



Left-sided chylothorax following ipsilateral hemithoracic stab wound in a 20-year-old man: the first case report

Mohammad Vakili Ojarood, MD^a, Ali Samady Khanghah, MD^{b,*}

Abstract

When the chyle, the liquid that is formed from the connection of the body's lymphatic flows, leaks to the pleural space, chylothorax expression comes into existence. Traumatic types are due to penetrating wounds or iatrogenic during heavy thoracic oncology surgeries. To the best of our knowledge, we have reported the first case of left-sided chylothorax following an isolated stab wound in the fifth intercostal space of the same side treated by tube drainage and 'nil per os' dietary condition.

Keywords: chylothorax, left side, nothing by mouth, stab wound

The chyle, a lymphatic emulsion rich in triglycerides, proteins, and leukocytes for any reason in the pleural space, is called chylothorax^[1]. There are two categories of chylothorax: traumatic and nontraumatic, separating therapeutic approaches. Traumatic ones are less common than other types^[2]. Typically penetrating traumas are responsible for this phenomenon. However, the literature has also reported chylothorax following blunt trauma^[3]. The most prevalent causes in this category are right-sided penetrating traumas damaging the thoracic duct (TD), the thickest lymphatic trunk, and operation-related iatrogenic complications^[4]. We have reported a case of left-sided chylothorax caused by a stab wound in the ipsilateral hemithorax in a young male, which improved by chest drainage and a 'nothing by mouth' condition. This work has been reported in line with the Surgical CAse REport (SCARE) criteria^[5].

Case presentation

A 20-year-old male of low socioeconomic status was presented to the emergency department complaining of a sharp object assault in his chest. In the primary trauma survey, he spontaneously

HIGHLIGHTS

- The presence of the chyle in the plural space is called chylothorax.
- Trauma, whether penetrating, iatrogenic, or during heavy thoracic oncology surgeries, of a major cause of chylothorax.
- Like all vessels in the body, variations are also found among lymphatic vessels.
- We have reported the first case of left-sided chylothorax following an ipsilateral stab wound in the fifth intercostal space.

spoke and had respiratory distress at the rate of 30/min using his scalene, intercostal, and abdominal respiratory-aid muscles. The breath sounds were obviously reduced, auscultating the ipsilateral hemithorax accompanied by bulged jugular veins. His blood pressure was 100 on 60 mmHg, and a stab wound measuring less than 2 cm in length on his fifth left intercostal space with no ongoing bleeding. There also was subcutaneous emphysema on the same side of the chest. He had tachycardia; however, no muffled heart sounds with no pieces of evidence of concurrent trauma in the secondary trauma survey as well. Supplying oxygen and intravenous crystalloids via large bore venous lines, a left-sided chest tube was immediately inserted in the emergency operating room. In no time, getting out large amounts of air, volumes of a milky-bloody exudate initiated secretion (Fig. 1). This component reaches nearly 1 l a day. The chest tube was replaced, and total parenteral nutrition was initiated (Fig. 2). Since the first hour of the administration, the patient underwent the 'nothing by mouth' condition. On the same day, the biochemical analyses proved the nature of these secretions as lymph. This flow continued for about 5 days with nearly 1 l daily but gradually reduced to 250–300 ml per day until it cleared gradually and reached such low amounts that it could be ignored. It was time to remove the chest tube (Fig. 3). The regular weekly follow-ups were uneventful for 1 month (Table 1).

^aDepartment of Thoracic Surgery and ^bDepartment of Surgery, Fatemi Hospital, Ardabil University of Medical Sciences, Ardabil, Iran

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

*Corresponding author. Address: No 1, Vathig Mogaddam Alley, Behind Arta Park, Imam Ave, Ardabil 5613754497, Iran. Tel: +98 147 004 062; fax: +9845-33232670. E-mail address: alisamady89@yahoo.com (A. Samady Khanghah).

Copyright © 2023 The Author(s). Published by Wolters Kluwer Health, Inc. This is an open access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

Annals of Medicine & Surgery (2023) 85:511–514

Received 16 November 2022; Accepted 25 December 2022

Published online 6 February 2023

<http://dx.doi.org/10.1097/MS9.000000000000191>



Figure 1. Placing the left-side chest tube in the operating room for probable haemopneumothorax. However, amounts of a milky-bloodly exudate were drained initially.

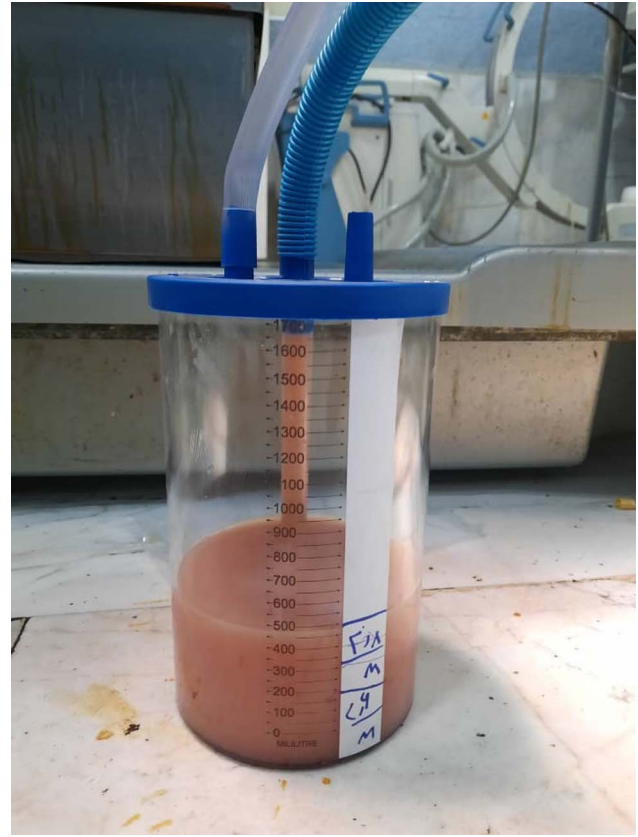


Figure 2. The chest bottle after replacement on the third day of admission representing the secretions had reached 200-300 ml a day (500 ml during two days).

Discussion

When the chyle, the liquid that is formed from the connection of the body’s lymphatic flows, leaks to the pleural space, chylothorax expression comes into existence. This buttermilk and turbid component participate in the cardiovascular, digestive, and immune systems, using hydro osmotic regulation, lipoproteins delivery, and lymphocytes, respectively. This trunk drains three-quarters of the lymphatic fluid in the cervicothoracic venous bloodstream. It enters the rib cage through the aortic hiatus and ascends along with and between the aorta and the azygos vein. The TD, the main lymphatic vessel, lays on the anterior surface of the thoracic vertebrae bodies and drains into the cervicothoracic junction of the left subclavian internal jugular veins^[6]. Its anatomical branching structure, variations, and physiology still need to be completely understood^[7]. Following a stab wound or penetrating traumas, mainly in the right hemithorax, chylothorax occurs if the TD is torn.

In most cases, during this incident, some alveoli and primary or accessory blood vessels are injured, leading to pneumohaemochylothorax. However, it will not change the therapeutic approach, so usually, the only management is tube thoracostomy. For the more aggressive techniques of the cardiothoracic and oncologic surgeries in this area, the iatrogenic causes passed the

penetrating traumas in the prevalence^[1,2]. A study aimed to document anatomic features and thresholds of the TD on cadavers from the point of spinal surgeries. This study found TDs in all dissections. The main tributaries were crowded at the upper (between the third and fifth thoracic vertebrae) and lower thoracic segments (below the level of the ninth thoracic vertebra). Nevertheless, the main lymphatic tributaries were drained into the TD only in the lower thoracic area (below the level of the 10th thoracic vertebra)^[8].

The diagnosis is primarily made by direct inspection of the chest bottle, including fluid or via thoracentesis. The chylomicron presence in this fluid or the triglyceride concentration of above 110 mg/dl proves the diagnosis. Oppositely, this was ruled out in concentrations below 55 mg/dl unless the patient has been under ‘nil per os’ condition in the long term. In such cases, the diagnosis is made by fluid analysis after a rich-in-fat diet^[4]. The accumulation rate of fluid into the pleural space of 400 ml/day is a helpful diagnostic clue raising suspicions in the postoperative period of nonassaulting patients^[1]. Variations of the TD have been reported^[9]. There needs to be more information regarding the intra-thoracic tributaries of the TD. Their mainstay is named intercostal, mediastinal, and bronchomediastinal branches^[9].



Figure 3. The sutured stab wound and the chest tube insertion site by the silk.

Dr Constantine first introduced percutaneous embolization of the TD in the late 1990s with the advocate of animal experiments. He performed pedal lymphatic trunk catheterization on 11 consecutive patients who sustained chylothorax after the experience of esophagostomy in more cases and then in each operation of a lung transplant, lobectomy, and coronary artery bypass grafting, aortic grafting, lymphangioliomyomatosis, and a gunshot wound. This author also reported some technical complications. Their therapeutic team only succeeded in 45% of patients since there were no retroperitoneal ducts appropriate for catheterization in six patients because of previous abdominal surgery, trauma, or lymphangioliomyomatosis^[10].

Table 1
The results of the drained exudate analysis

Indicators and cells	Amount
Sugar	101 mg/dl
Protein	3.1 mg/dl
LDH	739 U/l
TG	313 mg/dl
Albumin	2.5 g/dl
Amylase	32.1 U/dl
WBC	1200/ μ l
RBC	20 000/ μ l

LDH, lactate dehydrogenase; RBC, red blood cells; TG, triglycerides; WBC, white blood cells.

Currently, intranodal lymphangiography has obsolete the technique as mentioned earlier for shorter procedure time and increased success^[11,12]. An American study in 2020, both in pediatric and adult populations, introduced lymphangiography and TDE for managing traumatic chylothorax as a modality of choice if conservative care confronts failure^[4].

Conclusion

It is unclear whether the patient’s TD was located on the left side or had dominant ipsilateral intrathoracic tributaries. Furthermore, it should be considered that in the thoracic cavity’s lymphatic system, there are variations as in the veins or arteries. There is no need for surgical intervention in the cases of chylothorax cases to see whether the TD accompanying the other main trunks is damaged or not. Minimizing dietary lipoprotein intake can cure such victims mentioned above.

Ethical approval

The ethics committee of Ardabil University of Medical Sciences, Iran, has proved and observed all aspects of this research from the proposal to the final form of the manuscript. If necessary, the corresponding author can submit the certificate.

Patient consent

Written informed consent was obtained from the patient for review by the publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request. The authors ensure that all the images/figures/photos are suitably anonymized with no patient information or means of identifying the patient.

Sources of funding

None.

Author contribution

M.V.O. was the surgeon who operated on the patient and suggested publishing a case report. A.S.K., a member of the research committee of the hospital, prepared the manuscript, decided to advance it to a ‘case report and literature review’ manuscript, and then pursued the submission process.

Conflicts of interest disclosure

The authors declare that there are no conflicts of interest in preparing this manuscript and accept any responsibilities.

Research registration unique identifying number (UIN)

None.

Downloaded from http://journals.ww.com/annals-of-medicine-and-surgery by BnDMf5ePfkav1Zcoun1tQIN4e+KJLHEZgbsIH0dXMI0hCwCX1AVWnYQpIQRHID3I3D00dRy7T7vSF14C13VC1y0abgqZxd9Gj2MwZlel= on 04/13/2023

Guarantor

Ali Samady Khanghah accepts full responsibility for the work and approves the whole process from designing the study to publication.

References

[1] Maldonado F, Hawkins FJ, Daniels CE, *et al.* Pleural fluid characteristics of chylothorax. *Mayo Clin Proc* 2009;84:129–33.

[2] Doerr CH, Allen MS, Nichols FC, *et al.* Etiology of chylothorax in 203 patients. *Mayo Clin Proc* 2005;80:867–70.

[3] Calkins CM, Moore EE, Huerd S, Patten R. Isolated rupture of the cisterna chyli after blunt trauma. *J Pediatr Surg* 2000;35:638–40.

[4] Gilyard SN, Khaja MS, Goswami AK, *et al.* Traumatic chylothorax: approach and outcomes. *Semin Intervent Radiol* 2020;37:263–8.

[5] Agha RA, Franchi T, Sohrabi C, *et al.* The SCARE 2020 guideline: updating consensus surgical CAse REport (SCARE) guidelines. *Int J Surg* 2020;84:226–30.

[6] Williams PL, Warwick R, Dyson L, *et al.* *Gray’s Anatomy*. Churchill Livingstone; 1989.

[7] Ferguson M. The anatomy and physiology of the thoracic duct. *Thoracic surgery: surgical management of pleural diseases. Int Trends Gen Thorac Surg* 1990;6:353–56.

[8] Akcali O, Kiray A, Ergur I, *et al.* Thoracic duct variations may complicate the anterior spine procedures. *Eur Spine J* 2006;15:1347–51.

[9] Riquet M, Le Pimpec Barthes F, Souilamas R, *et al.* Thoracic duct tributaries from intrathoracic organs. *Ann Thorac Surg* 2002;73:892–8.

[10] Cope C, Salem R, Kaiser LR. Management of chylothorax by percutaneous catheterization and embolization of the thoracic duct: prospective trial. *J Vasc Intervent Radiol* 1999;10:1248–54.

[11] Rajebi MR, Chaudry G, Padua HM, *et al.* Intranodal lymphangiography: feasibility and preliminary experience in children. *J Vasc Intervent Radiol* 2011;22:1300–5.

[12] Nadolski GJ, Itkin M. Feasibility of ultrasound-guided intranodal lymphangiogram for thoracic duct embolization. *J Vasc Intervent Radiol* 2012;23:613–6.

Downloaded from <http://journals.lww.com/annals-of-medicine-and-surgery> by BhDMj5eP7Kav1ZEqum1tQIN4a+KJLHEZgbsIHod4MI0hCwWCX1AWnYQp/llQrHrD3i3D00dRy7T7vSF14C13VC1y0abggQZxd9Gj2MwvZLeI= on 04/13/2023