Congenital chylothorax in infants: An updated scoping review

A Alghobaishi,[1,2] MD, Clinical Fellowship in Pediatric Critical Care Medicine, Saudi Arabia, Fellowship in Paediatric Critical Care Medicine, University of Toronto; **S I Albraim,**[3] MD; **H I Albraim,**[3] MD; **N S Gubari,**[4] MD; **S Khan,**[4] 3rd-year medical student; **H I Thalib,**[4] 3rd-year medical student; **S Alagha,**[4] MD

[1] *Pediatric Critical Care, Department of Pediatric Medicine, King Fahad Armed Forces Hospital, Jeddah, Saudi Arabia*
[2] *Department of Pediatrics, Saudi German Hospital, Jeddah, Saudi Arabia*
[3] *Department of General Medicine, MyClinic, Jeddah, Saudi Arabia*
[4] *General Medicine Practice Program, Batterjee Medical College, Jeddah, Saudi Arabia*

Corresponding author: *S Khan (khansariya22@gmail.com)*

Chylothorax is a medical condition characterised by the abnormal accumulation of lymphatic fluid in the pleural cavity. In its congenital form, chylothorax develops as a result of an idiopathic abnormality in the thoracic duct. Congenital chylothorax (CCT) is the leading cause of pleural effusion in infants, a condition where excess fluid builds up in the space between the lungs and the chest wall. This scoping review includes a wide range of published studies from 1980 to January 2024, obtained from multiple reputable databases, including Google Scholar, PubMed, Springer and BioMed Central. Effective management strategies are crucial for improving outcomes in infants with CCT. Timely drainage of pleural fluid is essential to alleviate respiratory distress and prevent further complications. Appropriate nutritional care is also critical, as it helps in supporting the neonate's overall health and recovery. Early intervention and continuous monitoring can significantly improve the likelihood of a positive outcome.

Keywords. Congenital chylothorax, lymphatic dysfunction, respiratory distress.

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Study synopsis

What the study adds. Congenital chylothorax (CCT) is a serious but rare condition in newborns. CCT is characterised by the accumulation of lymphatic fluid in the pleural space with subsequent respiratory distress. This scoping review of recent literature describes current concepts in the aetiology, diagnosis and treatment of CCT in newborns, emphasising the importance of timely diagnosis and a multidisciplinary strategy. The review integrates available evidence on CCT, emerging diagnostic strategies such as lymphangiography and lymphoscintigraphy, and treatments such as video-assisted thoracoscopic surgery, to provide clinicians with practice-informed choice.

Implications of the findings. Early management and tailored intervention can improve results in infants with CCT. Improvements in morbidity and mortality have demonstrated the importance of new management strategies.

Chylothorax is a medical condition characterised by the abnormal accumulation of lymphatic fluid, or chyle, in the pleural cavity. It can occur either congenitally or as an acquired condition. In its congenital form, chylothorax develops as a result of an idiopathic abnormality in the thoracic duct, the main conduit for lymphatic drainage in the body. In contrast, acquired chylothorax typically arises as a result of trauma, surgical complications, or conditions such as infections, malignancies or thoracic duct injuries.[1,2] In infants, congenital chylothorax (CCT) is the leading cause of pleural effusion, a condition where excess fluid builds up in the space between the lungs and the chest wall. The reported incidence of CCT ranges from 1 in 5 800 to 1 in 24 000 live births, highlighting its rarity.[1] Despite its uncommon occurrence, CCT is associated with significant morbidity and mortality, often presenting serious challenges for both patients and healthcare providers.

Infants with CCT typically present with a variety of clinical symptoms, the most common of which is respiratory distress. The build-up of lymphatic fluid in the pleural space can compress the lungs, impairing respiratory function and leading to breathing difficulties. In addition, these infants may experience malnutrition, as the continuous loss of lymphatic fluid can result in depletion of essential nutrients and fats, leading to failure to thrive. Immune system compromise is also a significant concern, because lymph contains immune cells vital for defending the body against infections. Consequently, infections tend to be relatively common among affected infants. Furthermore, metabolic abnormalities may arise as a result of loss of electrolytes and proteins through lymphatic fluid leakage, exacerbating the infant's fragile condition.[3]

This article aims to provide a comprehensive exploration of CCT in infants. By reviewing and synthesising the latest scientific knowledge, we seek to highlight the key aspects of this rare but serious condition. The goal is to enhance understanding among clinicians and healthcare providers to improve clinical practices, leading to earlier diagnosis,

more effective management strategies, and ultimately better outcomes for infants affected by this challenging disorder.

Methods

This scoping review includes studies published from 1980 to January 2024, obtained from a range of reputable databases, including Google Scholar, PubMed, Springer and BioMed Central. The search strategy employed specific keywords including 'congenital chylothorax', 'infants', 'chyle', 'thoracic obstruction', and 'genetic abnormalities'.

Inclusion criteria were: (*i*) studies focusing on CCT in infants; (*ii*) publications in English; and (*iii*) case reports, systematic reviews and clinical trials. Exclusion criteria were: (*i*) studies focusing on acquired chylothorax; and (*ii*) articles not available in full text.

To ensure accuracy and relevance of the information, data extraction methods were applied to identify significant patterns, trends and key findings across the selected studies. This process enabled the synthesis of diverse and significant findings, contributing to a comprehensive and detailed understanding of CCT. By filtering and analysing the available literature, this review aims to provide a reliable resource that offers an in-depth explanation of CCT and supports the development of improved clinical approaches.

Aetiology and pathophysiology

The lymphatic system plays an important role in the human body, performing three key functions essential for maintaining homeostasis. Firstly, it helps in the transport of lipids and lipid-soluble vitamins from the digestive system to the systemic circulation. Secondly, it collects and returns extravasated proteins and fluid from the interstitial spaces, preventing fluid accumulation and tissue oedema. Lastly, the lymphatic system ensures the circulation of lymphocytes, which are crucial for immune function, by returning them to the bloodstream.[4]

The term 'chyle' is derived from the Greek word meaning 'juice', and refers to a milky body fluid produced during digestion. It is an alkaline, non-inflammatory and bacteriostatic fluid, the latter meaning that it resists bacterial growth. It is primarily composed of fat, electrolytes, proteins, glucose, and a high concentration of lymphocytes. During digestion, particularly after consuming fatty foods, the small intestine releases chyle, which is absorbed by specialised lymphatic vessels called lacteals.[5] Chyle has a normal protein concentration >3 g/L, and its electrolyte content closely resembles that of blood serum. The cell content of chyle is >1 000 cells/L, with the majority being T lymphocytes, which range from 400 to 6 800/mm^3. In a healthy adult, up to 4 L of chyle may be transported through the thoracic duct each day, with the normal range between 1.5 and 2.5 L daily. Chyle flows through the thoracic duct at varying rates, depending on the physiological state. During fasting, the rate may be as low as 14 mL per hour, while in the postprandial state, it can exceed 100 mL per hour. Approximately 10% of the fluid that leaks into the interstitial spaces is absorbed by lymphatic capillaries, forming lymph. These capillaries merge into larger lymphatic vessels, which eventually converge into the largest lymphatic vessel in the body, known as the thoracic duct. It runs behind the aorta and in front of the thoracic vertebrae, and its primary function is to return lymph to the bloodstream by draining it into the venous system at the junction of the left internal jugular and subclavian veins. This process is critical for maintaining fluid balance and therefore preventing tissue oedema by allowing re-entry of interstitial fluid into the circulatory system.[6,7]

The thoracic duct is the largest lymph vessel in the body. It starts as the cisterna chyli in the abdominal cavity and ascends upwards through the thorax and eventually into the left subclavian vein. The duct returns lymph and chyle, which is full of immune cells, fats and proteins, into circulation.[8,9] Any obstruction to this vessel will lead to chyle collection in the pleural space and cause chylothorax. In addition to thoracic duct agenesis and genetic syndromes, CCT can be caused by: (*i*) congenital lymphangiectasia, a developmental disorder in which the lymphatic vessels in the lungs are abnormally dilated, with abundant leakage of lymph; (*ii*) pulmonary lymphangiectasia, a rare condition in which the lymphatic vessels in the lung are dilated, causing chyle accumulation; and (*iii*) lymphangiomatosis, a progressive disease with abnormal growth of lymph vessels involving various organs, including the thoracic space.[10]

CCT primarily results from abnormal development of the lymphatic system during intrauterine life. This abnormality can manifest in several ways, including agenesis (absence) of the thoracic duct, which leads to inadequate lymph drainage. When the lymphatic system fails to develop properly, chyle can leak into the pleural space, resulting in chylothorax.[11] Additionally, congenital obstructions in the thoracic duct or at the venous junction can disrupt the normal flow of lymph, leading to the accumulation of chyle in the pleural cavity. Increased lymph production, as seen in conditions such as fetal hydrops, can also overwhelm the lymphatic system's capacity, resulting in CCT.[11]

Genetic disorders, such as Noonan, Down and Turner syndromes, are known to predispose infants to CCT, as these conditions often include abnormalities in the development of the lymphatic system. Although rare, intrauterine trauma or familial genetic predispositions may also contribute to the onset of CCT.[12] Understanding the underlying causes of CCT, including both genetic and anatomical factors, is crucial for developing targeted treatment strategies aimed at reducing the morbidity and mortality associated with this condition.

Diagnostic approaches

The diagnosis of CCT requires a comprehensive, multifaceted approach that includes imaging modalities, laboratory tests, and genetic testing in certain specific cases. During the prenatal period, one of the primary diagnostic tools used is ultrasound, which can detect pleural effusions as early as the second trimester. Ultrasound remains crucial even in the postnatal phase, as it enables clinicians to confirm the existence of chyle in the pleural cavity and assess the severity and extent of the chylothorax. Ultrasound is non-invasive and widely available, making it a first-line tool in both prenatal and postnatal diagnostics.[13]

Magnetic resonance imaging (MRI) is another key imaging technique that offers more detailed visualisation of the thoracic duct and the lymphatic structures associated with it. MRI is particularly useful for cases in which there are questions regarding the underlying anatomical causes of the chylothorax, such as obstructions or malformations of the thoracic duct.[14]

In addition to these classic imaging techniques, newer ones are increasingly being employed to achieve higher specificity. Lymphangiography is a high-end imaging technique that enables the clinician to see the lymphatic structures and offers visualisation of a leak or area of blockade. This technique is based on injecting contrast dye into the lymph pathways, which can potentially mark lymphatic defects and provide useful information to develop a specific intervention. Another recently developed modality is lymphoscintigraphy, which involves use of radiolabelled tracers to assess lymphatic function in real time and aid in the detection of abnormal patterns of lymphatic drainage. Such new imaging modalities complement the conventional diagnostic practices and give a more accurate understanding of the pathophysiology of CCT.[15,16]

A definitive diagnosis of chylothorax is often confirmed through thoracentesis, followed by analysis of pleural fluid.[17] A triglyceride level >110 mg/dL in the pleural fluid is typically diagnostic of chylothorax. However, it is important to note that in certain cases, particularly depending on the patient's fat intake or the time since the last meal, triglyceride levels may be normal. In such instances, lipoprotein electrophoresis can confirm the diagnosis by showing the presence of chylomicrons in the pleural fluid. Additionally, chylous pleural fluid tends to have a total cholesterol level <200 mg/dL, further distinguishing it from other causes of pleural effusions.[17] In cases where CCT is suspected to be part of a broader genetic syndrome, genetic testing plays a crucial role in establishing the underlying aetiology. The identification of specific genetic mutations or chromosomal abnormalities through genetic screening can offer invaluable insights into the cause of CCT, particularly in infants with conditions such as Noonan, Turner or Down syndromes, which are known to be associated with abnormal lymphatic development. Early identification of these genetic factors can guide both diagnosis and management, improving the likelihood of a favourable outcome for affected infants.[18]

Management and treatment options

CCT is usually a short-term condition that is resolved by termination of the lymphatic flow in the thorax.[19] Since CCT is such a rare condition, there are insufficient studies to shed light on an optimal treatment plan and duration. Generally, a stepwise approach is used in which the condition is initially managed conservatively for a short period of time before more invasive measures are begun. Progression in the risk and invasiveness of the treatment options is determined by response to the treatments, measured by the volume of drained fluid (>10 mL/kg/d is considered high), as well as the degree of interference with pulmonary function.[20] Following spontaneous resolution of chylothorax, several non-surgical methods have been used in the past to try to prevent or treat chylothorax recurrence, including dietary changes and adjunctive medications.

Dietary changes

When CCT is diagnosed, dietary modifications are the first-line management to reduce the flow of chyle through the thoracic duct while waiting for spontaneous healing to occur. These changes include starting formulas enriched with medium-chain triglycerides (MCTs), a fat-free diet, or aggressive fasting accompanied by total parenteral nutrition (TPN) containing MCTs. Furthermore, an MCT diet should be maintained for 6 weeks after removal of the chest drains, along with weekly perfusion of a 20% lipid solution and fat-soluble vitamins, to avoid deficiencies in these essential nutrients. Höck *et al.*[21] used a procedure to skim breastmilk for use in infants with CCT. Patients with chylothorax have high energy and protein requirements because of increased metabolic demand from the combination of chyle loss and hypermetabolism associated with surgery. Protein supplementation may be necessary to maintain total body protein stores and serum albumin concentrations >30 g/L. In addition, electrolytes, micronutrients and clotting factors should be monitored and replaced as necessary.[21]

Thoracocentesis and chest tube

When a large volume of pleural fluid is initially aspirated during diagnostic procedures, which may compromise respiratory function or present a risk of recurrence, the insertion of a chest tube is warranted to facilitate continuous drainage of the pleural space. Continuous drainage is crucial for managing significant pleural effusion effectively. However, prolonged use of a chest tube has been associated with risks such as electrolyte imbalances, fluid imbalances, malnutrition and immunodeficiency.[22] To minimise these complications, continuous drainage should be limited to a period of <2 weeks. If the volume of fluid drained exceeds 1.5 L per day, or if the patient develops complications such as infections or worsening of symptoms, surgical intervention should be considered. Surgical options may be necessary to address the underlying issues more effectively and prevent further complications.[23]

Medical treatment

Somatostatin/octreotide

Somatostatin acts on various organs, including the gastrointestinal tract. Octreotide, a synthetic somatostatin with a longer half-life and increased potency, can be administered subcutaneously.[18] When pleural drainage and dietary modification prove to be ineffective, somatostatin/ocretotide is the treatment of choice.[24] These agents induce splanchnic vasoconstriction and decrease hepatic venous flow, as well as decreasing pancreatic and gastric secretions. All these changes in turn lead to reduced lymphatic flow.[25] Both of these agents can be given as a continuous intravenous infusion or as an intravenous bolus twice daily. The starting dose of somatostatin is 3.5 mg/kg/h, and the dose can be increased to 10 mg/kg/h. The octreotide dose in children can range from 0.3 to 1.0 mg/kg/h.[18] The duration of administration in cases of successful resolution varies between 4 and 21 days and is largely guided by response to therapy.[26] Regular monitoring of liver function, blood glucose and thyroid function is recommended during administration of these agents.[27] There are no clinical trials that have studied the effect of octreotide on infants with CCT. Evidence is limited to case reports and data from observational studies. A systematic review conducted by Resch *et al.*[2] reported octreotide being a cornerstone in CCT treatment alongside respiratory support, pleural drainage, TPN and an MCT diet. In addition, Abuhamda *et al.*[28] reported a case of CCT with good response to IV octreotide and an MCT diet.

Nitric oxide

Oh *et al.*[29] reported inhaled nitric oxide to be beneficial in managing persistent pulmonary hypertension of newborns caused by CCT, even when mechanical ventilation could not improve respiratory distress.

Etilefrine/midodrine

Etilefrine is a sympathomimetic agent with both alpha- and beta-adrenergic stimulation. A report of two cases by Muniz *et al.*[30] noted a significant reduction of chyle output after initiation of a continuous infusion of etilefrine. Tomobe *et al.*[31] reported successful resolution of a refractory case of CCT after using etilefrine in combination with pleurodesis. Moreover, another case report of refractory CCT by Tamaoka *et al.*[32] noted successful remission of CCT and ascites with the use of midodrine, an oral alpha-1-adrenoreceptor agonist.

Sildenafil

Sildenafil, commonly used to treat pulmonary arterial hypertension, has recently gained attention for its potential use in managing CCT. Malleske and Yoder[33] were the first to report successful treatment of CCT with sildenafil, marking a new avenue for addressing this challenging condition. Following this, Uzodimma *et al.*[34] published a case study demonstrating that oral sildenafil significantly reduced pleural fluid volume in just 5 days in a patient with CCT, indicating its effectiveness in rapidly improving symptoms. Additionally, Bhagiratha *et al.*[35] reported a case in which sildenafil was added to the treatment regimen for persistent chyle drainage. This approach proved beneficial, enhancing the management of CCT when standard treatments alone were insufficient. In summary, these studies highlight the promising role of sildenafil as an adjunctive therapy for CCT, offering a valuable option for patients who do not respond to conventional treatments.

Propranolol

Propranolol, a non-selective beta-adrenergic receptor blocker, is commonly used for managing hypertension, tachyarrhythmias and infantile haemangiomas. A prospective study by Handal-Orefice *et al.*[36] demonstrated that propranolol can be effective in treating chylothorax that is resistant to standard management approaches. Additionally, Mitchell *et al.*[37] observed an improvement in chylous effusion in an infant with CCT following the initiation of propranolol therapy. Furthermore, a case study by Liviskie *et al.*[38] reported successful outcomes using lower doses of propranolol (5 mg/kg/d), indicating that even reduced doses can be effective in managing this condition.

Corticosteroids

A retrospective study by Sersar *et al.*[39] highlighted the effectiveness of corticosteroids in reducing chest tube drainage of chylothorax following cardiac surgery, suggesting that corticosteroid therapy can be a valuable intervention in managing this condition. Similarly, Fujino *et al.*[40] reported successful resolution of CCT after initiating treatment with a combination of prednisolone, octreotide and TPN, highlighting the potential efficacy of these therapeutic approaches in managing CCT.

Surgical management

Surgical intervention for chylothorax should be considered when conservative medical management is insufficient to reduce chyle flow and facilitate healing of the thoracic duct. Although there is no universally agreed upon timing for surgery, it is generally recommended if the pleural effusion persists for >2 weeks or if large volumes of chyle are being drained, such as 100 mL per day in children.[18] Video-assisted thoracoscopic surgery (VATS) is increasingly popular as a less traumatic surgical option for CCT, particularly when conservative therapy is unsuccessful. In contrast to open thoracotomy with a large incision and extensive dissection, VATS is carried out using small keyhole incisions with a thoracoscope that contains a camera to obtain real-time views of the pleural space and thoracic duct, allowing precise identification and control of chyle leaks with less traumatic surgery.[41]

The indications for VATS in CCT are high-volume chronic chyle output (>10 mL/kg/d for >2 weeks), failure to respond to conservative management with pharmacological intervention and dietary modification, recurrent pleural effusions without drainage, and suspected anatomical thoracic duct abnormalities. VATS can be employed for the following therapeutic procedures: direct thoracic duct ligation, pleurodesis, and tissue sealing with fibrin glue or other sclerosing agents. VATS thoracic duct ligation is strongly indicated whenever the intraoperative site of leakage is definable. The procedure involves suture, clip closure or stapling with the use of energy devices to close injured lymph channels. Secondly, when the precise leak source is not easily identifiable, VATS can be used to enable intralymphatic dye injections, such as methylene blue or indocyanine green, to make leaks visible. This technique significantly increases the precision of surgical treatment and improves patient outcome. Pleurodesis, another VATS procedure, is insufflation of a sclerosing agent such as talc, doxycycline or fibrin glue into the pleural space to induce fibrosis and pleural surface adhesion that prevents further chyle accumulation. It is particularly helpful in infants with widespread lymphatic leakage where selective ligation is not feasible.[42,43]

Relative to traditional open surgery, VATS has certain advantages, such as reduced postoperative pain, shorter hospitalisation, quicker recovery, and lower rates of complications such as infection and wound dehiscence. Excellent success rates with VATS have been reported in infants with CCT, particularly when early VATS was performed in refractory chylous effusions. Although it is generally safe and effective, some complications of VATS are recurrent air leaks, inability to close chyle leaks, and, in a small number of instances, injury to the surrounding thoracic structures. With growing experience in surgical technique and perioperative care, however, VATS is a useful part of modern CCT treatment, offering a less invasive but highly effective option in infants with intractable disease. Evolving future technologies, advances and research, e.g. robot-assisted VATS, are likely to improve precision and outcomes of performing repair in neonatal chylothorax.[44,45] While VATS is being used increasingly in the majority of centres because it is minimally invasive and recovery is rapid, it should be remembered that open thoracotomy remains a standard procedure, particularly in low- and middle-income countries and in children in whom VATS cannot be performed. The surgical approach will therefore have to be decided based on institutional experience and resource availability. Intraoperative cream or dye-stained enteral feeds via a nasogastric tube can be useful to demonstrate the site and presence of chyle leak to facilitate direct ligation or clipping of the thoracic duct.

Most studies advocate a period of conservative management lasting 3 - 4 weeks before opting for surgical treatment, allowing for the possibility of spontaneous resolution and minimising the risk of premature surgical intervention. However, in cases where a specific site

of chyle leak is identified and high chyle flow prevents spontaneous healing, earlier surgical intervention may be warranted.[18] Alternatively, a pleuroperitoneal shunt can be created to redirect chyle from the pleural space to the peritoneal cavity, where it is absorbed.[25] Thoracic duct ligation, performed via thoracoscopy or thoracotomy, involves surgically closing off the thoracic duct to stop chyle flow into the pleural space.[25] Thoracic duct embolisation uses radiological techniques to occlude the thoracic duct and prevent chyle leakage.[25] Additionally, creating an anastomosis between the thoracic duct and the azygous vein can re-route chyle flow back into the venous system.[25] The choice of surgical procedure depends on the specific characteristics of the chylothorax, including the location of the chyle leak and the overall health of the patient, aiming to achieve the best possible outcome. Table 1 summarises the management options used in various cases of CCT and the outcomes of these interventions.

Prognosis and outcomes

The prognosis of CCT can vary significantly based on several factors, including the severity of the condition and the timing and effectiveness of diagnosis and treatment. Infants diagnosed with CCT may encounter immediate respiratory challenges due to the accumulation of chyle in the pleural cavity. This accumulation can lead to complications such as hypoxia (insufficient oxygen in the blood), respiratory distress, and persistent pulmonary hypertension of the newborn, all of which can worsen the infant's overall clinical status.[51] Several factors can influence the prognosis of CCT, including the underlying cause of the condition, the presence of associated genetic syndromes, and the infant's overall health at birth. Research has shown that infants with isolated CCT – where no other congenital anomalies are present – tend to have a more favourable prognosis compared with those with additional congenital abnormalities. For example, a study by Al Tawil *et al.*[52] found that term and preterm infants with isolated CCT had a generally positive prognosis, even when hydrops (fluid accumulation in fetal tissues) was present. Effective management strategies are crucial for improving outcomes in infants with CCT. Timely drainage of pleural fluid is essential to alleviate respiratory distress and prevent further complications. Appropriate nutritional care is also critical, as it helps in supporting the infant's overall health and recovery. Early intervention and continuous monitoring are key components in managing CCT effectively, and they can significantly enhance the likelihood of a positive outcome. Another important determinant of prognosis is the volume of chyle present in the pleural fluid and the infant's response to treatment.[53]

Although these interventions lead to stabilisation of the condition, there remains a risk of developing complications. Common issues include infections, nutritional deficiencies and long-term developmental challenges. The development of chronic lung disease, recurrent pleural effusions and developmental delays is particularly prevalent if CCT is associated with other congenital anomalies. While effective management can lead to stabilisation and improved outcomes, ongoing monitoring and supportive care are essential to manage these potential long-term impacts and ensure the best possible quality of life for affected infants.

Conclusion

Chylothorax is a complex condition and presents a treatment challenge, especially in infants with CCT. It is characterised by an excess of chyle in the pleural cavity. There are many reasons for development of CCT, including abnormal development of the lymphatic system, genetic abnormalities, and presence of other risk factors. Timely detection and early intervention are crucial for effective management in infants. Clinical outcomes can vary depending on the presence of other conditions in association with CCT. Patients with isolated CCT generally have a better prognosis than those with genetic conditions. The clinical outcome and prognosis also depend on factors such as time of detection, response to treatment, and amount of chyle accumulated. As research and clinical practice continue to

Table 1. Management options for and outcomes of congenital chylothorax in infants

Authors, title and year of publication	Management	Outcome
Resch *et al.* Congenital chylothorax of the newborn: A systematic analysis of published cases between 1990 and 2018 (2022)[2]	MCT diet, octreotide, pleurodesis	88% survival rate; early intervention improved outcomes
Wang *et al.* Clinical features and outcomes of congenital chylothorax: A single tertiary medical center experience in China (2022)[24]	Mechanical ventilation, delayed feeding, octreotide therapy	88% survival rate; better outcomes with prenatal therapy
Healy *et al.* Management and outcomes of congenital chylothorax in the neonatal intensive care unit: A case series (2017)[46]	TPN, chest drainage, surgery	75% survival; early surgery led to better prognosis
Li *et al.* Sildenafil to treat congenital chylothorax: The first case report in Taiwan (2024)[47]	Sildenafil, MCT diet	Significant reduction in pleural effusion; successful discharge
Resch *et al.* Long-term follow-up of children with congenital chylothorax (2012)[48]	Surgical intervention, MCT diet	Long-term survival with normal development in most cases
Vain *et al.* Neonatal chylothorax: A report and discussion of nine consecutive cases (1980)[49]	Somatostatin analogues, chest drainage	78% survival; higher survival rates in later gestational age births
Resch B. Management of congenital chylothorax of the newborn (2022)[50]	Conservative management, including MCT diet and pleural drainage	High survival rate with conservative management; surgical intervention required in non-responders

MCT = medium-chain triglyceride; TPN = total parenteral nutrition.

evolve, a deeper understanding of CCT will enhance early detection, improve treatment strategies, and ultimately lead to better outcomes for affected infants.

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