

# Thoracoscopic Thoracic Duct Ligation

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Chylothorax is the presence of chyle in the thoracic cavity due to a disruption of the thoracic duct. The cause of chylothorax includes congenital malformation, trauma, neoplasm, and inflammation. Complications of chylothorax are severe and include significant nutritional deficiency, immunocompromised status, and metabolic derangements. These complications are a result of the rich composition of chyle. Chyle contains dietary fats absorbed enterally, fat-soluble vitamins, protein, and T-cell lymphocytes.<sup>1</sup> The composition of chyle is similar to that of plasma in terms of electrolytes. Losing a significant amount of chyle can lead to the disastrous consequences previously listed. The diagnosis of chylothorax is confirmed by sampling the pleural effusion with a triglyceride level >110 and by the presence of chylomicrons.<sup>1,2</sup>

Management of chylothorax begins with drainage of chyle from the pleural cavity by either tube thoracostomy or an image-guided percutaneous drain. Medical management involves diet modification through 2 modalities. The first is a low-fat diet, rich in medium-chain fatty acids, as this will bypass the thoracic duct via direct absorption in the portal vein. Strict nil per os and total parenteral nutrition are the other modalities used as bowel rest decreases the amount of chyle flowing through the thoracic duct. Somatostatin has been found to decrease the volume of chyle by decreasing absorption in the gastrointestinal tract.<sup>3</sup> This has been used primarily in the pediatric population with sparse case reports in the adult literature.<sup>4</sup>

Surgical management includes several therapeutic options. Surgical management is indicated for 1 L or greater of chyle drainage over a 24-hour period or for patients who fail to stop leaking chyle with conservative therapy. Pleurodesis, via talc or fibrin glue, has been used with reported success.<sup>5</sup>

The placement of a Denver pleuroperitoneal shunt has been used in patients who are nonoperative candidates; however, these shunts are fraught with complications such as tenderness from the catheter site, obstruction, and patient noncompliance.<sup>6</sup> Thoracic duct embolization via percutaneous catheterization and lymphography is another option. This technique is successful in approximately 70% of cases in which the thoracic duct can be cannulated.<sup>7</sup>

More definitively, the thoracic duct can be ligated, through either isolation or mass tissue ligation, as discussed later.<sup>5,8,9</sup>

## Preoperative Preparation

The key step in the ligation of the thoracic duct is the ability to identify the duct as it emerges from the aortic hiatus.<sup>8,9</sup> This is important in reoperative cases such as postlobectomy and postesophagectomy chylothorax, where the planes are obliterated and the anatomy is not well defined.<sup>1,6</sup> To accomplish this, the patient is given a diet rich in fat content preoperatively. Several methods have been described that vary from a high fat diet the evening before that includes heavy cream or ice cream.<sup>8,9</sup> Some have advocated for enteral fat to continue during the intraoperative period via a nasogastric tube, nasoduodenal feeding tube, gastrostomy tube, or feeding jejunostomy.<sup>8,9</sup> This will create a high-volume flow of chyle and allow the surgeon to identify the thoracic duct clearly.

## Anatomy

The thoracic duct begins below the diaphragm at the cisternae chyli at the 2nd lumbar vertebrae. The duct then runs superiorly through the aortic hiatus between the azygous vein and the aorta. The thoracic duct then crosses the midline at the level of the 4th to 5th thoracic vertebra and empties into the junction of the left internal jugular and subclavian vein, as shown in Fig. 1. There are many anatomic variations mostly due to the embryology of the thoracic duct, which begins as a bilateral structure. Up to 40% to 50% of the population will have 2 or 3 major branches of the thoracic duct; however, it is more likely to emerge as a single duct from the aortic hiatus.<sup>1,2</sup>

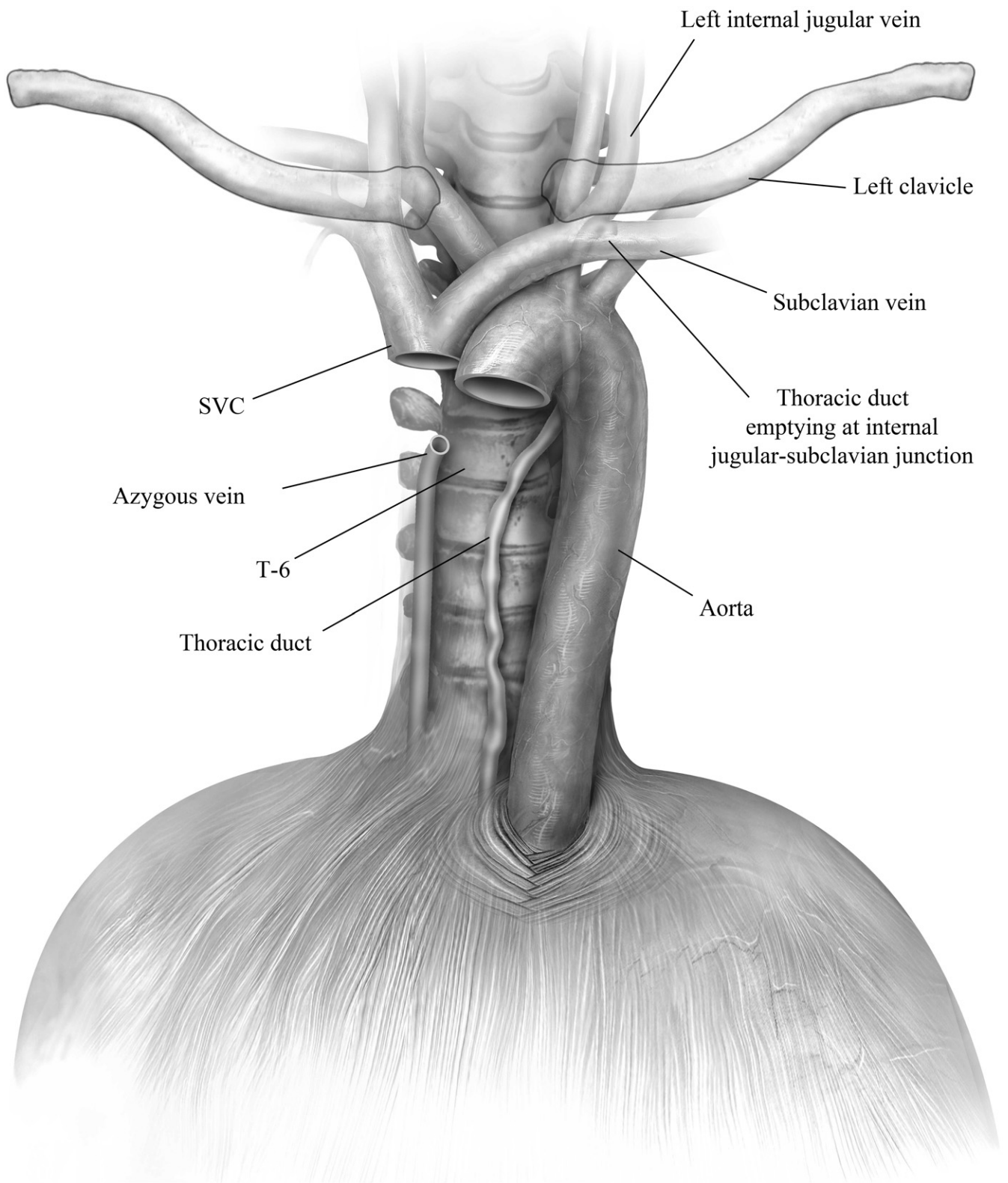
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Dr. Pickens reports receiving consulting and lecture fees from Ethicon. Drs. Ahmed and Sancheti have no commercial interests to disclose.

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**Figure 1** Thoracic duct anatomy. SVC = superior vena cava.

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