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CASE REPORT

A rare cause of cardiac failure following transthoracic oesophagectomy

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Abstract

Following elective transthoracic oesophagectomy in a 75-year old female, sudden haemodynamic instability occurred on the second postoperative day, requiring re-intubation and inotropic support. A large mediastinal fluid collection with mechanical compression of the heart was found with computed tomography imaging of the thorax. Restoration of cardiac function was noted following successful surgical fluid drainage. Subsequent ligation of the thoracic duct because of persisting leakage of chylous fluid resulted in final patient recovery.

Chyle leakage following oesophagogastrectomy usually results in pleural effusion. However, a chylomediastinum may sometimes occur with potentially significant haemodynamic consequences. Recognition of the thoracic duct at initial surgery with or without prophylactic ligation is crucial for preventing major complications caused by chyle leakage.

Introduction

During oesophagogastrectomy, injury to the main thoracic duct or its branches often occurs. This is related to the close anatomical proximity of the thoracic duct to the oesophagus. As a consequence, lymphatic fluid may leak into the thoracic cavity, resulting in a so-called chylothorax[1]. This complication causes significant morbidity, but fortunately is relatively uncommon. The overall incidence is reported to be around 2% to 3%, depending on the type of surgical approach used[2]. Opening the thoracic cavity during a transthoracic approach logically increases the risk of a chylothorax compared to a transhiatal oesophagogastrectomy.

A chylothorax usually presents as a high-volume lymphatic output from a chest tube or an undrained pleural effusion on a chest radiograph. A chylomediastinum (mediastinal chyle collection), however, may have significant haemodynamic consequences due to its close relationship with the heart and major vascular structures. This situation is illustrated in the following case report.

Case report

A 75-year old female was admitted to our hospital with a biopsy-proven squamous cell carcinoma of the distal oesophagus. At preoperative work-up, including endoscopic ultrasound as well as computed tomography (CT) imaging of the thorax and abdomen, it was classified as a cT_3N_1 tumour. Following standard preoperative chemoradiotherapy, a transthoracic oesophagectomy was performed with a primary anastomosis located in the neck.

During surgery, the oesophagus and surrounding lymph nodes were mobilized through a right thoracotomy and incisions in the upper abdomen and neck. The anastomosis was made between the cervical oesophagus and the fundus of the stomach. The initial surgery was uneventful. Drains were situated in the neck, right pleural cavity and upper abdomen. Postoperatively, the patient was admitted to the Intensive Care Unit and was extubated the following day without any problems.

On postoperative day (POD) 2, the patient suddenly deteriorated haemodynamically (hypotension, tachycardia and increased central venous pressure [23 mm Hg]), requiring re-intubation and inotropic support. The chest radiograph showed bilateral pleural effusions for which an additional chest tube was placed at the left side, draining a large amount of typical chylous (milky) fluid. Laboratory analysis showed an elevated level of triglycerides (5.3 mmol/L) suggestive for chyle. Fluid cultures were negative. Additionally, conservative treatment with total parenteral nutrition (TPN) was started. However, the patient did not improve. Subsequent CT imaging of the thorax showed a large mediastinal fluid collection adjacent to the neo-oesophagus, compressing the left atrium of the heart (*figure 1*). Additional cardiac ultrasound confirmed low cardiac output due to external compression of the left atrium with a subsequent decrease of cardiac inflow. At re-laparotomy on POD 3, the mediastinal collection was drained through a transhiatal approach using the upper abdominal incision. Immediate reduction in the patient's need of vasopressors and inotropic support was noted as well as a marked decrease in heart rate following successful drainage. Central venous pressure decreased to 11 mm Hg. Postoperative cardiac ultrasound confirmed the presence of a normalized cardiac function. A medium-chain triglyceride (MCT) diet was started postoperatively.

Figure 1. CT images of the thorax (a: transverse, b: coronal) demonstrating a large mediastinal fluid collection (c) adjacent to the neo-oesophagus and compressing the left atrium of the heart

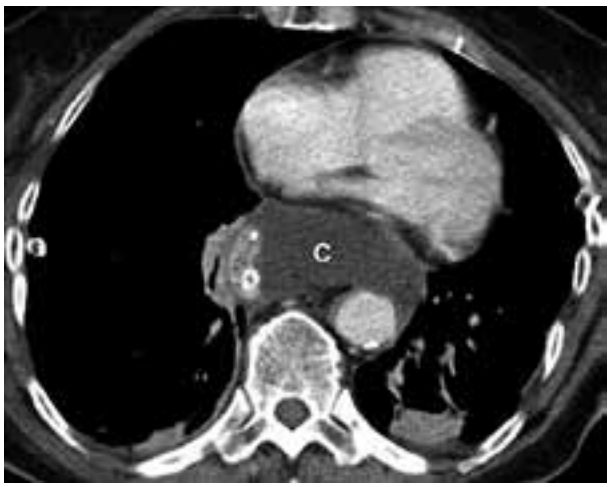
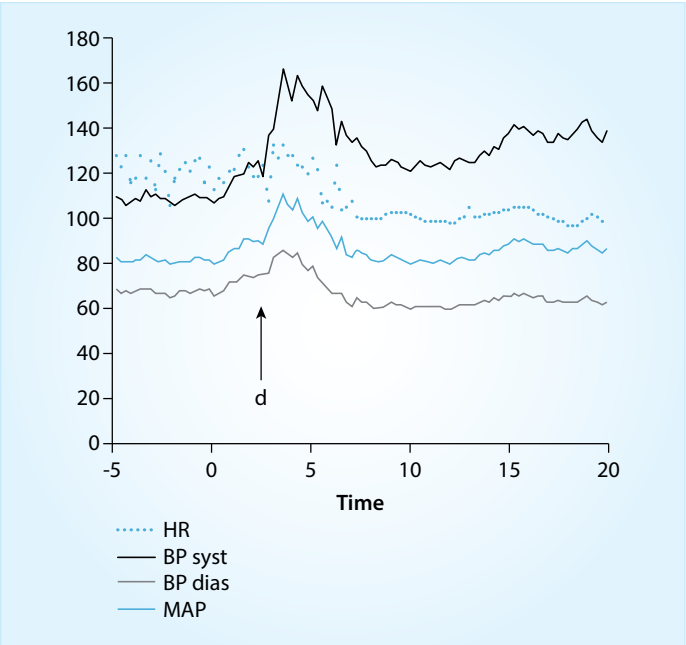


Figure 2. Marked reduction of heart rate and improvement of blood pressure during re-laparotomy. Time 0 represents the beginning of surgery. Mediastinal drainage (d) occurred 2 to 3 minutes later



Due to continuing production of fluid in the upper abdominal drain (5 to 6 liters of chylous fluid per day), a re-thoracotomy was performed on POD 14. During surgery, leakage of lymph from the thoracic duct was noted. The thoracic duct was subsequently ligated, resulting in a marked improvement of patient recovery.

Discussion

Cases and management of postoperative chylothorax following oesophagogastrectomy have been frequently presented[3,4]. However, to our knowledge, the presence of a chylomediastinum has only been reported on a few occasions[5-8]. In addition, significant secondary haemodynamic consequences were described in only one paper[8].

Postoperatively, massive chylous chest tube effusion is suggestive of thoracic duct injury. Loculated mediastinal collection of chyle is, however, rare especially following a transthoracic procedure when the pleural cavity has been opened[2]. One could assume that in these cases sufficient fluid drainage is possible through the chest tubes. Due to the high volume of physiological lymph production, insufficient mediastinal drainage may cause rapidly progressive mechanical obstruction of vital mediastinal organs. In our case, decreased left-sided cardiac inflow due to external left atrial compression resulted in a significant reduction of cardiac output. Interestingly, obvious improvement of cardiac function occurred following successful fluid drainage. Intra-operative monitoring demonstrated a marked subsequent reduction of heart rate and improvement of blood pressure (*figure 2*).

Usually, the presence of a chylothorax can be managed conservatively by TPN or an MCT diet, occasionally resolving within a few days. Only persisting chyle leakage necessitates re-operation and ligation of the thoracic duct. However, different thresholds of continuing fluid drainage per day that require re-operation are advised[9,10]. In general, operative therapy is suggested in case of a daily output of more than 2 liters after two days of optimal conservative therapy[10]. In our case, we observed an uncommonly high production of chyle of 5 to 6 liters per day. In cases of severe haemodynamic consequences, surgical intervention is urgently required. Some authors recommend prophylactic ligation of the thoracic duct during initial surgery to minimize the risk of postoperative morbidity and mortality[11]. Of course, mediastinal chyle collections need to be distinguished from a local abscess or anastomotic leakage. These complications require a different treatment approach. CT imaging is usually indicated to differentiate between these causes.

In summary, chyle leakage following oesophagogastrectomy usually results in pleural effusion. Mediastinal collections may, however, occur with potentially significant haemodynamic consequences. Early recognition and subsequent management is essential.

Intra-operative recognition of the thoracic duct with or without prophylactic ligation remains crucial to prevent major complications due to chyle leakage.

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