

Ligation of the Thoracic Duct through Transabdominomedial Approach: A New Operative Technique for Traumatic Chylothorax

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Summary. A new surgical procedure of ligation of the thoracic duct through a transabdominomedial approach is introduced. The procedure enables an easy approach to the posterior lower mediastinum and ligation of the duct at levels as low as 10th or 11th thoracic vertebra, close to the *cisterna chyli*, without thoracotomy. The comprehensive feasibility of this as an alternative to the conventional transthoracic procedure for curing traumatic chylothorax is considered.

INTRODUCTION

Traumatic chylothorax is an infrequent but troublesome complication following almost every known thoracomedial surgery.¹⁾ Ligation of the thoracic duct at the injured site or its lower mediastinal pathway has been advocated as a reliable surgical measure in this situation.^{1,2)} For this purpose, transthoracic procedures have been exclusively adopted. In this paper, we describe a new surgical procedure of ligation of the thoracic duct through transabdominomedial approach with a successful case report.

PATIENT

A 5-year-old male, 111 cm in height and 18 kg in body-weight, underwent transannular patch repair through median sternotomy for correction of Fallot's tetralogy (T/F) on July 25, 1991 at our institution. On the second postoperative day, the chest roentgenogram exhibited a large quantity of right pleural effusion requiring insertion of a chest tube, from which translucent fluid accumulating from 575 ml/day to 960 ml/

day was withdrawn for consecutive 6 days. The fluid was rich in protein and triglyceride and positive to Sudan III stain. Therefore, the patient was diagnosed as suffering from postoperative right traumatic chylothorax. He initially received treatment with plasma transfusion and total parenteral nutrition (TPN) for this annoying complication. However, a large amount of plasma loss along with right heart failure resulting from the correction of T/F made his hemodynamic status intractably precarious. On August 2, he underwent ligation of the thoracic duct through transabdominomedial approach. The right pleural effusion decreased to around 300 ml/day or less from the next day on and gradually diminished. A tiny outflow of milky fluid from the chest tube was recognized after per os milk intake on the fifth day, suggesting the incomplete cure of the chylothorax due to a possible auxiliary duct system that might have survived. This was easily controlled, and ceased within a few days by TPN with restriction of milk intake. No other event indicative of surgical failure was experienced. The patient recovered from persistent right heart failure and was discharged from the hospital on October 10, 1991.

OPERATIVE PROCEDURE: LIGATION OF THE THORACIC DUCT THROUGH TRANS-ABDOMINOMEDIASTINAL APPROACH

The patient was placed on the table in supine position with an endotracheal tube for general anesthesia. Laparotomy was made through upper abdominal transverse and auxiliary upward midline incisions. The left triangular ligament was cut to mobilize the

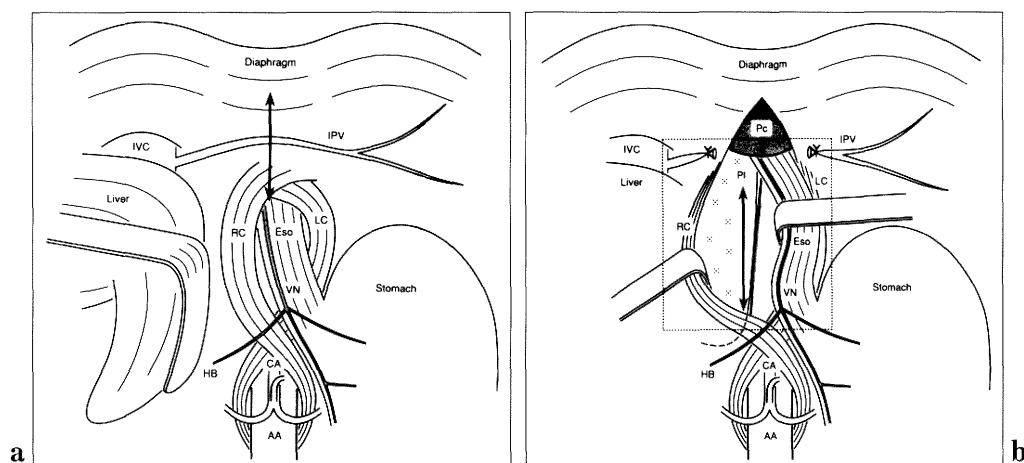


Fig. 1-a. Incision of median phrenotomy is shown by the thick line with an arrow head at both ends. The lateral segment of the liver has been mobilized and bent downward. **Fig. 1-b.** Exposure of posterior lower mediastinum through median phrenotomy. The thick line with an arrow head at both ends indicates incision on the right parietal pleura. The area shown by dotted lines is enlarged and illustrated in Figs. 2-a and 2-b. IVC: inferior vena cava, IPV: inferior phrenic vein, Eso: esophagus, RC: right crus of the diaphragm, LC: left crus of the diaphragm, VN: vagal nerve, HB: hepatic branch of the vagal nerve, CA: celiac axis, AA: abdominal aorta, Pc: pericardium, Pl: right parietal pleura

lateral segment of the liver that was then bent downward. Peritoneum covering the right semicircular part of the esophageal hiatus was incised to expose the inner verge of the right crus of the diaphragm. Injury to the anterior trunk of the vagal nerve and its hepatic branch was avoided. To prevent destruction of His' angle, no manipulation was added to the left semicircular part of the esophageal hiatus.

After ligation and division of the left inferior phrenic vein on the midline, a median phrenotomy was made from the esophageal hiatus to the center of the central tendon of the diaphragm (Fig. 1-a). Loose connective tissue around the right crus of the diaphragm, right parietal pleura, pericardium, right verge of the lower intrathoracic esophagus and descending aorta was dissected. The right parietal pleura and descending aorta were exposed by drawing the right crus to the right and the esophagus to the left. Then the right chest cavity was opened through a longitudinal incision in the pleura just beside the descending aorta (Fig. 1-b).

The lateral margin of the incised pleura was drawn upward to the right together with the right crus to open the prevertebral field. The right lung did not hinder the field. The azygos vein was seen through the mediastinal pleura. The thoracic duct was as-

sumed to run between it and the descending aorta. The mediastinal pleura was incised as longitudinally as possible as to the left side (Fig. 2-a), and dissected from the vertebral column. The thoracic duct was visualized in front of the 10th (Th10) and 11th thoracic vertebrae (Th11). Identification of the duct measuring about 1 mm in diameter was easy by its thin wall with transparent appearance. No other threads suggestive of duplicate or multiple ducts were recognized. Two pinches of hemostatic clips were placed on the duct at the level of Th10, and soon its caudal portion became obviously expanded. A small incision was made in the wall of the swollen duct just below the clips. Further confirmation of the duct was made by the immediate outflow of transparent lymph fluid. Two more clips were equipped on the duct at the level of Th11; ligation of the thoracic duct was completed (Fig. 2-b). Several suture ligatures of the prevertebral fibrous tissue were added to clear away possible minute lymphatics. The phrenotomy incision was closed by sutures and the esophageal hiatus was loosely reconstituted without closure of the incisions in the parietal and mediastinal pleurae. The lateral segment of the liver was replaced and the abdominal wall was closed without any drainage.

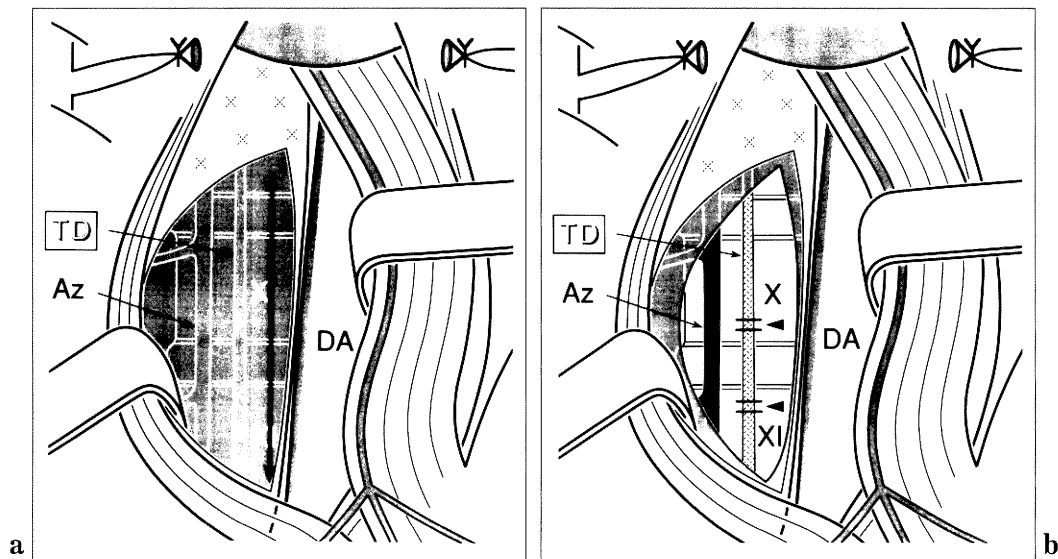


Fig. 2-a. Exposure of prevertebral field at the level of Th10 to Th11. The line with an arrow head at both ends indicates incision on the mediastinal pleura just beside the descending aorta. **Fig. 2-b.** Exposure and ligation of thoracic duct. Each of two arrow heads indicates ligation of the duct by hemostatic clips. TD: thoracic duct, Az: azygos vein, DA: descending aorta, X: 10th thoracic vertebra, XI: 11th thoracic vertebra

DISCUSSION

As the esophageal hiatus is located at the level of Th10, the transabdominomedial approach through median phrenotomy warrants facile development of posterior mediastinum at the level of Th10 to Th11 where the thoracic duct lies between the azygos vein and descending aorta.³⁾ There the duct can be readily distinguished and ligated at a site close to the *cisterna chyli*. Our expedient with ligation of the thoracic duct at levels as low as Th10 or Th11 would be feasible to every chylothorax in either side or even bilateral, caused by injury of the duct cephalad at the site of ligation. There remains an apprehension that our contrivance may fail to cure patients with multiple or plexiform duct systems identified at the level of Th10 in 28% of 50 autopsy specimens.⁴⁾ It is generally known, however, that interruption of the main chyle pathway controls a chylous fistula.¹⁾ Our case presented here is likely one of such instances. Our procedure would be preferable for patients with significant cardiopulmonary compromise or severe intrathoracic adhesions in whom transthoracic proce-

dures should be avoided.

The comprehensive feasibility of the transabdominomedial procedure should be a monopolistic advantage lacking in the transthoracic procedures. We expect that, although with only a single corroboration, this might well be an alternative to the conventional transthoracic procedures for cure of traumatic chylothorax.

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