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CLINICAL CASE

QUILOTÓRAX EN PACIENTE CON HERIDA TORACOABDOMINAL: REPORTE DE CASO

CHYLOTHORAX IN A PATIENT WITH A THORACOABDOMINAL WOUND: CASE REPORT

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RESUMEN

Un paciente sano produce aproximadamente dos litros de líquido quiloso proveniente del tracto gastrointestinal en 24 horas, los cuales son transportados a través del conducto torácico hacia el sistema vascular. Cuando ocurre una lesión de este conducto por cualquier mecanismo, sobreviene una rápida acumulación de quilo en el espacio pleural, presentamos el caso de un hombre en su quinta década de la vida quien ingresa al servicio de urgencias con herida por arma de fuego a nivel toracoabdominal la cual requirió de manejo con toracostomía cerrada y rafia de lesión diafragmática, durante su postoperatorio se evidencio producción por sistemas de drenaje de líquido de característica tipo quilo ante lo cual se realiza un citoquímico confirmado presencia de quilotórax con un nivel de triglicéridos de 166.03 se inició manejo multidisciplinario por parte del equipo de cirugía de tórax y nutrición posterior a dos semanas paciente persistía con clínica se realizó manejo quirúrgico con pleurodesis ante la no se evidencio cambios en el paciente y como instancia final se decide realizar manejo del conducto torácico el paciente presentó mejoría con posterior egreso de la institución.

PALABRAS CLAVE:

Heridas por arma de fuego, Quilotórax, Neumotórax, Hemotórax, Nutrición.

SUMMARY

A healthy patient produces approximately two liters of chylous fluid from the gastrointestinal tract in 24 hours, which is transported through the thoracic duct to the vascular system. When an injury occurs to this duct by any mechanism, a rapid accumulation of chyle in the pleural space follows. We present the case of a 41-year-old

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man who was admitted to the emergency department with a gunshot wound at the thoracoabdominal level, which required management with closed thoracostomy and diaphragmatic lesion repair. During his postoperative period, chylous fluid was observed in the drainage systems. A cytochemical test confirmed the presence of chylothorax with a triglyceride level of 166.03. A multidisciplinary approach was initiated by the thoracic surgery and nutrition teams. After two weeks, the patient developed peristalsis with clinical symptoms, and surgical management with pleurodesis was performed due to the lack of changes in the patient's condition. As a final measure, thoracic duct management was decided upon, and the patient showed improvement and was subsequently discharged from the institution.

KEYWORDS:

Gunshot wound, Chylothorax, Pneumothorax, Hemothorax, Nutrition.

INTRODUCTION

The thoracic duct is a structure measuring approximately 35 to 46 cm in length that originates from the cisterna chyli in the abdomen. It is formed by the convergence of intestinal lymphatic vessels known as lacteals[1], and enters the thoracic cavity through the aortic hiatus of the diaphragm. It courses along the right side of the midline, positioned between the aorta and the azygos vein, posterior to the esophagus[1]. At the level of the thoracic vertebrae T4–T6, the duct crosses to the left of the midline and ascends before arching to terminate at the junction of the left internal jugular and subclavian veins[1]. The lymphatic system produces approximately 1.5 to 2.5 liters of lymph per kilogram[4]. Chylothorax is defined as the accumulation of chyle within the pleural cavity. Chyle is a milky fluid formed during the digestion of fats, rich in triglycerides, fat-soluble vitamins, lymphocytes, and immunoglobulins[1]. This condition results from leakage of chyle into the pleural space due to obstruction or injury of the thoracic duct or its tributaries, or via transdiaphragmatic flow from the peritoneal cavity[2].

Clinically, chylothorax is suspected when milky fluid is aspirated from the pleural space; this presentation occurs in approximately 22–44% of patients who ultimately meet the diagnostic criteria. The accumulation of chyle typically exhibits a unilateral pattern in 84% of cases, with 50–60% occurring on the right side. The etiologies of chylothorax are broadly categorized as traumatic and non-traumatic[3]. Traumatic cases can be further subclassified into iatrogenic and non-iatrogenic causes, with the latter accounting for approximately 20% of

traumatic instances. Notably, ruptures of the thoracic duct have also been reported following episodes of coughing or vomiting. Historically, non-traumatic chylothorax was more prevalent and often associated with malignant neoplasms, infections, or undiagnosed inflammatory processes. Traumatic chylothorax generally results from injury to the thoracic duct, either due to penetrating trauma or as a postoperative complication[3].

Case presentation

A male patient in his fifth decade of life presented to the emergency department following a gunshot wound to the right thoracoabdominal region. His medical history was notable for occasional tobacco and cannabis use, with no prior documented medical interventions. On admission, the patient exhibited dyspnea, diaphoresis, pallor, tachypnea, and severe pain localized to the trauma sites. Physical examination revealed a bullet entry wound at the right paravertebral region at the level of the seventh intercostal space, with an exit wound located at the seventh intercostal space along the midclavicular line. Additional gunshot wounds were identified: one on the right forearm and two on the right thigh—one on the anterior-medial aspect and another on the posterior proximal third. Initial computed tomography imaging demonstrated a moderate right-sided pneumothorax with segmental collapse of the right lower pulmonary lobe and an infiltrate in the posterior basal segment of the left lower lobe. **Figure 1.**

Figure 1. Chest computed tomography revealed mild bilateral pneumothoraces and moderate to severe bilateral pleural effusions, with the right side demonstrating a moderate volume and the left side similarly affected.

The patient was taken to the operating room, where the general surgery team performed a diaphragmatic dome repair via thoracoscopy, followed by bilateral thoracotomies. Bilateral chest tubes were placed due to the presence of bilateral hemopneumothorax.

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The patient was subsequently transferred to the intensive care unit, where he remained for six days. During this period, the pleural drainage exhibited a characteristic milky appearance, prompting cytochemical analysis that confirmed the diagnosis of chylothorax, with a triglyceride level of 166 mg/dL. Multidisciplinary management was initiated involving thoracic surgery and nutrition teams. The patient was placed on a hyperproteic, hypolipidic parenteral nutrition regimen supplemented with amino acids for 15 days, resulting in a total weight loss of 13%. Due to insufficient improvement, somatostatin therapy was added; however, despite normalized triglyceride and cholesterol levels in pleural fluid cytochemistry, drainage output remained unchanged. One week post-thoracic surgery, the patient underwent thoracoscopic pleurectomy and chemical pleurodesis, but clinical evolution remained unsatisfactory. Consequently, interventional radiology consultation was requested for thoracic lymphangiography with thoracic duct embolization. As this service was unavailable at the institution, an external referral was made; however, the procedure could not be performed due to logistical issues beyond the surgical team's control. The patient's pleural drainage persisted without improvement, and a follow-up CT scan revealed a persistent right pneumothorax accompanied by severe ipsilateral pleural effusion. **Figure 2.** An urgent fibrobronchoscopy was performed, followed by utility thoracotomy, pleurectomy, decortication, ligation of the thoracic duct, and placement of pleural drainage. The patient showed a satisfactory postoperative course and was discharged from the hospital after four days.

Figure 2. Chest computed tomography revealed severe pneumothorax on both the left and right sides, accompanied by significant bilateral pleural effusion. Additionally, there were signs of lobar collapse in multiple segments of the right lung due to extrinsic compression.

Two weeks after discharge, the patient attended a follow-up medical evaluation

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and was found to be in excellent clinical condition. A control chest radiograph demonstrated no residual pleural fluid.**Figure 3.**

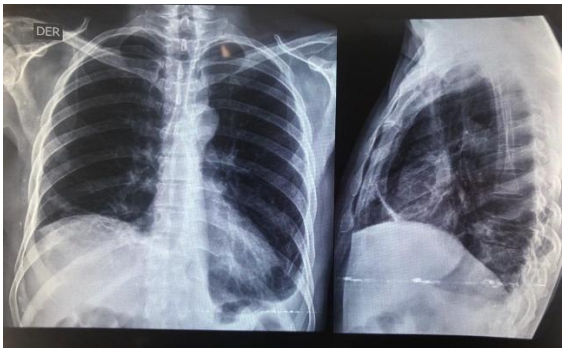

Figure 3. Chest X-ray showed no evidence of pleural effusion or pulmonary consolidation.

Diagnostic

Pleural fluid analysis is essential for the diagnosis of chylothorax.

This diagnosis is primarily based on demonstrating the presence of chylomicrons in the pleural fluid. Ideally, this is achieved through lipoprotein electrophoresis, which is considered the gold standard; however, it is often costly and not widely available. Consequently, in clinical practice, the most commonly used approach involves measuring triglyceride and cholesterol levels in the pleural fluid, which serves as a practical and effective alternative for diagnosing chylothorax[1].

Specifically, a triglyceride level in pleural fluid greater than 110 mg/dL (1.24 mmol/L), along with a cholesterol level lower than 200 mg/dL (5.18 mmol/L), constitutes the standard diagnostic criteria for chylothorax. In addition to these biochemical measurements, pleural fluid cytology is essential—particularly in cases where a malignant etiology is suspected. Chylothorax is typically characterized by a predominantly lymphocytic exudate, with lymphocytes making up more than 70% of the differential cell count[1].

While chest X-rays can aid in initial suspicion, they are limited in specificity. Computed tomography (CT) scans of the chest, abdomen, and pelvis play a crucial role in narrowing the differential diagnosis by identifying traumatic disruptions of the lymphatic system, mediastinal or abdominal lymphadenopathy, ascites, or malignant lesions. Other advanced imaging modalities, such as lymphoscintigraphy and magnetic resonance imaging (MRI), can also be employed to visualize the lymphatic system. The choice of modality

should be tailored to the clinical context and individual patient characteristics[2].

Treatment

In general, conservative management is the initial approach to chylothorax and is typically pursued for a limited duration before progressing to more invasive interventions. The decision to escalate treatment depends on several factors, including the type and location of the chyle leak, the patient's functional status, the underlying etiology, and the availability of specialized expertise[7]. Management should always aim to address the root cause of the chylothorax when identifiable. For instance, corticosteroids may be indicated in cases secondary to sarcoidosis, while guideline-directed medical therapy—particularly the use of diuretics—may be appropriate in chylothorax associated with congestive heart failure[1].

Oral or enteral dietary modifications are commonly implemented as first-line management in cases of low-output chylothorax[1]. Patients should undergo nutritional evaluation and be advised to follow a high-protein, low-fat or fat-free diet in which any fat consumed consists of medium-chain triglycerides (MCTs). MCTs are absorbed directly into the portal circulation, bypassing the intestinal lymphatics, thereby reducing chyle flow through the thoracic duct[1].

In high-output chylothorax, total parenteral nutrition (TPN) is often preferred, as it more effectively minimizes chyle production, promotes closure of the lymphatic leak, and prevents acute nutritional deficiencies. Pharmacologic therapy may also be employed, particularly somatostatin or its analogs (e.g., octreotide), which have been shown to reduce chyle flow rates[7], [8], [9].

If chylothorax does not resolve with conservative or pharmacological therapy, more invasive interventions should be considered. Chemical pleurodesis may be indicated in cases where conservative management has failed and/or when the patient is not an appropriate candidate for surgical repair of the thoracic duct leak[7].

A pleuroperitoneal shunt (PPS) may be considered as a palliative option for symptom relief, particularly dyspnea, in selected cases of chylothorax. The PPS, which can be placed subcutaneously or

externally and is connected to a manually activated pump, enables unidirectional drainage of chyle from the pleural cavity into the peritoneal space. There, the chyle can be efficiently reabsorbed, potentially preserving both its nutritional and immunological components[7].

The most frequently described surgical approach for the management of chylothorax is thoracic duct ligation. To facilitate intraoperative identification of the chyle leak, patients may be administered a fat-rich substance, such as cream, shortly before surgery[1]. Alternatively, lipophilic dyes such as Sudan Black, methylene blue, or indocyanine green can be used to visually highlight the leakage site. Once the site is localized, repair is typically performed using minimally invasive techniques, including video-assisted thoracoscopic surgery (VATS) or robot-assisted thoracic surgery[1].

In the context of traumatic chylothorax, thoracic duct ligation has demonstrated a high success rate, exceeding 90% in some reported cohorts. However, outcomes in non-traumatic cases are less well established and may vary depending on the underlying etiology and patient condition. Potential complications of thoracic duct ligation include persistent chyle leakage and the formation of multiloculated chylothorax, which can complicate further management and may require additional interventions[1].

An alternative to surgical approaches for managing chylothorax is thoracic duct embolization, a minimally invasive technique designed to seal the chyle leak at its source. The procedure typically begins with pedal or intranodal lymphangiography to opacify the cisterna chyli or other dilated lymphatic vessels. Once visualized, the thoracic duct is cannulated using a catheter, and thoracic ductography is performed to localize the exact site of the leak. Following this, embolization coils (or spirals), sometimes in combination with glue or other agents, are deployed to occlude the duct and stop the leakage. This technique has shown promising results, particularly in patients who are poor surgical candidates or when conservative management has failed. [1]

DISCUSSION

In the management of the chyothorax, conservative therapy should be started by means of a high-protein and low-fat

diet to decrease the absorption of fat from the intestine, reducing the production of the kilo through the thoracic Even the most invasive as described in the literature such as thoracic duct ligation, in this clinical case the difficulty that can occur in the management of a pathology such as the chyothorax is evident.

The need for a multidisciplinary management to achieve the therapeutic goal in the chyothorax is demonstrated in this clinical case including the help of different specialties such as nutrition and chest surgery or the need for others as was the case of radiology Interventional for a possible clipping of the thoracic duct.

CONCLUSIONS

Multidisciplinary management is essential to achieving therapeutic success in chylothorax, given the complexity of its treatment and the diversity of its potential etiologies. Effective care requires the coordinated involvement of multiple specialties, including general surgery, thoracic surgery, nutrition, pulmonology, and interventional radiology. This collaborative approach facilitates accurate diagnosis, appropriate therapeutic decision-making, and timely intervention, ultimately improving patient outcomes in this challenging condition.

The timely diagnosis of chylothorax is crucial for initiating appropriate treatment and guiding clinical management, particularly given its multifactorial etiology. Early recognition allows for the prompt identification of the underlying cause and helps to prevent complications associated with delayed intervention. As chylothorax may mimic or coexist with other pleural pathologies, it should be considered in the differential diagnosis, especially when common causes have been ruled out.

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