

Case Report

Post-Esophagectomy Chylothorax: The Impact of Thoracic Duct Embolization on Clinical Outcomes

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Abstract

Chylothorax, an accumulation of chyle in the pleural cavity, typically occurs due to thoracic duct damage, presenting as a milky exudate with high lymphocyte and triglyceride content. It is most commonly observed following thoracic surgeries, especially esophagectomy. This report describes the case of a 48-year-old man treated for chylothorax after a McKeown esophagectomy. The patient was treated conservatively with no improvement until undergoing embolization of the thoracic duct. The lymphatic cistern was not identified and several unsuccessful attempts at catheterization were made, but embolization of the thoracic duct was not possible. Despite this, the cervical discharge stopped three days later.

This case highlights the evolving role of minimally invasive interventions like thoracic duct embolization and alternative techniques in managing high-output chylothorax.

Keywords: Chylothorax; Esophagectomy; Lymphocytes

Introduction

Chylothorax is a rare but potentially life-threatening complication characterized by chyle accumulation in the pleural cavity. The condition manifests as a milky exudate rich in lymphocytes and triglycerides [1-3]. It is most commonly caused by thoracic duct injury following thoracic surgery, particularly esophagectomy, with an incidence ranging from 4.7% to 8.6% in such cases [2,3,4]. It typically presents within the first two weeks postoperatively [1].

The treatment strategy depends on the severity of the condition. Low-output chylothorax (<1000 mL/day) is generally managed conservatively with chest drainage, parenteral nutrition, or a low-fat diet. In contrast, high-output chylothorax (≥ 1000 mL/day) or cases unresponsive to conservative measures often necessitate surgical thoracic duct ligation or Thoracic Duct Embolization (TDE) [1-5]. TDE, a minimally invasive procedure, has gained prominence due to its efficacy and reduced morbidity compared to surgical alternatives [1-5].

This case report discusses the management of a patient with high-output chylothorax following esophagectomy, emphasizing the challenges and alternative approaches in treating thoracic duct injuries.

Case Presentation

A 48-year-old man presented with progressive dysphagia to solid

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food, choking episodes, regurgitation, and significant weight loss over three months. Upper gastrointestinal endoscopy revealed a friable, non-passable tumor in the upper third of the esophagus, 24 cm from the dental arch. Imaging studies identified esophageal stenosis at the level of the carina, proximal esophageal dilation, and no signs of metastatic disease.

Following multidisciplinary evaluation, the patient underwent primary chemoradiotherapy, followed by McKeown esophagectomy and Stamm-type jejunostomy. Postoperatively, the patient developed high-output chylous drainage (≥ 1000 mL/day) through a cervical drain by the fourth postoperative day. Analysis of the drainage confirmed thoracic duct injury. Conservative management was initiated, including cessation of enteral feeding, initiation of total parenteral nutrition, and octreotide therapy. Despite these measures, the chylous drainage persisted.

On postoperative day 22, an attempt was made to perform selective thoracic duct embolization. An intranodal lymphangiogram with lipiodol was conducted, but the lymphatic cistern could not be identified, and multiple catheterizations attempts at the L2 level were unsuccessful. Remarkably, the cervical discharge diminished spontaneously, ceasing entirely by postoperative day 25. The patient tolerated an oral diet and was discharged on postoperative day 31, asymptomatic and with no signs of recurrence.

Discussion

Chylothorax, though rare, is a significant complication of thoracic surgeries, particularly esophagectomy, with an overall incidence of approximately 0.4% across all thoracic procedures [3]. Management depends on the volume of chyle output and the underlying cause. Conservative treatment suffices for low-output cases but is often inadequate for high-output chylothorax. In such cases, surgical ligation or embolization of the thoracic duct is frequently recommended [4-6].

Surgical thoracic duct ligation, traditionally the standard treatment for refractory cases, carries significant morbidity (25%) and mortality (38.8%) [6]. Thoracic duct embolization has emerged as a

viable, less invasive alternative, demonstrating success rates between 60% and 80% [1-3]. The procedure involves lymphangiography, thoracic duct cannulation, and embolization. However, its efficacy is contingent on successful identification and catheterization of the lymphatic channels.

In cases where TDE is unsuccessful, alternative techniques like the needle disruption method have been employed. This technique involves puncturing lymphatic vessels with a fine needle, disrupting the chyle flow and promoting spontaneous sealing of the leak. Although the precise mechanism remains unclear, factors such as local inflammatory responses, hematoma formation, and increased lymphatic viscosity likely contribute to its effectiveness. Success rates for needle disruption range from 44% to 72%, with intentional and targeted disruptions yielding better outcomes [7-9].

While the needle disruption approach has a high success rate, it is still less effective than a well accomplished TDE [2].

Lymphangiography itself may also have therapeutic benefits. Studies suggest that lipiodol injection during lymphangiography induces localized inflammation, leading to closure of the leak [3,10]. Additionally, newer approaches, such as hybrid techniques combining embolization and surgical ligation, are being explored to address refractory cases. The growing use of advanced imaging techniques, including MRI-based lymphangiography, has the potential to improve procedural success rates [11-13].

In the present case, the patient's high-output chylothorax resolved without further intervention after failed TDE attempts. This outcome may reflect the natural sealing of the thoracic duct injury facilitated by the inflammatory effects of lipiodol and the cessation of chyle flow through conservative measures [5,8]. This underscores the importance of individualized management and highlights the potential for spontaneous resolution even in refractory cases.

Conclusion

The management of high-output chylothorax has evolved with the advent of minimally invasive techniques like thoracic duct embolization and needle disruption. Despite their efficacy, limitations such as failure to identify and cannulate lymphatic channels remain challenges [6,7]. Hybrid approaches combining minimally invasive and surgical techniques may address these limitations in complex cases [10-13]. Additionally, advancements in imaging technologies can enhance the identification and treatment of thoracic duct injuries [11].

This case demonstrates that, even when embolization is unsuccessful, conservative measures and the physiological effects of lymphangiography may lead to resolution. The integration of innovative techniques and continued research into lymphatic interventions are crucial to improving outcomes for patients with high-output chylothorax.

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