

## Video-Assisted Thoracoscopic Ligation of the Thoracic Duct in a Patient with Traumatic Chylothorax

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Non-surgical traumatic chylothorax following blunt chest trauma is rare, with only a few cases having been reported. In general, conservative treatment measures are recommended as initial management of traumatic chylothorax; these include closed thoracostomy, dietary restriction, and parenteral nutrition. There are few reports of surgery for traumatic chylothorax. We report our experience with thoracic duct ligation using video-assisted thoracoscopic surgery in a patient with chylothorax following blunt chest injury with associated fractures of the thoracic spine. [ J Trauma Inj 2016; 29: 89-92 ]

**Key Words:** Chylothorax, Injuries, Ligation

### I. Introduction

Chylothorax is a type of pleural effusion caused by disruption or obstruction of the thoracic duct, resulting in leakage of chyle into the pleural space. The most common cause of non-traumatic chylothorax is malignancy, especially lymphoma. Chylothorax can also frequently result from direct injury of the thoracic duct during surgery.<sup>(1)</sup> However, blunt traumatic chylothorax—a case of which is reported here—is an extremely rare condition.

### II. Case

A 50-year-old male construction worker was sent to the emergency department of another hospital following a fall from a height of three meters; he had landed on his back, colliding with an iron frame. He developed paraplegia immediately after

the accident. Imaging revealed he had sustained flexion–distraction injuries and incomplete cord injury at the level of the tenth and eleventh thoracic spinal vertebrae (T10 and T11) (Fig. 1). Linear fractures of the right fifth and sixth ribs and an associated hemothorax were also diagnosed. Closed thoracostomy was performed, but only a small amount of blood was drained. There were no other injuries to his vital organs including the brain, heart, lung, liver, and kidney. The patient was referred to our hospital three days after the trauma at the request of the patient and his family. On admission to our unit, the patient was being allowed to resume oral intake from the local hospital, following which the nature of the pleural fluid drained changed to a pink and milky appearance. The amount of fluid drained exceeded 700 ml per day, and pleural fluid triglyceride concentration was 103 mg/dL, which strongly supports the diagnosis of a chylothorax. On

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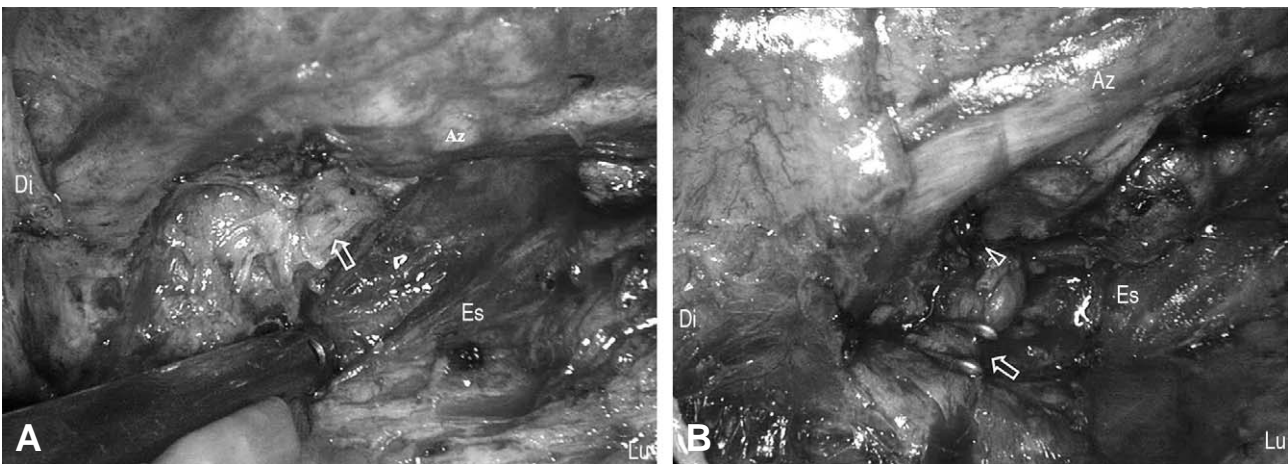
the fourth day after the accident, posterior spinal fusion from T10 to T12 was performed urgently to stabilize the spine and relieve the pressure on the spinal cord in accordance with the policy of the orthopedic surgeons.



**Fig. 1.** A spinal chest computed tomographic scan reveal that the tear drop fracture of T10 body (arrow), and fracture of left upper body and posterior element of T11.

After the diagnosis of a chylothorax was made, the patient was kept nil-by-mouth and given total parenteral nutrition. However, in spite of proper conservative treatment, the amount of chest tube drainage was greater than 1 L per day for six days; hence, we decided to perform surgical exploration.

After induction of general anesthesia with double-lumen endotracheal intubation, the patient was placed in the left lateral decubitus position. Two ports were placed through 10-mm incisions at the 8<sup>th</sup> intercostal space along the anterior axillary line and at the 10<sup>th</sup> intercostal space along the mid axillary line. The working port was placed at the 9<sup>th</sup> intercostal space along the mid axillary line. The right pleural cavity was thoroughly inspected after introducing a 10-mm 30° thoracoscope. We found that the parietal pleura at T10 level was more greasy and glistening than the superior mediastinal pleura. The parietal pleura was then incised medial to the azygos vein at T10 level. The thoracic duct was identified and noted to be ruptured with flow of chyle seen. Upon confirmation of leakage of chyle from the thoracic duct, it was ligated distally with two 5-mm clips between T11 and T12 level (Fig. 2). After duct ligation, cessation of chyle leakage was visually confirmed. A soft chest tube was placed posteriorly and inferiorly in the dependent position. On day 1 post surgery, the amount of chest tube drainage was 180 ml of clear, serous fluid; hence, oral intake was



**Fig. 2.** (A) Operative view of the ruptured thoracic duct at the tenth thoracic vertebral level; arrow, ruptured thoracic duct (B) Operative view after thoracic duct ligation; arrow, thoracic duct ligation with metal clips; arrow head, suture ligation with monofilament for intercostal artery hemorrhage. Az: azygos vein, Di: diaphragm, Es: esophagus, Lu: lung.

restarted with regular diet. Following reintroduction of regular diet, the chest-tube drainage remained below 300 ml for three days. The chest tube was then removed without any further postoperative complications.

At the time of writing, the patient had been transferred to the department of rehabilitation to receive continuous and comprehensive rehabilitation services for his disabilities.

### III. Discussion

Chyle is a milky body fluid with a high triglyceride content in the form of chylomicrons. The thoracic duct carries chyle, which is formed in the small intestine, to the bloodstream. The causes of chylothorax can be categorized as non-traumatic or traumatic. The most common cause of non-traumatic chylothorax is a thoracic neoplasm, with lymphoma accounting for up to 70% of chylothoraces.(1) Traumatic chylothoraces are caused by disruption of the thoracic duct anywhere along its course. Thoracic surgeries including esophagectomy or pulmonary resection are the usual etiologies, representing 80% of traumatic causes.(2) Nonsurgical traumatic chylothorax can complicate central venous catheterization, pacemaker implantation, and chest trauma.(3) Penetrating or blunt trauma causing chylothorax is a rare event, but when it does occur, it is often associated with neck or chest perforation, posterior rib or vertebral body fracture.(4) Thoracic duct injury after blunt trauma is commonly caused by sudden hyperextension of the spine, just above the diaphragm in the right thorax, at the level of T10 to T12.(5,6)

Due to a lack of prospective studies, the guidelines for optimal treatment of a chylothorax are unclear. However, the following principles are widely accepted: 1) effective pleural drainage, 2) treatment of underlying condition, 3) dietary control with proper nutritional support, 4) chemical or surgical pleurodesis, 5) thoracic duct ligation, 6) well studied, specific treatments including somatostatin, octreotide, sirolimus, and pleuroperitoneal shunt.(7)

Conservative treatment has an approximately 50 to 80 percent success rate in postoperative chy-

lothorax, with higher success rates reported in patients with <500 mL/day pleural fluid drainage.(8) For patients with non-surgical traumatic chylothorax, conservative treatments are suggested initially rather than surgical exploration. However, surgery is recommended when the drainage persists for 2 weeks, or drainage volume exceeds 1 L per day for five or more days in spite of proper conservative treatment.(9) During the initial phase, our patient's treatment was strictly limited to conservative measures including chest tube drainage and dietary restriction (nil-by-mouth) with total parenteral nutrition, but the chest tube drainage was greater than 1 L per day for six days.

During the surgery, we found a few differences between our patient and patients with post-surgical traumatic chylothorax. In our case, it was very difficult to dissect the soft tissue and to identify the thoracic duct because of soft tissue edema and hematoma around the level of the fractured vertebral bodies. We performed meticulous dissection of the connective tissue medial to the azygos vein and finally located the ruptured thoracic duct. However, during the dissection, we encountered massive hemorrhage caused by inadvertent tearing of the intercostal artery at T10 level; fortunately, the intercostal tear was well controlled with 6-0 monofilament sutures. The authors suggest that more careful attention is required during surgery on patients with blunt traumatic chylothorax than on patients with chylothorax from other causes.

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