PANORAMIC AITIA IN CHYLOTHORAX

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KEYWORDS

Chylothorax, Chyle, thoracic duct

ABSTRACT

Introduction:

The etiology of chylothorax can be divided into a)Traumatic b)Spontaneous and c)Idiopathic. Traumatic chylothorax, usually following iatrogenic injury like oesophageal surgery accounts for0.3-5%. Non - iatrogenic traumatic chylothorax are extremely rare (about 31 cases in the last 20 years) so also chylothorax following thyroidectomy (0.5%-6%). Here we present four cases of chylothorax each following a different aetiology for their rarity.

Materials and methods:

The cases were manged in the department of cardiothoracic surgery. The first case was a 36 yr old man who presented with right sided chylothorax following a road traffic accident. The second case was a 55 yr old woman who presented with left sided chylothorax following thyroidectomy for follicular carcinoma thyroid. The third patient was referred following pericardectomy for constrictive pericarditis with right sided chylothorax and the last case developed bilateral chylothorax following thymectomy for myasthenia gravis. All patients were placed on conservative treatment with tube thorocostomy, low fat diet, medium chain fatty acid diet with parentral nutrition and octreotide for atleast 2 weeks. All patients required surgical intervention with ligation of thoracic duct. The intraop challenge was to identify the leaking duct, which was overcome by instilling a high fat mixture(indigenous), through nasogastric tube soon after induction. Post operative period was uneventful.

Results:

Operative intervention provides prompt relief for those who fail initial trial of conservative treatment. One should not wait too long before intervening surgically as the waiting period causes malnourishment and metabolic problem s which can interfere with recupertion.

INTRODUCTION

Chylothorax is caused by an injury of the thoracic duct which is well protected inside the chest. This explains the rarity of this condition. When chyle accumulates in the pleural cavity, it may cause cardiovascular, respiratory, or nutritional complications[1]. The adverse effects of chylothorax depend on the size of the leak, associated co-morbidities and management of the patient. The etiology of chylothorax can be divided into a)Traumatic b)Spontaneous and c)Idiopathic. Traumatic chylothorax, usually following iatrogenic injury like oesophageal surgery accounts for0.3-5%. Non -iatrogenic traumatic chylothorax are extremely rare (about 31 cases in the last 20 years) so also chylothorax following thyroidectomy (0.5%-6%). Here we present four cases of chylothorax each following a different aetiology for their rarity.

METHODS

The cases were manged in the Department of cardiothoracic surgery.

Case 1:

36 year old male was admitted in casualty following road traffic accident. On evaluation he was found to have 8^{th} and 9^{th} thoracic vertebra fracture with no neurological deficit. On further investigation he was found to have right pleural collection for which intercostal drainage was done. Milky fluid drained which on analysis showed elevated triglycerides, an evidence of chylothorax.

Case 2:

55 year old female was admitted in surgery ward with complaints of thyroid swelling. On evaluation was found have follicular carcinoma thyroid. She underwent total thyroidectomy with lateral neck node dissection for the same in an outside hospital. In the post operative period, she complained of shortness of breath, a chest x ray revealed left pleural collection. Promptly an intercostal drainage was inserted, which drained milky white fluid. She was referred with intercostal drainage to our department for further treatment.

Case 3:

45 year old female had undergone pericardectomy for constrictive pericarditis in an outside hospital. Post surgery she developed right sided pleural effusion for which intercostal drainage was done. The drained fluid was milky white which on analysis showed elevated triglycerides. She was referred to our department for further treatment.

Case 4:

36 year old female came with complains of generalised weakness, drooping of eyelids. She was clinically diagnosed to have myasthenia gravis. On evaluation showed elevated levels of anticholinesterase receptor antibody. She was started on neostigmine and plasmapheresis was done. She underwent thymectomy. In the post operative period there was persistent fluid drainage in the drain tube, which turned milky white from third postoperative day after starting the patient on oral diet. On fluid on analysis showed elevated triglycerides. Chest Xray showed bilateral pleural effusion. Hence the patient had developed bilateral chylothorax following thymectomy for myasthenia gravis.

All patients were placed on conservative treatment with tube thorocostomy, low fat diet, medium chain fatty acid diet with parentral nutrition and octreotide for atleast 2 weeks. All patients required surgical intervention with ligation of thoracic duct. The intraop challenge

was to identify the leaking duct, which was overcome by instilling a high fat mixture(indigenous), through nasogastric tube soon after induction. Post operative period was uneventful.

Fig1: Chest Xray showing right pleural effusion

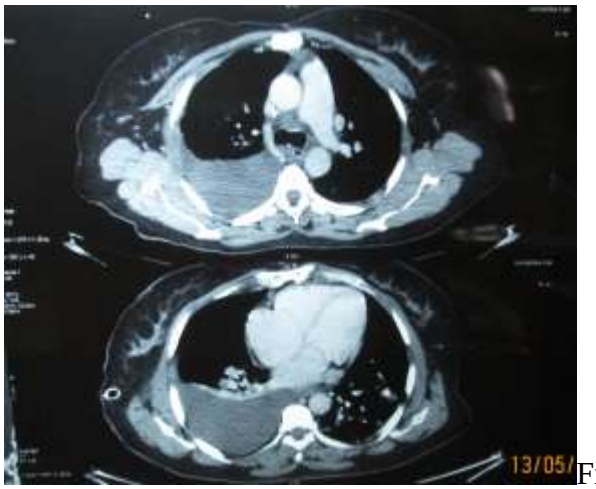

Fig2: CECT chest showing right pleural effusion

RESULTS

We treated all our patient initially conservatively. Initial management of chylothorax aims to decompress the pleural space and minimize chyle production by not feeding the patient via the enteral route. Total parenteral nutrition may be needed if a low fat diet does not reduce the volume of drained chyle[2]. Generally, a small chyle leak is managed conservatively. If there is a heavy loss of chyle it may lead to complications and surgery could be necessary. It is agreed that conservative management is advised for two weeks, unless thoracotomy is indicated for another reason, in which case ligation of the thoracic duct can be carried out, or unless the patient's nutritional status deteriorates rapidly due to significant chyle drainage[3].

Operative intervention provides prompt relief for those who fail initial trial of conservative treatment. One should not wait too long before intervening surgically as the waiting period causes malnourishment and metabolic problems which can interfere with recupertion.

DISCUSSION

The thoracic duct anatomically extends from the cisterna chyli, which is located near the second lumbar vertebra. It initially arises from the right side, then courses near the fourth thoracic vertebra on the left side, and ultimately curves posteriorly to terminate in the left

venous angle in the neck. However, the termination of the thoracic duct into the neck venous system is highly variable[4]. It can terminate on the left side in the internal jugular vein(46%), in the jugulo-venous angle(32 %), subclavian vein (18 %), external jugular vein, vertebral vein, transverse cervical vein, brachiocephalic vein, suprascapular vein, innominate vein, and in the right internal jugular vein (4 %). The right lymphatic duct is located at the medial border of the anterior scalene muscle, and its course is similar (although shorter) compared to the left side.
Traumatic chylothorax can develop following cervical, thoracic, or abdominal surgeries, due to malignancy, or as a result of penetrating or blunt trauma. When injury occurs above the fifth or sixth thoracic vertebra, it typically leads to left-sided chylothorax, whereas injury below that level results in right-sided chylothorax. Chest X-rays may reveal pleural effusion, and the drainage of milky white pleural fluid may suggest chylothorax. Injury to the thoracic duct can happen through hyperextension of the spine, direct injury from vertebral fracture, or direct cutting by the diaphragmatic crura.[5,6,7,8].

The likelihood of developing chylothorax escalates when thyroid surgery is coupled with neck dissection (ND). After total thyroidectomy with central ND, the risk is approximately 0.5%. This risk increases to 5.1% after total thyroidectomy with lateral ND on one side, and further to 6.2% after total thyroidectomy with lateral ND on both sides.

[8,9,10]. Chylothorax after thyroidectomy appears to be extremely rare and is reported only anecdotally. Although the cervical chyle leak can be explained by lateral ND, the risk factors and determinants of a chylothorax after thyroidectomy remain unknown. It appears that the identification of the thoracic duct in cervical surgery does not play a major role in avoiding a cervical or thoracic chyle leak.

Two pathomechanisms for acquired (iatrogenic) chylothorax are mentioned in the literature [11]: (1) direct leakage due to traumatic injury during surgery, a notable amount of chyle leaks directly from the base of the neck into the mediastinum [12], (2) increase of backward hydrostatic pressure in the thoracic duct after duct ligation [13], causing the intraluminal pressure on the duct increases to the point where a non-traumatic leakage of chyle is induced or a secondary rupture of the thoracic duct occurs. [14].

Chylothorax in pericardectomy following constrictive pericarditis is possibly due to the obstruction and disruption of the intrathoracic lacteals[15].

Chylothorax results from tear or rupture of thoracic duct or its branches and can occur after various kinds of thoracic surgery. Bilateral chylothorax following transsternal total thymectomy is an uncommon occurrence, but it can represent a significant complication.. Disruption of minor lymphatic channels in the anterior mediastinum which is remote from thoracic duct is considered to be the cause of chylothorax. Bilateral chylothorax is an infrequent complication following thymectomy performed through a median sternotomy and Huang et al. reported that 3 out of 217 patients (1.38%) who underwent extended thymectomy due to myasthenia gravis had postoperative chylothorax [16].

The diagnosis of chylothorax relies on clinical observations, which encompass postoperative respiratory symptoms such as dyspnea, chest discomfort, or chest pain, alongside radiological evidence of significant pleural effusions, which can be confirmed through standard chest X-rays, CT scans, or ultrasound. The thoracic X-ray is the most frequently used standard imaging modality for this purpose. Dyspnea could also be a result of other conditions, such as

bilateral recurrent nerve paralysis, hypocalcemia or lung embolism [17], which is the reason why this rare complication might be initially missed. Following diagnostic thoracocentesis, the analysis of the milky fluid confirms the presence of chyle. Complications primarily involve the loss of fluid, electrolytes, proteins, fats, fat-soluble vitamins, and lymphocytes, particularly of the T-cell variety. Consequently, chyle leakage may result in metabolic imbalances, nutritional deficiencies, and infections due to immunodeficiency. Chyle in the pleural space can lead to cardiopulmonary compromise by compressing the lungs, causing a mediastinal shift and distortion of the great vessels. [18,19]

Conservative treatment is generally the preferred therapeutic approach. The first step is a diagnostic and therapeutic thoracocentesis with relief of respiratory symptoms**.**[20,21] Additional therapy consists of nutritional modifications with the aim to reduce chyle production and to prevent metabolic complications. Dietary options for managing chylothorax include either complete fasting to allow for enteral rest, along with the administration of total parenteral nutrition, or a high-protein, low-fat diet supplemented with medium-chain triglycerides. Surgical intervention, such as duct repair, may be warranted in cases of persistent fistulae despite conservative treatment, significant leakage, or associated complications. Some authors propose a limit in quantity (>1 liter per day for 5 days) or time of drainage (>2 weeks) for conservative treatment, but there is no international consensus[22].

The primary goal of surgical management is to identify and ligate the thoracic duct, which is the primary source of chyle. Identifying the thoracic duct is a crucial step in surgical management of chylothorax, as it is the primary source of chyle and must be ligated or divided to prevent further leakage into the pleural space. There are several methods for identifying the thoracic duct during chylothorax surgery. One of the most common methods is to perform a lymphangiogram prior to surgery. This involves injecting a contrast agent into the lymphatic vessels and taking X-ray images to visualize the flow of lymphatic fluid. This can help identify the location and course of the thoracic duct, making it easier to locate and ligate during surgery. Another method for identifying the thoracic duct is to use intraoperative ultrasound. This involves using a handheld ultrasound probe to visualize the anatomy of the chest and identify the location of the thoracic duct. This technique can be particularly useful in cases where the duct is difficult to locate using traditional surgical techniques. Intraoperative injection of dye into the lymphatic vessels can also be used to identify the thoracic duct. This involves injecting a small amount of dye into the lymphatic vessels and watching for its appearance in the pleural cavity. This can help identify the location and course of the thoracic duct, making it easier to locate and ligate during surgery. In some cases, the thoracic duct may be identified based on its anatomical location. The duct typically runs anterior to the vertebral bodies and posterior to the azygos vein, and can be located by carefully dissecting the tissues in this area.

CONCLUSION

Approximately 25–50% of patients will require surgical treatment for traumatic chylothorax [23]. Even though very rare, chylothorax should still be considered as a potential postoperative complication in patients with respiratory symptoms after thoracic surgery.

Operative intervention provides prompt relief for those who fail initial trial of conservative treatment. One should not wait too long before intervening surgically as the waiting period causes malnourishment and metabolic problems which can interfere with recupertion.

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