Case report - Esophagus

Post-esophagectomy chylous leakage from a duplicated left-sided thoracic duct ligated successfully with left-sided video-assisted thoracoscopic surgery

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Abstract

Three months after esophagectomy for esophageal cancer, a 58-year-old man presented with fluid trapped in his upper mediastinum due to chylous leakage from a duplicated left-sided thoracic duct that remained after excision of the main thoracic duct. Classical lymphangiography using lipiodol confirmed the presence of duplicated thoracic ducts. Conservative treatments were not effective, and then we performed ligation of the left-sided thoracic duct with left-sided video-assisted thoracoscopic surgery. Anatomic variations of the thoracic duct can result in chylous leakage after thoracic surgery. Even if the patient has anomaly of the thoracic duct, classical lymphangiography is useful for detecting locations of the thoracic duct precisely, allowing for certain ligation of the duct with video-assisted thoracoscopic surgery.

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1. Introduction

Although relatively rare, chylous leakage is a complication of esophageal cancer surgery that can be life threatening. Chylous leakage generally occurs in response to thoracic duct injury, regardless of whether the duct is preserved or resected with the esophagus. Previous reports describe anatomic variations in thoracic duct structure [1, 2], which can add to the risk of injury during esophageal surgery. Here we describe a very rare case of chylous leakage that occurred from a duplicate left-sided thoracic duct remaining after esophagectomy with excision of the thoracic duct. The leakage was treated successfully by ligation of the left-sided thoracic duct under left-sided video-assisted thoracoscopic surgery (VATS).

2. Case report

A 58-year-old man was referred to our hospital for the treatment of thoracic esophageal cancer. Following neo-adjuvant chemotherapy, the patient underwent esophagectomy via right thoracotomy with three-field lymphadenectomy. The thoracic duct, excised with the esophagus, was ligated at the right supra-diaphragmatic site. The patient did not experience any postoperative complications and was discharged on the 23rd postoperative day. The patient reported no adverse symptoms until three months after discharge, when he experienced an occasional cough. Computed tomography (CT) films demonstrated fluid trapped in the upper mediastinum that compressed his trachea (Fig. 1), for which he was readmitted to our hospital.

After admission, a pig-tailed catheter was inserted via CT guidance for fluid collection. The drained fluid was milky and showed an elevated triglyceride level of 1748 mg/dl, leading to a diagnosis of chylous leakage. Because the leakage did not appear as a chylothorax and we had excised his thoracic duct during the surgery, we speculated that a duplicate left-sided thoracic duct, which flowed into the normal thoracic duct behind the left carotid and subclavian arteries, had not been ligated at the site of confluence with the main thoracic duct.

Chylous drainage volume was between 800–1000 ml daily. Although the patient underwent total parenteral nutrition and a subcutaneous injection of octreotide (a somatostatin analogue), the volume did not decrease. To detect and possibly treat the lymphatic leakage, we then performed classical lymphangiography using lipiodol. This procedure confirmed the existence of duplicated thoracic ducts, with the right-sided duct ligated successfully at the right supra-diaphragmatic site, and the duplicate left-sided duct remaining and extending to the upper mediastinum (Fig. 2a–d). Because lymphangiography did not stop the chylous leakage, surgical treatment was required.

Based on the lymphangiographic findings, we performed ligation of the left-sided thoracic duct using left-sided VATS. As seen in CT films, a left-sided thoracic duct was detectable in the space bounded by the parietal pleura, the descending aorta and the vertebral body. We performed...
mass ligation of the duplicated thoracic duct at the supradiaphragmatic area.

After surgery, drainage of chylous leakage ceased immediately. The patient did not experience any postoperative complications and was discharged from our hospital on the 7th postoperative day.

3. Discussion

Chylous leakage following esophagectomy is a dangerous complication that has been reported to occur in approximately 0.9–4.7% of cases [3, 4], and generally due to an undetected injury of a thoracic duct, regardless of whether the duct remains or is excised.

Previous reports describe many types of thoracic duct anatomic variations, and a left-sided thoracic duct was detected previously in approximately 7.8% of patients [1]. In such cases, thoracic ducts are generally duplicated, with the left-sided thoracic duct flowing into the normal thoracic duct behind the left carotid and subclavian arteries, the ducts then draining together into the left subclavian vein. In the present case, we speculated that the leakage occurred in response to drainage from the undetected and unligated left-sided thoracic duct, a hypothesis that was confirmed by lymphangiography.

Conservative treatment of chylous leakage, consisting of adequate drainage and either a low-fat diet or total parenteral nutrition, was not effective in this case. Although recent reports indicate that injection of somatostatin or octreotide (a somatostatin analogue) can lead to rapid cessation of chylous production [5, 6], this treatment did not reduce the chylous leakage from our patient.

Other recent reports describe classical lipiodol lymphangiography as a useful tool for the diagnosis and treatment of postoperative lymphatic leakage. Extravasated lipiodol has been hypothesized to induce a granulomatous reaction that can result ultimately in closure of leakage sites [7]. In the present case, lymphangiography did not stop chylous leakage, but did confirm that the leakage derived from a left-sided thoracic duct. Magnetic resonance lymphangiography, which is thought to be less invasive than lipiodol lymphangiography, is another modality for detection of thoracic ducts [8], however, it promised no effect as a therapeutic approach.

Because recent reports of video-assisted thoracoscopic ligation of the thoracic duct [3, 4, 9] indicate that this approach is less invasive than thoracotomy, we opted to perform VATS. In the present case, chylous leakage was trapped in the upper mediastinum, where our approach was impeded by adhesions around the left recurrent laryngeal nerve. Consequently, we ligated the left-sided thoracic duct without confirmation of chylous leakage cessation during the thoracoscopic operation. In this situation, preoperative lymphangiography data were useful in that they provided us with the exact course of the left-sided thoracic duct.

During surgeries for esophageal cancer that involve thoracic duct, we recommend possible ligation of any thick tributaries from the thoracic duct. In practice, it can be difficult to recognize such thick tributaries during surgery. For this reason, preoperative administration of oral cream [10] or magnetic resonance lymphangiography can be applied as a detection technique to avoid chylous leakage after esophagectomy. Should chylous leakage occur after esophagectomy, classical lymphangiography is useful for precise detection of the thoracic duct, which allows certain ligation of the duct with VATS.

References