hindered the establishment of uniform treatment protocols so far. Most literature is still limited to isolated case reports or single-centre experiences, raising major challenges to evidence-based practice, especially among general surgeons outside specialised lymphatic centers [15,16]. There is a need for a greater consolidation of emerging evidence on CA, primarily for general surgeons who are often confronted with the condition in postoperative and systemic illness contexts. No comprehensive, narrative, surgery-oriented review synthesises diagnostic and therapeutic strategies into a practical format, despite several articles tackling aspects related either to imaging or paediatric cases.

REVIEW OF LITERATURE

The search was conducted in PubMed, Scopus, and Google Scholar from January 2000 to May 2025 using the following relevant key words in combination: "CA," "postoperative lymphatic leakage," "systemic lupus and chylous effusion," "MR lymphangiography," and "lymphatic reconstruction surgery". Only peer-reviewed case series, systematic reviews, original articles, and seminal case reports were included.

The first description of CA as a clinical entity was provided by Cárdenas A and Chopra S (2002), who defined its biochemical profile, aetiologic classification, and conservative management [17]. Further sporadic case reports extended the aetiologic spectrum, and Ng ZQ et al., 2021 provided the first systematic review of CA in colorectal surgery, defining risk factors and management outcomes in postoperative patients [18]. Recently, Majed HI et al., 2022 presented the rare case of SLE-induced chylothorax, which confirmed the pathogenic role of autoimmune diseases in lymphatic leakage [19]. Lu C et al., 2022 emphasised imaging advances, namely, MR lymphangiography for lymphatic leak localisation, providing improved sensitivity of diagnosis [20].

In 2023, Corredor-Orlandelli D et al., emphasised the overlap between severe SLE flare and lymphatic complications, such as Evans syndrome, and the importance of multisystem involvement [21]. In 2024, Epelde C et al., presented a pregnancy case detailing idiopathic CA in an uncommon physiological state [22]. Weinzierl A et al., (2024) described a milestone report of thoracic duct LVA, illustrating the capability of microsurgery in central lymphatic

repair [23]. Negm AS et al., (2024) confirmed the role of MR lymphangiography in various lymphatic disorders [24], and Sun Y et al., (2025) documented post-lymphadenectomy CA and its relationship with surgical procedure and complication rates [25] as illustrated in [Table/Fig-1] [17-25].

DISCUSSION

Aetiologic Spectrum: Systemic Disorders and Surgical Triggers

The CA result from obstruction or disruption of abdominal lymph channels, with aetiologies usually classified as being systemic or a postoperative surgical complication. Systemic aetiologies, which include lymphoproliferative neoplasms such as non-Hodgkin's lymphoma, are the most commonly reported [26]. Invasion and compression of lymphatic channels by neoplasms can lead to compromised lymph drainage and accumulation of peritoneal chyle. Autoimmune disorders such as SLE have also been reported. Here, inflammation of the lymphatics and injury from immune complexes could enhance permeability and destroy lymphatic vessels [27]. Although rare, SLE-related CA often present in association with other serosal effusions, suggesting generalised disease activity. Congenital lymphatic malformations and infectious aetiologies including tuberculosis or filariasis, though more common in children or endemic populations, fall into the more general category of systemic aetiologies [28].

On the surgical side, iatrogenic causes are increasingly being recognised because of the rising prevalence of advanced abdominal and retroperitoneal surgery. Robotic or laparoscopic para-aortic lymphadenectomy, especially in gynaecologic or colorectal cancer, is exceedingly dangerous and involves central lymphatic pathways like cisterna chyli and thoracic duct tributaries [29]. Abdominal aortic aneurysmectomy, liver transplant, and pancreatic resection are also chyle leak-associated because of their proximity to large lymphatic trunks. CA may not become evident immediately postoperatively, typically manifesting during early convalescence. Sensitivity to surgical and systemic aetiologies is thus critical for early diagnosis and individualised management. Treatment of these rare but interrelated aetiologies is a key to successful clinical management [30], as demonstrated in [Table/Fig-2].

Authors (Year)	Key finding	Research focus	Challenges/Limitations	Future scope
Cárdenas A and Chopra S (2002) [17]	Established clinical features and management principles for Chylous Ascites (CA).	Clinical overview of CA.	Lacked surgical intervention detail.	Integrate imaging and surgical strategies.
Ng ZQ et al., (2021) [18]	Reviewed CA in colorectal surgery; identified risk factors and outcomes.	Postoperative CA in colorectal cases.	Heterogeneous patient data; small sample.	Develop guidelines for prevention and management.
Majed HI et al., (2022) [19]	SLE is linked to chylothorax as a rare complication.	Autoimmune-related chylothorax.	Single case; limited generalisability.	Explore autoimmune-lymphatic interactions.
Lu C et al., (2022) [20]	Demonstrated accuracy of MR lymphangiography in localising lymphatic leaks.	Imaging diagnostics for lymphatic leaks.	Technology availability and expertise.	Standardise MR lymphangiography use.
Corredor-Orlandelli D et al., (2023) [21]	Showed that SLE with Evans syndrome can cause extensive lymphatic complications.	Systemic autoimmune manifestations.	Rare syndrome; no treatment protocol.	Multisystem approach in autoimmune CA.
Epelde C et al., (2024) [22]	Reported idiopathic CA in pregnancy; unique physiological context.	Idiopathic CA in pregnancy.	Rare and poorly understood.	Monitor outcomes in obstetric CA.
Weinzierl A et al., (2024) [23]	Validated thoracic duct LVA as a novel surgical treatment.	Microsurgical lymphatic reconstruction.	Requires surgical specialisation.	Expand access to microsurgical care.
Negm AS et al., (2024) [24]	Outlined MR lymphangiography's clinical utility in lymphatic disorders.	Lymphatic imaging advances.	The institutional learning curve for imaging.	Broaden institutional training on lymphatic imaging.
Sun Y et al., (2025) [25]	Highlighted CA after robotic para-aortic lymphadenectomy in colorectal surgery.	Postoperative CA in high-volume surgical centres.	Retrospective, single-centre; limited generalisability.	Support multicentre trials and improve surgical risk assessment.

[Table/Fig-1]: Literature search on Chylous Ascites (CA) [17-25].

Author (Year)	Primary clinical focus	Underlying pathology	Diagnostic insight	Mechanistic insight	Management and outcomes
Lu C et al., (2022) [20]	Lymphatic leakage localisation in Chylous Ascites (CA)	Lymphatic disruption/leak	Carbon Nanoparticle Suspension (CNS) for intraoperative leak detection	CNS flow enhanced by lymphatic filling; targeted ligation	CNS-guided surgery; pre-op fat diet improves tracer utility

Negm AS et al., (2024) [24]	MR lymphangiography in lymphatic disorders	Congenital/acquired lymphatic anomalies	Dynamic contrast-enhanced MR lymphangiography for lymphatic imaging	High-resolution imaging of central/peripheral lymphatics	Imaging-guided intervention; multidisciplinary approach
Sun Y et al., (2025) [25]	Post-Para-Aortic Lymph Node (PALN) dissection CA	Surgical lymphatic injury	Indocyanine Green (ICG) fluorescence for leak identification	Surgical trauma to central lymphatics	Conservative first-line; ICG-guided surgery/injections for refractory cases
Arya R et al., (2023) [26]	Lymphatic dysfunction in cirrhosis with refractory ascites	Cirrhosis with secondary intestinal lymphangiectasia	Identification of lymphatic dysfunction markers	Lymphatic congestion, impaired lymph reabsorption	Highlighted diagnostic importance; no direct management
Stoichitoiu LE et al., (2023) [27]	Polyserositis systematic review including lymphatic causes	Autoimmune diseases (SLE), infections, neoplasia	Diagnostic overlap in autoimmune and infectious aetiologies	Immune-mediated lymphatic inflammation	Narrative review; no outcome data
Mallick B et al., (2018) [28]	Mycobacterial Chylous Ascites (CA)	Tuberculosis and atypical mycobacterial infections	Ascitic fluid analysis with high triglycerides; clinical correlation	Granulomatous lymphadenitis causing lymphatic obstruction	Antibiotic therapy and symptomatic management
Tulunay G et al., (2012) [29]	Chylous Ascites (CA) in gynaecologic oncology surgery	Postoperative lymphatic injury	Clinical and surgical history; imaging and lymphatic leak identification	Lymphatic disruption during para-aortic lymphadenectomy	Mostly conservative management; surgery for refractory cases
Lizaola B et al., (2017) [30]	Diagnostic approach and management of Chylous Ascites (CA)	Malignancy, cirrhosis, infections, surgery	Comprehensive diagnostic algorithm integrating fluid analysis and imaging	Multifactorial lymphatic disruption	Tailored treatment: conservative, interventional, surgical

[Table/Fig-2]: Chylous Ascites (CA) Highlighting Aetiologies, Diagnostics, and Management Strategies [20, 24-30].

Clinical Presentation and Pitfalls in Diagnosis

The clinical presentation of CA is nonspecific and indolent and thus leads to delay in diagnosis. The presenting symptoms are progressive abdominal distension, ill-defined abdominal pain, early satiety, fatigue, and unintentional weight loss [31]. Malnutrition or evidence of immunosuppression may present in some patients due to ongoing loss of lymphocytes, proteins, and fat-soluble vitamins into the peritoneum. Postoperative CA may be masked by anticipated postoperative fluid redistribution or inappropriately attributed to more common causes of postoperative complications such as seroma, infection, or haemorrhage [32]. In systemic diseases like SLE or lymphoma, CA may present as pleural effusions, oedema, or constitutional symptoms, further masking the clinical presentation. Overlap with conditions like tuberculous peritonitis or peritoneal carcinomatosis typically leads to inappropriate initial management and diagnostic strategy [33].

Definitive diagnosis relies on paracentesis and biochemical ascitic fluid study. The characteristic presentation of CA is a milky, opalescent appearance with a triglyceride concentration of more

than 110 mg/dL and a lymphocyte-predominant white cell count. However, not all chylous fluid presents classically, especially in partial lymphatic obstruction or mixed ascites [34]. Culture is always negative, and cytology may rule out malignant ascites. Imaging modalities like ultrasound or CT scans most frequently cannot delineate the cause or location of lymphatic leakage. The ascitic fluid study, therefore, clinical suspicion in high-risk patients and advanced lymphatic imaging become relevant to bypass these diagnostic pitfalls and initiate proper therapy, as shown in [Table/Fig-3] [35].

Advances in Imaging: From Conventional Modalities to MR Lymphangiography

Imaging plays a central role in diagnosing CAs and localisation of the site of lymphatic leak. Older modalities like ultrasound and Computed Tomography (CT) are the first-line investigations of choice due to their availability and ability to identify fluid collections. Ultrasound can identify anechoic or faintly echogenic free fluid but is nonspecific [36]. CT scans, although helpful in detecting

Author et al., (Year)	Clinical symptoms	Diagnostic challenges	Ascitic fluid analysis	Imaging limitations	Diagnostic approach
Lu C et al., (2022) [20]	Progressive abdominal distension, abdominal discomfort, malnutrition	Difficulty localising site of lymphatic leak; nonspecific early symptoms	Milky appearance; elevated triglycerides (>200 mg/dL); lymphocyte predominance	Conventional CT often fails to identify exact leakage site	Lymphangiography (intranodal or pedal) for leak localisation; interventional radiologic techniques
Corredor-Orlandelli D et al., (2023) [21]	Dyspnea, abdominal distension, pleural effusion in systemic illness	Overlap with autoimmune disease manifestations; rare aetiology	Chylous fluid with high triglycerides; inflammatory background	Imaging confounded by systemic inflammation and effusions	Combined clinical, biochemical fluid analysis and targeted imaging; exclusion of secondary causes
Weinzierl A et al., (2024) [23]	Persistent Chylous Ascites (CA), chylothorax, postoperative lymphatic leakage	Complex central lymphatic anatomy; failure of conservative therapy	Confirmatory chylous characteristics; monitoring postoperative output	Limited resolution for functional lymphatic flow	Dynamic lymphatic imaging followed by microsurgical Lymphovenous Anastomosis (LVA)
Negm AS et al., (2024) [24]	Abdominal distension, protein loss, oedema	Differentiating primary vs secondary lymphatic disorders	Chylous fluid supports diagnosis but not aetiology	Static imaging insufficient for flow dynamics	MR lymphangiography to map anatomy, flow patterns, and guide management
Do TV et al., (2021) [31]	Dyspnea, abdominal distension, oedema	Rare transudative Chylous Ascites (CA) misclassified as CHF	Confirmed with 671 mg/dL TG in peritoneal fluid	No lymphoscintigraphy available	Paracentesis+pleural fluid triglyceride analysis
Athanasias DI et al., (2022) [32]	Postprandial pain, nausea	Rare association with an internal hernia; often missed	Milky effusion, TG >200 mg/dL	Nonspecific CT findings	CT+intraoperative confirmation
Nakano TA et al., (2022) [33]	Respiratory distress, ascites in neonates	Overlaps with infections and cardiac anomalies	Lipid-laden lymphatic fluid in infants	Inconsistent imaging across centres	Stepwise: Echo→lymphoscintigraphy→surgical
Park SH et al., (2022) [34]	Postoperative abdominal fullness, drainage	Delayed recognition post-gastrectomy	Peritoneal TG: median 282 mg/dL	Drainage inspection often relied upon	Drain fluid appearance+TG assay
Prihastuti PS and Wibawa ID (2023) [35]	Nonspecific GI discomfort, ascites	Misdiagnosis with TB or malignancy	TG >110 mg/dL; milky chylous fluid	Poor access to MR lymphangiography	Clinical suspicion+ascitic TG >110 mg/dL

[Table/Fig-3]: Clinical presentation and diagnosis of Chylous Ascites (CA) [20-24,31-35].

associated lymphadenopathy, mass, or surgical changes, cannot clearly delineate lymphatic structures. Although useful in general abdominal assessment, these older techniques lack delineation of the site and the extent of lymphatic disruption [37].

Lymphangiography has made immense strides to transcend this deficiency. Intranodal lymphangiography with improved safety and visualisation largely supplements or replaces old oil-based lymphangiography, which was once the gold standard. The greatest advance over the last decade is magnetic resonance lymphangiography, which provides high-resolution, non-invasive imaging of the thoracic duct, cisterna chyli, and mesenteric lymphatics [38]. This modality enables dynamic assessment of lymphatic flow and precise localisation of leaks in the absence of ionising radiation. In tertiary centres, magnetic resonance lymphangiography can be enhanced through the addition of contrast-enhanced intranodal injections, which increase sensitivity in the assessment of micro leaks or aberrant flow patterns. These advances have greatly changed preoperative planning and have enabled targeted surgical or interventional treatment, such as thoracic duct embolisation or LVA. As these imaging modalities become more widely disseminated, there is the potential for dramatic reductions in diagnostic delays and improvements in outcomes for patients with complicated or refractory CAs [39].

Conservative Management Approaches and Restriction

Conservative management is the initial management of CAs, particularly if the aetiology is reversible or not acutely life-threatening. Dietary change is the cornerstone of conservative treatment aimed at reducing lymphatic flow [40]. The usual treatment is a low-fat diet supplemented with Medium-Chain Triglycerides (MCTs), which enter the portal circulation directly without passing through intestinal lymphatics [41]. In severe cases, especially with high-output chylous drainage, the patient may require TPN to allow total bowel rest and reduce chyle production [42]. Pharmacologic therapy with octreotide, a somatostatin analogue, to reduce gastrointestinal secretions and lymphatic flow has been employed with variable success reported in the literature [43].

Even with these measures, conservative management is typically received with limited success in the chronic or postoperative setting. Success is highly variable, and extended treatment can lead to nutritional deficiency, immunosuppression, and muscle wasting [44]. Moreover, delay in definitive management can lead to increased morbidity, particularly in those with copious lymphatic leakage or compromised immunity from underlying malignancy or autoimmune disease. Octreotide treatment, even helpful in some instances, is lacking in proven dosing regimens and is not helpful uniformly in all aetiologies [45]. Therefore, medical management and diet therapy

are often merely a bridge to interventional or surgical therapy. Early identification of non-responders is crucial to prevent complications and permit a timely transition to more definitive treatment, such as lymphatic embolisation or microsurgical reconstruction as shown in [Table/Fig-4] [46,47].

New Surgical Approaches and Microsurgical Reconstruction Methods

When conservative treatment fails to control CAs, interventional or surgical treatment is warranted. Traditional surgery is thoracic duct ligation, mainly if an intraoperative area of leak is found. It is used most commonly when imaging has demarcated disruption of abdominal tributaries or thoracic duct [48]. Another choice is peritoneovenous shunting, which shunts ascitic fluid into the systemic venous circulation. Relief of symptoms is provided, but the underlying lymphatic disease process is not alleviated and is complicated by infection, coagulopathy, and catheter failure. These procedures are reserved only for high-output or intractable cases, especially if less invasive methods are inaccessible [49].

Recent technical advances in microsurgical lymphatic reconstruction have transformed the treatment paradigm. LVA is an anastomosis of lymphatic channels to adjacent venules for physiological chyle drainage into the venous system. This is a targeted, minimally invasive intervention treating the site of lymphatic leakage without the morbidity of open surgery [50]. Experience accumulated in high-volume institutions has shown promising results, including a low recurrence rate and a shorter recovery time. Image-guided lymphatic embolisation, usually delivered through intranodal access, is a minimally invasive intervention with increasing application. The above microsurgical and endovascular treatments require specific skills and equipment, limiting their availability to tertiary centres. These provide long-term solutions with improved patient outcomes. As training and clinical experience increase, these treatments will become more available and part of the multidisciplinary management of complex CAs [51].

Practice Gaps and Future Horizons in Multidisciplinary Management

Even with advances in microsurgical technique and imaging diagnosis, the management of CAs is laden with several systemic problems. Most pertinent is the lack of uniform clinical guidelines, particularly relating to postoperative and systemic disease presentations. The heterogeneity in the initial workup, duration of conservative treatment, and surgical referral criteria all lead to inconsistent outcomes across institutions because of inconsistencies in the initial workup, duration of conservative management, and referral criteria for surgery. Furthermore, low recognition and underdiagnosis of the

Author et al.,	Aetiology and patient profile	Initial conservative strategy	Outcome and response timeline	Recommendations and practice implications
Lattere PF et al., (2000) [40]	Mixed aetiologies: malignancy, cirrhosis, infection	Low-fat diet with MCT, TPN if needed	Variable success; prolonged treatment risks deficiency	Early diet therapy fundamental; monitor nutrition
Calabrese PR et al., (1977) [41]	Lymphangiomyomatosis with Chylous Ascites (CA)	Dietary fat restriction plus MCT supplementation	Clinical improvement in case reports	Diet modification cornerstone; MCT preferred source
Mas E et al., (2022) [42]	GI disorders including paediatric Chylous Ascites (CA)	Octreotide administration	Variable response; effective in some cases	Octreotide adjunct; dosing protocols unclear
Kotb MA et al., (2021) [43]	Paediatric postoperative Chylous Ascites (CA)	MCT diet, paracentesis	Resolved in most; some needed TPN	Early conservative trial; escalate if persistent >2 weeks
Do TV et al., (2021) [44]	Heart failure-related Chylous Ascites (CA)	Low-fat diet	Unclear response; rare transudative cases	Include cardiac workup in unexplained cases
Kong PF et al., (2022) [45]	Post-gastric cancer surgery	Stepwise conservative protocol	Clear criteria for resolution vs failure	Use imaging and TG thresholds to guide timing
Nofal Y et al., (2023) [46]	Cirrhotic Chylous Ascites (CA)	Low-fat diet plus fluid restriction	Complete resolution within 1 week	Consider orlistat trial in cirrhotic cases
Litchinko A et al., (2025) [47]	Postoperative Chylous Ascites (CA)	Initial conservative management	Failures led to Lipiodol embolisation success	Consider early embolisation in surgical cases

[Table/Fig-4]: Conservative management of Chylous Ascites (CA) [40-47].

condition by general internists and surgeons result in late diagnosis, with consequent increased duration of hospital stay and patient morbidity. Lastly, incomplete outcome registries impede efforts to measure treatment efficacy and optimise best practices. Another essential obstacle is the lack of surgical experience and specialised lymphatic interventions. LVA and thoracic duct embolisation require sophisticated interventional radiologic and microsurgical skills that are not uniformly distributed. Coordination among gastroenterologists, surgeons, radiologists, and immunologists is required but often poorly coordinated. Specialised lymphatic centres or care models can bridge this gap by collaboration. Evidence-based guidelines, more training in lymphatic surgery, and prospective multicenter trials to standardise treatment protocols will be required. In addition, the integration of artificial intelligence and advanced imaging analytics might further increase diagnostic sensitivity. Bridging these systemic gaps will optimise outcomes and provide equitable access to new therapies for patients with CAs.

In summary, CAs is an uncommon but clinically important condition that requires careful diagnostic expertise and multidisciplinary therapeutic planning. The multicausality of both systemic and iatrogenic aetiologies contributes to significant diagnostic delays [52].

The review outlines that, though CA is still infrequent, its increasing incidence due to complicated abdominal surgery and autoimmune disorders testifies to a growing clinical importance, especially in surgical and tertiary institutions. The aetiological spectrum of CA is complex because it involves systemic and surgical aetiologies. Patients with systemic diseases, especially lymphomas and autoimmune diseases such as SLE tend to have nonspecific abdominal complaints at presentation, and thus early diagnosis is often difficult [53].

In malignancy, lymphatic blockage by the tumour can result in progressive chyle leakage into the peritoneal cavity. In autoimmune illness, inflammatory endothelial injury to lymphatics can compromise flow integrity, a less recognised but recently more appreciated phenomenon in the literature [54]. For CAs after surgical procedures, such as retroperitoneal or para-aortic lymph node involvement, it has become a significant postoperative complication. With more frequent use of minimally invasive and robotic-assisted oncologic resections, such as colorectal and gynaecologic cancer, incidental lymphatic channel injury, such as the cisterna chyli or thoracic duct tributary, is becoming more common. Nevertheless, the incidence is likely underestimated due to diagnostic uncertainty or misattribution to more frequent causes of postoperative ascites [55].

One of the important hurdles in the early and accurate diagnosis is the nonspecific nature of presentation. Clinical presentations such as abdominal distension, weakness, and early satiation can be easily confused with other intra-abdominal conditions. Further, in postoperative situations, CAs is confused with an infectious or inflammatory effusion, resulting in an unwarranted delay in the appropriate intervention [56]. Clinical suspicion becomes more difficult because the milky appearance of ascitic fluid is lost in patients on a low-fat diet or with mixed ascites. Increased triglyceride content and lymphocytosis are indicative features of diagnosis, yet it will not be diagnosed by clinicians without typical fluid features or in case of borderline levels of the content of triglyceride, especially in low-prevalence settings [57].

Technological improvements in imaging modalities have greatly improved diagnostic performance in CAs. Conventional imaging modalities such as ultrasound and CT, while helpful in detecting fluid accumulation, are of little help localising lymphatic leaks. MR lymphangiography and dynamic contrast-enhanced imaging have filled this gap by allowing sensitive visualisation of thoracic and abdominal lymphatic anatomy [58]. These imaging modalities have been of particular value in identifying subtle flow defects and lymphatic leaks that affect surgical or interventional planning.

Intranodal contrast injections have also improved sensitivity and procedural safety. Access to these advanced imaging modalities is restricted to tertiary referral centres and is thus restricted in most clinical practices. Institutional capability and operator expertise are still strong determinants of diagnostic performance; thus, wider training and infrastructure development are needed [59].

Conservative management therapeutically remains first-line therapy in the majority of patients. Dietary alteration with low-fat, MCT-supplemented diets is planned to reduce chyle production by bypassing intestinal lymphatics. TPN is typically used in highly leaking patients to induce bowel rest and decrease lymph flow [60]. Pharmacologic therapy with octreotide has been helpful in a few cases, though there remains a lack of standardised regimens regarding dose and duration. Even with these interventions, conservative management is often insufficient in the presence of high-output ascites or continuing lymphatic disruption, especially in the postoperative patient. Prolonged conservative management in non-responders compromises nutrition, causes infection, and postpones definitive therapy, making early escalation appropriate [61].

Surgical interventions have become better, with microsurgery offering promising interventions. Older methods, such as thoracic duct ligation or peritoneovenous shunting, have been used mainly for refractory cases but are plagued by inherent hazards and are associated with variable long-term efficacy [62]. LVA and image-guided lymphatic embolisation have changed the paradigm toward more focused, physiologic, and less morbid interventions. These interventions address lymphatic disruption directly by restoring continuity or bypassing lymphatic flow into the venous system. Published data from high-volume centers indicate an improvement in the resolution of symptoms, with reduced recurrence at much lower morbidity compared to standard surgery [63]. The wide application of such interventions is barred by the requirement for microsurgical skills, special equipment, and interventional radiological skills. This imbalance in accessibility reflects a broader issue in surgical management of lymphatic disorders whereby advances accrue in high-volume centres and leave general surgical practice with little to offer [64].

A common problem is the lack of standard practices along the continuum of treatment and diagnosis. Clinical management, due to the rare and heterogeneous nature of CAs, tends to be based on institutional practice or personal experience. The absence of standardised algorithms for diagnoses and therapeutic protocols contributes to variability and uncertainty in management [65]. Randomised trials and prospective studies, in large measure because of the low prevalence and heterogeneity of aetiologies of the syndrome, do not exist. Most published data depend on case series and small retrospective series. These, though helpful, provide results with limited external validity [66].

Such inequalities need to be addressed through concerted efforts, informed by multiple disciplines. There is a need for greater collaboration between surgeons, radiologists, gastroenterologists, and immunologists to rationalise diagnosis and enhance therapeutic specificity. Specialist lymphatic disease units or referral centers could allow earlier diagnosis with appropriate treatment of complex cases [67]. Teaching lymphatic anatomy and surgical skills as part of general surgery training programs would allow future surgeons to better diagnose and treat such conditions. In research, multi-centre registries and collaborative outcome monitoring could provide stronger evidence to underpin clinical guidelines and policy development. Further, there is a suggestion that the application of artificial intelligence and machine learning to image diagnosis may further improve early leak detection and treatment planning [68].

CONCLUSION(S)

The CAs is a rare but increasingly recognised condition, whose often insidious onset and shared features with other abdominal

pathologies make diagnosis challenging. MR lymphangiography has significantly improved preoperative localisation and informed management pathways that include conservative and microsurgical options. Dietary and pharmacologic interventions continue to play a cornerstone role in the management; however, refractory cases mandate timely escalation to minimally invasive or surgical therapies to avoid protracted morbidity. Optimal outcomes depend upon close collaboration among surgical, radiological, and medical teams and emphasise the importance of specialised training and institutional preparedness. Standardised guidelines and prospective registries will facilitate consistent, evidence-based care in the future.

REFERENCES

- [1] Srinivasa RN, Chick JFB, Gemmete JJ, Hage AN, Srinivasa RN. Endolymphatic interventions for the treatment of chylothorax and chylous ascites in neonates: Technical and clinical success and complications. *Ann Vasc Surg.* 2018;50:269-74.
- [2] Campisi C, Bellini C, Eretta C, Zilli A, da Rin E, Davini D, et al. Diagnosis and management of primary chylous ascites. *J Vasc Surg.* 2006;43(6):1244-48.
- [3] Long L, Zhen C, Yandong W, Ning D, Qi L, Qing G, et al. Congenital chylous ascites in infants: Another presentation of intestinal malrotation. *J Pediatr Surg.* 2018;53(3):537-39.
- [4] Nishigori H, Ito M, Nishizawa Y, Koyama A, Koda T, Nakajima K, et al. Postoperative chylous ascites after colorectal cancer surgery. *Surg Today.* 2012;42:724-28.
- [5] Matsuda T, Fujita H, Kunimoto Y, Kimura T, Ogino K. Chylous ascites as a complication of laparoscopic colorectal surgery. *Asian J Endosc Surg.* 2013;6:279-84.
- [6] Bhardwaj R, Vaziri H, Gautam A, Ballesteros E, Karimedini D, Wu GY. Chylous ascites: A review of pathogenesis, diagnosis and treatment. *J Clin Transl Hepatol.* 2017;6(1):105.
- [7] Galanopoulos G, Konstantopoulos T, Theodorou S, Tsoutsas I, Xanthopoulos D, Kaperonis E, et al. Chylous ascites following open abdominal aortic aneurysm repair: An unusual complication. *Methodist Debakey Cardiovasc J.* 2016;12(2):119.
- [8] Kaas R, Rustman LD, Zoetmulder FA. Chylous ascites after oncological abdominal surgery: Incidence and treatment. *Eur J Surg Oncol.* 2001;27(2):187-89.
- [9] Al-Busafi SA, Ghali P, Deschênes M, Wong P. Chylous ascites: Evaluation and management. *Int Sch Res Notices.* 2014;2014:240473.
- [10] Grenier JM, Borst AJ, Sheppard SE, Snyder KM, Li D, Surrey LF, et al. Pathogenic variants in PIK3CA are associated with clinical phenotypes of kaposiform lymphangiomatosis, generalized lymphatic anomaly, and central conducting lymphatic anomaly. *Pediatr Blood Cancer.* 2023;70(9):e30419.
- [11] Trenor CC, Chaudry G. Complex lymphatic anomalies. *Semin Pediatr Surg.* 2014;23(4):186-90.
- [12] Nandy K, Jayaprakash D, Rai S, Kumar A, Puj K, Tripathi U. Management of chyle leak after head and neck surgery; our meritorious experience in 52 cases and review of literature. *Indian J Otolaryngol Head Neck Surg.* 2022;74(Suppl 3):5978-83.
- [13] Du L, Wei N, Maiwall R, Song Y. Differential diagnosis of ascites: Etiologies, ascitic fluid analysis, diagnostic algorithm. *Clin Chem Lab Med (CCLM).* 2024;62(7):1266-76.
- [14] Lin YJ, Chen DY, Lan JL, Hsieh TY. Chylothorax as the initial presentation of systemic lupus erythematosus: A case report. *Clin Rheumatol.* 2007;26(8):1373-74.
- [15] Narita Y, Naoki K, Hida N, Okamoto H, Kunikane H, Omori T, et al. Case of bilateral chylothorax with systemic lupus erythematosus complicated by steroid-/immunosuppressant-resistant pleural effusion. *Nihon Kokyuki Gakkai Zasshi.* 2008;46:120-25.
- [16] Manzella DJ, Dettori PN, Hertimian ML, Melero MJ. Chylous ascites and chylothorax as presentation of a systemic progression of discoid lupus. *J Clin Rheumatol.* 2013;19:87-89.
- [17] Cárdenas A, Chopra S. Chylous ascites. *Am J Gastroenterol.* 2002;97(8):1896-900.
- [18] Ng ZQ, Han M, Beh HN, Keelan S. Chylous ascites in colorectal surgery: A systematic review. *World J Gastrointest Surg.* 2021;13(6):585-91.
- [19] Majed HI, Nabil MT, Juahar I, Mohammed JA. Chylothorax as a rare complication of systemic lupus erythematosus—case study. *Rheumatol (Bulgaria).* 2022;30(3):90-94.
- [20] Lu C, Wang L, Gao Q. Chylous ascites with lymphatic leakage localization: Technical aspects and clinical applications. *BMC Surg.* 2022;22(1):158.
- [21] Corredor-Orlandelli D, Arévalo-Romero A, Reyes C, Arango D. Massive right chylothorax secondary to a severe systemic lupus erythematosus flare with secondary evans syndrome: A case report and literature review. *Clin Med Insights Case Rep.* 2023;16:11795476231186735.
- [22] Epelde C, Saravia F, Aguinaga M, Toledo A, Lekuona A, Gorostidi M. Acute abdomen in pregnancy due to idiopathic chylous ascites. *Case Rep Obstet Gynaecol.* 2024;2024:8898451.
- [23] Weinzierl A, Grünherz L, Puippe GD, Gnannt R, Von Reibnitz D, Giovanoli P, et al. Microsurgical central lymphatic reconstruction—the role of thoracic duct lymphovenous anastomoses at different anatomical levels. *Front Surg.* 2024;11:1415010.
- [24] Negm AS, Collins JD, Bendel EC, Takahashi E, Knavel Koepsel EM, Gehling KJ, et al. MR lymphangiography in lymphatic disorders: Clinical applications, institutional experience, and practice development. *Radiographics.* 2024;44(2):e230075.
- [25] Sun Y, Tang Z, Wang X, Xu Z, Huang Y, Chi P. Focusing on chylous ascites: A noteworthy complication after laparoscopic/robotic para-aortic lymphadenectomy in left-sided colorectal cancer in a high-volume single center. *Tech Coloproctol.* 2025;29(1):78.
- [26] Arya R, Kumar R, Kumar T, Kumar S, Anand U, Priyadarshi RN, et al. Prevalence and risk factors of lymphatic dysfunction in cirrhosis patients with refractory ascites: An often unconsidered mechanism. *World J Hepatol.* 2023;15(10):1140.
- [27] Stoichitoiu LE, Ionescu GD, Neatu I, Baicus C. Causes of polyserositis: A systematic review. *J Pers Med.* 2023;13(5):834.
- [28] Mallick B, Mandavdhare HS, Aggarwal S, Singh H, Dutta U, Sharma V. Mycobacterial chylous ascites: Report of three cases and systematic review. *Ther Adv Infect Dis.* 2018;5(4):69-75.
- [29] Tulunay G, Ureyen I, Turan T, Karalok A, Kavak D, Ozgul N, et al. Chylous ascites: Analysis of 24 patients. *Gynaecol Oncol.* 2012;127(1):191-97.
- [30] Lizaola B, Bonder A, Trivedi HD, Tapper EB, Cardenas A. The diagnostic approach and current management of chylous ascites. *Aliment Pharmacol Ther.* 2017;46(9):816-24.
- [31] Do TV, Cozza J, Ganti S, Depa J. Recurrent chylous ascites leading to transudative chylothorax due to bi-ventricular heart failure. *J Investig Med High Impact Case Rep.* 2021;9:23247096211026144.
- [32] Athanasiadis DI, Carr RA, Painter R, Selzer D, Lee NK, Banerjee A, et al. Chylous ascites in the setting of internal hernia: A reassuring sign. *Surg Endosc.* 2022;36(4):2570-73.
- [33] Nakano TA, Dori Y, Gumer L, Liptzin DR, Hill LR, Kulungowski AM. How we approach pediatric congenital chylous effusions and ascites. *Pediatr Blood Cancer.* 2022;69:e29246.
- [34] Park SH, Kim KY, Cho M, Kim HI, Hyung WJ, Kim YM. Chylous ascites after gastric cancer surgery: Risk factors and treatment results. *J Gastric Cancer.* 2022;23(2):253.
- [35] Prihastuti PS, Wibawa ID. Diagnosis and management of chylous ascites. *Indones J Gastroenterol Hepatol Dig Endosc.* 2023;24(1):63-71.
- [36] Ashida H, Kasaki S, Enoki K, Ojiri H. Interventional radiology in management of postoperative chylous ascites. *Interv Radiol.* 2025;2023-0039.
- [37] Benjamin J, O'Leary C, Hur S, Gurevich A, Klein WM, Itkin M. Imaging and interventions for lymphatic and lymphatic-related disorders. *Radiology.* 2023;307(3):e220231.
- [38] Hur S. Novel interventional radiology for the treatment of various lymphatic leakages: Lymphatic intervention and embolization. *Vasc Spec Int.* 2023;39:42.
- [39] Hur S, Jun H, Jeong YS. Novel interventional radiological management for lymphatic leakages after gynaecologic surgery: Lymphangiography and embolization. *Gland Surg.* 2021;10(3):1260.
- [40] Laterre PF, Dugernier TH, Reynaert MS. Chylous ascites: Diagnosis, causes and treatment. *Acta Gastroenterol Belg.* 2000;63(3):260-63.
- [41] Calabrese PR, Frank HD, Taubin HL. Lymphangiomyomatosis with chylous ascites. Treatment with dietary fat restriction and medium chain triglycerides. *Cancer.* 1977;40(2):895-97.
- [42] Mas E, Borrelli O, Broekaert I, de-Carpi JM, Dolinsek J, Miele E, et al. Drugs in focus: Octreotide use in children with gastrointestinal disorders. *J Pediatr Gastroenterol Nutr.* 2022;74(1):1-6.
- [43] Kotb MA, Mosallam DS, Ragab HA, Abd El Baky H, El Hatw A, Hamza AF, et al. Management and outcome of chylous ascites in children: A CARE compliant case series. *Pediatr Sci J.* 2021;1(1):34-40.
- [44] Do TV, Cozza J, Ganti S, Depa J. Recurrent chylous ascites leading to transudative chylothorax due to bi-ventricular heart failure. *J Investig Med High Impact Case Rep.* 2021;9:23247096211026144.
- [45] Kong PF, Xu YH, Lai ZH, Ma MZ, Duan YT, Sun B, et al. Novel management indications for conservative treatment of chylous ascites after gastric cancer surgery. *World J Gastroenterol.* 2022;28(42):6056.
- [46] Nofal Y, Mahmoud S, Al-Rawi S, Rahil A. Successful treatment of cirrhotic chylous ascites using orlistat and dietary modifications: A case study and literature review. *Am J Case Rep.* 2023;24:e938611-1.
- [47] Litchinko A, Monnard E, Tappero C, Egger B. Role of Lipiodol® lymphangiography in the diagnosis and management of post-operative chylous ascites. *Front Radiol.* 2025;5:1537744.
- [48] Soysal DE, Hizar Turan S, Ozmen M, Pekdikler M, Kalender ME, Koc E, et al. A rare case of systemic lupus erythematosus with chylous ascites and chylothorax. *Case Rep Rheumatol.* 2013;2013:797696.
- [49] Chennadi S, Charoenpong P, Zulqarnain S. Systemic lupus erythematosus (SLE) with refractory bilateral chylothorax and chylous ascites. *Chest.* 2016;150(4_S):574A.
- [50] Hur S, Kim J, Ratnam L, Itkin M. Lymphatic intervention, the frontline of modern lymphatic medicine: Part I. History, anatomy, physiology, and diagnostic imaging of the lymphatic system. *Korean J Radiol.* 2023;24(2):95-108.
- [51] Chavhan GB, Amaral JG, Temple M, Itkin M. MR lymphangiography in children: Technique and potential applications. *Radiographics.* 2017;37(6):1775-90.
- [52] Ramirez-Suarez KI, Tierradentro-Garcia LO, Smith CL, Krishnamurthy G, Escobar FA, Otero HJ, et al. Dynamic contrast-enhanced magnetic resonance lymphangiography. *Pediatr Radiol.* 2022;52(2):285-94.
- [53] Zaidan LR, Ahmed EK, Halimeh B, Radwan Y, Terro K. Long-standing biliary colic masking chylous ascites in laparoscopic Roux-en-Y gastric bypass: A case report. *BMC Surg.* 2018;18:43.
- [54] Livingston EH. The incidence of bariatric surgery has plateaued in the U.S. *Am J Surg.* 2010;200:378-85.
- [55] Aalami OO, Allen DB, Organ CH Jr. Chylous ascites: A collective review. *Surgery.* 2000;128(5):761-78.
- [56] Al-Mulla AE, Sultan AE, Imam ES, Al-Huzaim RA. Swirl sign in post-Roux-en-Y gastric bypass patients: A case series. *J Surg Case Rep.* 2021;2021(12):rjab321.
- [57] Alejandre-Lafont E, Krompiec C, Rau WS, Krombach GA. Effectiveness of therapeutic lymphography on lymphatic leakage. *Acta Radiol.* 2011;52(3):305-11.
- [58] Bazancir LA, Jensen RJ, Frevert SC, Ryom P, Achiam MP. Embolization of the thoracic duct in patients with iatrogenic chylothorax. *Dis Esophagus.* 2021;34(9):doab001.

- [59] Le Pimpec-Barthes F, Pham M, Jouan J, Bel A, Fabiani JN, Riquet M. Peritoneoatrial shunting for intractable chylous ascites complicating thoracic duct ligation. *Ann Thorac Surg.* 2009;87(5):1601-03.
- [60] Weniger M, D'Haese JG, Angele MK, Kleespies A, Werner J, Hartwig W. Treatment options for chylous ascites after major abdominal surgery: A systematic review. *Am J Surg.* 2016;211:206-13.
- [61] De Simoni O, Barina A, Sommariva A, Tonello M, Gruppo M, Mattara G, et al. Complete mesocolic excision vs conventional hemicolectomy in patients with right colon cancer: A systematic review and meta-analysis. *Int J Colorectal Dis.* 2021;36:881-92.
- [62] Wang C, Gao Z, Shen K, Shen Z, Jiang K, Liang B, et al. Safety, quality and effect of complete mesocolic excision vs non-complete mesocolic excision in patients with colon cancer: A systematic review and meta-analysis. *Colorectal Dis.* 2017;19:962-72.
- [63] Leibovitch I, Mor Y, Golomb J, Ramon. The diagnosis and management of postoperative chylous ascites. *J Urol.* 2002;167(2 Pt 1):449-57.
- [64] Siebert S, Helbling C, Wolff M, Franz A, Müller A, Kau N, et al. Peritoneovenous shunting as palliative treatment in an infant with chylous ascites due to generalised congenital lymphangiectasia. *Klin Padiatr.* 2010;222(5):317-18.
- [65] Camoglio FS, Dipaola G, Cervellione RM, Chironi C, Giacomello L, Zanatta C, et al. Treatment of neonatal chylous ascites using a modified Denver peritoneovenous shunt: A case report. *Pediatr Med Chir.* 2003;25(2):145-47.
- [66] Majdalany BS, Khayat M, Downing T, Killoran TP, El-Haddad G, Khaja MS, et al. Lymphatic interventions for isolated, iatrogenic chylous ascites: A multi-institution experience. *Eur J Radiol.* 2018;109:41-47.
- [67] Gao Q, Xie W, Wang Q, Wei G, Yao N, Li Z, et al. Novel technique to manage refractory chylous ascites with carbon nanoparticle suspension in infants. *J Pediatr Surg.* 2020;55(4):772-76.
- [68] Wang LY, Li JH, Zhou X, Zheng QC, Cheng X. Clinical application of carbon nanoparticles in curative resection for colorectal carcinoma. *Onco Targets Ther.* 2017;10:5585-89.

PARTICULARS OF CONTRIBUTORS:

1. Junior Resident, Department of Shalya Tantra, Mahatma Gandhi Ayurved College, Hospital and Research Centre, Wardha, Maharashtra, India.
2. Professor and Head, Department of Shalya Tantra, Mahatma Gandhi Ayurved College, Hospital and Research Centre, Wardha, Maharashtra, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Sakshi D Ghugul,
Datta Meghe Institute of Higher Education and Research Sawangi (Meghe),
Wardha-442001, Maharashtra, India.
E-mail: sakshighugal@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Jul 02, 2025
- Manual Googling: Apr 06, 2026
- iThenticate Software: Apr 08, 2026 (1%)

ETYMOLOGY: Author Origin**EMENDATIONS:** 6**AUTHOR DECLARATION:**

- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Jun 29, 2025**Date of Peer Review: **Oct 25, 2025**Date of Acceptance: **Apr 11, 2026**Date of Publishing: **Jun 01, 2026**