

Thoracic Duct Embolization with Lipiodol for Chylothorax due to Thoracic Endovascular Aortic Repair with Debranching Procedure

Kwang Hyoung Lee, M.D.¹, Jae Seung Jung, M.D., Ph.D.¹, Sung Bum Cho, M.D, Ph.D.²,
Seung Hun Lee, M.D.¹, Hee Jung Kim, M.D.¹, Ho Sung Son, M.D., Ph.D.¹

Chylothorax is a rare postoperative complication of a thoracic surgical procedure. Here, we report a case of chylothorax after thoracic endovascular aortic repair with debranching for the distal arch aneurysm of the aorta. First, the patient was treated by a medical method (*nil per os*, fat-free diet, and octreotide), but this method failed. The patient strongly refused surgical treatment. Therefore, we tried to occlude the thoracic duct by lymphangiography Lipiodol, and this line of treatment was successful.

Key words: 1. Chylothorax
2. Thoracic duct
3. Embolization

CASE REPORT

A 65-year-old female visited Korea University Anam Hospital complaining of chest pain, palpitation, and dyspnea. On the basis of computed tomography, she was diagnosed with Takayasu's arteritis including a large aneurysm (58 mm) on the aortic distal arch (Fig. 1A, B). Because the patient strongly refused surgery, we performed thoracic endovascular aortic repair (TEVAR) with left subclavian artery (LSCA) to left common carotid arterial transposition (Fig. 1C, D). The thoracic duct was ligated due to injury during the LSCA dissection. After TEVAR, the patient's symptoms improved, and she was discharged on postoperative day 10 with a normal chest X-ray (Fig. 2A).

The patient returned to the hospital complaining of moderate dyspnea on postoperative day 19, and the follow-up chest X-ray showed a severe left pleural effusion (Fig. 2B). After

the insertion of a chest tube, postoperative chylothorax was confirmed by a pleural fluid analysis. Conservative management with a fat-free diet and *nil per os* was attempted for 2 weeks, but there was no remarkable improvement. Chest tube drainage exceeded 300 mL/day despite the conservative management. Therefore, we administered a subcutaneous injection of octreotide (0.1 mg) every 8 hours for 2 weeks; however, even these injections had no effect. Surgical treatment was also considered, but given the possibility of unsuccessful repair due to the uncertainty of the exact site of the thoracic duct leakage and the patient's strong refusal, it could not be our next option.

Therefore, we performed an intranodal lymphangiogram using lipiodol (poppy seed oil used as a radio-opaque contrast agent to outline structures in radiological investigations) on postoperative day 46. A total volume of 3 to 6 mL of lipiodol was injected into each lymph node at the inguinal area

Departments of ¹Thoracic and Cardiovascular Surgery and ²Interventional Radiology, Korea University College of Medicine

Received: July 8, 2014, Revised: September 13, 2014, Accepted: September 15, 2014, Published online: February 5, 2015

Corresponding author: Jae Seung Jung, Department of Thoracic and Cardiovascular Surgery, Korea University College of Medicine, 73 Incheon-ro, Seongbuk-gu, Seoul 136-705, Korea
(Tel) 82-2-920-5369 (Fax) 82-2-928-5678 (E-mail) heartistcs@naver.com

© The Korean Society for Thoracic and Cardiovascular Surgery. 2015. All right reserved.

© This is an open access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

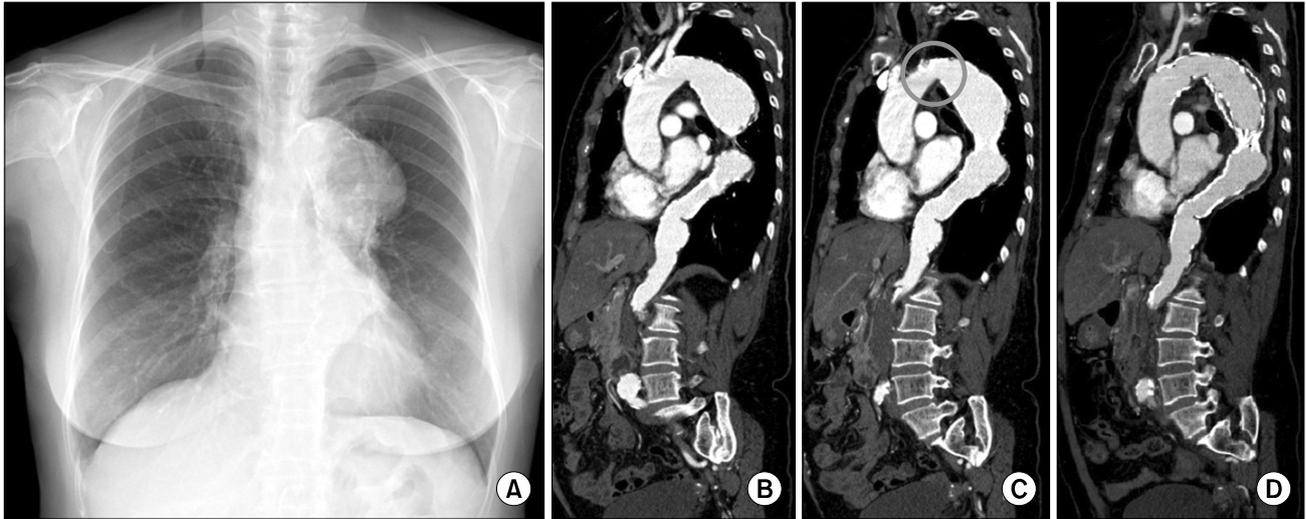


Fig. 1. (A, B) Takayasu's arteritis and a large aortic aneurysm. (C) After left subclavian artery to left commoncarotid arterial transposition (circle). (D) After thoracic endovascular aortic repair.

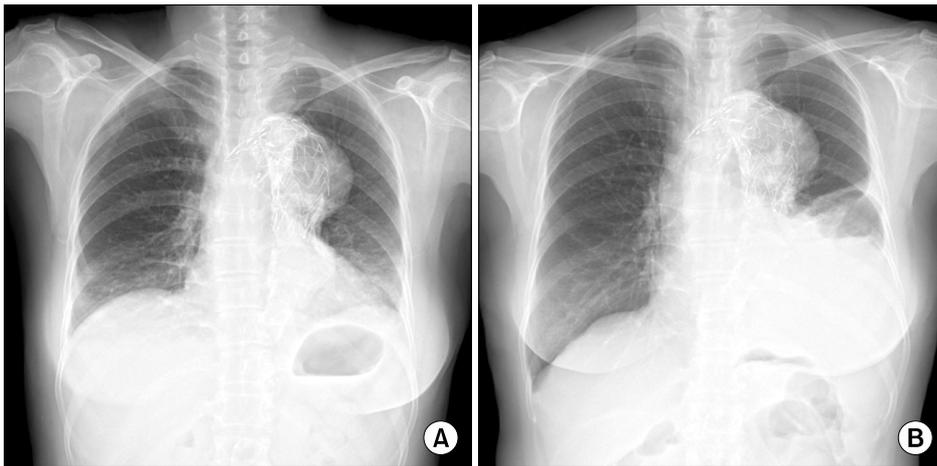


Fig. 2. (A) Chest X-ray on discharge. (B) Chest X-ray on re-visit.

under the guidance of ultrasonography. During the fluoroscopy, the lipiodol had migrated to the retroperitoneal lymphatics but did not advance beyond the L3 level. However, the chest X-ray taken 3 days after the thoracic duct embolization (TDE) revealed that the lipiodol had migrated up to the subclavian lymphatics (Fig. 3).

The chest tube drainage suddenly decreased on the 3rd day after TDE, and we were finally able to remove the chest tube on the 13th day after TDE (Fig. 4). The patient was discharged on the 17th day without any complications. Thus far, she has not shown any problems.

DISCUSSION

Postoperative chylothorax is a rare but serious complication of the thoracic and esophageal surgical procedure. The rapid loss of chyle is associated with hypovolemia and respiratory difficulty. Patients may experience malnutrition and electrolyte imbalance. Further, a significant loss of immunoglobulins, T lymphocytes, and proteins into the pleural cavity results in immunosuppression [1].

Conservative treatments include drainage of the pleural effusion, a diet including medium-chain triglycerides (MCTs), total parenteral nutrition (TPN), and injection of somatostatin

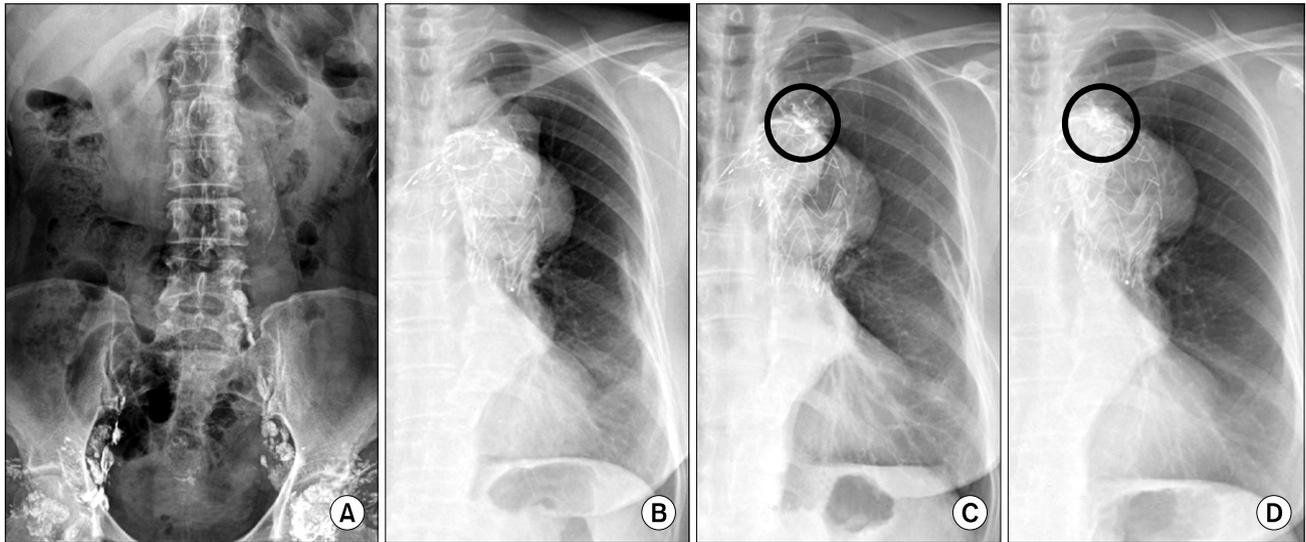


Fig. 3. Chest X-ray obtained after TDE with lipiodol (circle). (A) After TDE. (B) Post TDE 3 days. (C) Post TDE 13 days (circle). (D) Post TDE 28 days (circle). TDE, thoracic duct embolization.

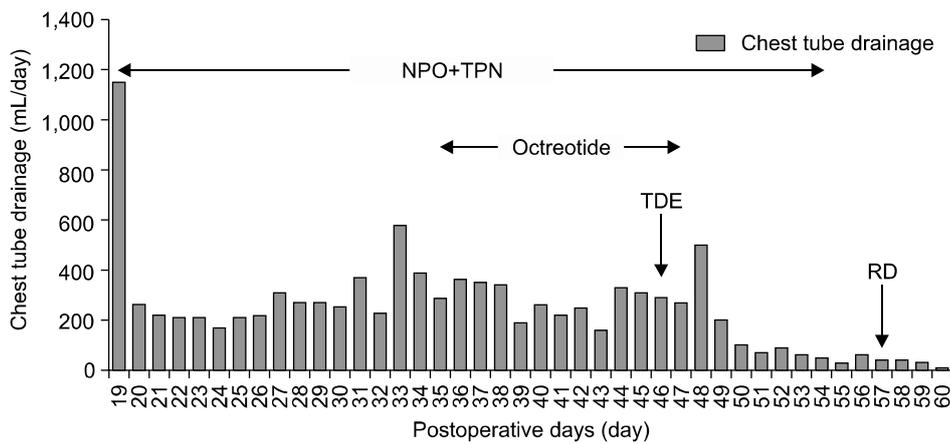


Fig. 4. Chest tube drainage. NPO, non per oral; TPN, total parenteral nutrition; TDE, thoracic duct embolization; RD, regular diet.

Table 1. Success rate of thoracic duct embolization by lymphangiography

Author (year) [reference]	Procedure	Patients (n=6)	Technical success rate	Clinical success rate
Nadolski et al. (2012) [3]	Intranodal lymphangiography	6	100%	83.3%
	Pedal lymphangiography	6	100%	100%
Alejandro-Lafont et al. (2009) [4]	Bipedal lymphangiography	43	79%	51% (complete cessation)
				63% (reduction in lymphatic Drainage volume)
Boffa et al. (2008) [5]	Pedal lymphangiography	21	100%	12/12 (100%) embolizations 5/9 (56%) disruptions
Itkin et al. (2010) [6]	Pedal lymphangiography, transabdominal approach	106	71/73 (97%) embolizations	64/71 (90%) embolizations
			18/33 (55%) disruptions	13/18 (72%) disruptions

analogs like octreotide. An MCT diet and TPN reduce the chyle's flow, and somatostatin analogs reduce the intestinal chyle production. In case the high-output chylothorax responds poorly to conservative management, surgical treatment such as thoracic duct ligation, pleuroperitoneal shunt, pleurodesis, or pleurectomy is required [1,2].

Lymphangiography has also been considered a treatment of chylothorax, being less invasive than surgery and having a success rate of about 80% (Table 1) [3-6]. TDE could be performed via the catheterization of the cisterna chyli or lymphatic ducts. The mechanism is thought to be caused by lipiodol, which produces an inflammatory process and occludes the chyle leak [7]. Complications of lymphangiography are pulmonary oil embolism, hypersensitivity, and lymphatic obstruction, but these are rare and usually minor [8].

In our case, postoperative chyle leakage was not reduced or improved despite the trial of conservative management and octreotide injection. Therefore, we performed an intranodal lymphangiogram and TDE with lipiodol.

Through this case, we verified that TDE with lipiodol could be considered an alternative for the treatment of postoperative chylothorax, if conservative medical treatment is unsuccessful and surgical treatment is not possible.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. McGrath EE, Blades Z, Anderson PB. *Chylothorax: aetiology, diagnosis and therapeutic options*. *Respir Med* 2010; 104:1-8.
2. Chalret du Rieu M, Baulieux J, Rode A, Mabrut JY. *Management of postoperative chylothorax*. *J Visc Surg* 2011;148:e346-52.
3. Nadolski GJ, Itkin M. *Feasibility of ultrasound-guided intranodal lymphangiogram for thoracic duct embolization*. *J Vasc Interv Radiol* 2012;23:613-6.
4. Alexandre-Lafont E, Krompiec C, Rau WS, Krombach GA. *Effectiveness of therapeutic lymphography on lymphatic leakage*. *Acta Radiol* 2011;52:305-11.
5. Boffa DJ, Sands MJ, Rice TW, et al. *A critical evaluation of a percutaneous diagnostic and treatment strategy for chylothorax after thoracic surgery*. *Eur J Cardiothorac Surg* 2008;33:435-9.
6. Itkin M, Kucharczuk JC, Kwak A, Trerotola SO, Kaiser LR. *Nonoperative thoracic duct embolization for traumatic thoracic duct leak: experience in 109 patients*. *J Thorac Cardiovasc Surg* 2010;139:584-89.
7. Cope C. *Diagnosis and treatment of postoperative chyle leakage via percutaneous transabdominal catheterization of the cisterna chyli: a preliminary study*. *J Vasc Interv Radiol* 1998;9:727-34.
8. Plotnik AN, Foley PT, Koukounaras J, Lyon SM. *How I do it: lymphangiography*. *J Med Imaging Radiat Oncol* 2010;54: 43-6.