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## CHYLOTHORAX A COMPLICATION OF CARDIOVASCULAR AND THORACIC SURGERY: A CASE REVIEW

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#### ABSTRACT

Chylothorax, the accumulation of chyle in the pleural space, is a relatively rare cause of pleural effusion in children. Chylothorax is caused by injury or obstruction of the thoracic duct leading to chyle accumulation in the pleural space. It most commonly occurs from trauma or malignancy. However chylous effusions are rare, they have serious clinical consequences including cachexia, respiratory distress, malnutrition and immunodeficiency. A prompt diagnosis is needed to start treatment of the underlying cause. Treatment can be divided into conservative and surgical interventions. The conservative therapy includes intercostals decompression of the pleural effusion along with nutritional support (MCT diet) in the form of total parenteral nutrition, and reduction of chylous formation with somatostatin. Surgical interventions include thoracic duct ligation, pleuroperitoneal shunt and percutaneous embolisation. This case review will focus on causes, pathology, medical and surgical management as well as nursing management of children with chylothorax after cardiac and thoracic surgery.

#### INTRODUCTION

Chylothorax is an uncommon complication of thoracic surgery associated with significant morbidity and extended hospital stay. Incidence of this complication ranges from 0.6% to 2.5% of children undergoing cardiac surgery. The management of these patients includes drainage of the chylous effusion, dietary limitation of fat intake, as well as other surgical and medical therapy. Nursing management of these patients can be complex and challenging [1].

Chylothorax refers to pleural effusion of chyle. The causes of chylothorax are multiple, and there are several major types of chylothorax defined by their origins, i.e. traumatic chylothorax, medical (spontaneous) chylothorax and congenital chylothorax. Chylothorax is a

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Raghu V A Email:- raghuva84@gmail.com serious complication that may follow any thoracic procedure requiring dissection in the proximity of thoracic duct[2]. A study was conducted by Emily H.chan. Jennifer L. and William G to determine the incidence of chylothorax after the cardiovascular surgery found that 48 cases out of 1257 cases had chylothorax after cardiac surgery with an incidence rate of 3.8 % and these cases had a prolonged hospital stays (median, 22 versus 8 days; p < 0.001). Incidence of chylothorax was significantly higher with heart transplantation and Fontan procedures [3].

#### Definition

Chylothorax is a collection of a white milky drainage from the lymphatic system within the thoracic cavity that can impair respiratory status as it accumulates [4].

#### Causes of chylothorax

Post operative complication of cardiothoracic surgery

• It can also occur after thoracic surgery of esophageal and chest vascular surgery.

• Chylothorax usually occurs due to injury to lymphatic ducts of thoracic cavity

• Chylothorax is especially likely to occur in children with elevated pressure in the systemic venous system of the upper body, such as those children who have undergone hemifontan, bi-directional Glenn or fontan procedure [5].

#### Pathophysiology

• Chyle is an opaque milky white fluid consisting of protein, fat, lymphocytes, and electrolytes absorbed through the gut into the lymph channels of the gastrointestinal tract. The lymph channels drain into the cistern chyle and then travel up the thoracic duct to reenter the vascular system near the junction of the left subclavian and left internal jugular veins. The thoracic ducts are present near the meditational structures heart, aorta, esophagus, and systemic veins.

• Any injury to these thoracic ducts during surgery can cause leak of chylus into thoracic cavity.

• And in other case the elevated pressure creates a relative obstruction of flow, which prevents the drainage of chyle from the thoracic duct into the left subclavian vein.

• Vascular thrombus in the superior vena cava or subclavian vessels can also create an elevated systemic venous pressure leading to chylothorax or can directly obstruct chylous flow from the thoracic duct to the subclavian.

• In addition, there are case reports of congenital and spontaneous chylothorax[1].

#### **Clinical manifestation**

- Persistent Pleural effusion
- Continuous and prolonged chest drainage
- Prolonged hospital stay
- Dyspnea due to fluid accumulation
- The more serious consequence of chylothorax is malnutrion, dehydration, weakness, metabolic acidosis and immunosupression [7].

#### Diagnosis

- Blood cell count of peritoneal fluid
- Presence of protein and triglyceride in peritoneal fluid
- The fluid is sterile and somewhat bacteriostatic due to the presence of so many white Blood cells.
- The total cell count, triglyceride and lymphocyte helps to differentiating serous effusion from emphysema from chylorus drainage.
- Chest x ray [5].

#### **Conservative Management of chylothorax**

#### **Dietary management**

The goal of dietary management in chylothorax is to reduce the flow of chyle through the thoracic duct. Mainly long chain fatty acids that are absorbed from the intestines via lacteals and enter the central circulation at the thoracic duct, therefore enteral intake of long chain fats must be completely limited.

Thus, dietary management includes

1. Complete intestinal rest with parenteral nutrition,

2. Fat-free enteral feeding, or very low long-chain triglyceride- medium chain triglyceride (MCT) enteral feeding

3. Medium chain fatty acids (6-12 carbons in length) are absorbed directly into the portal system and do not enter the lymphatic system.

4. The patient must be provided with adequate calories, fluids, electrolytes, and protein regardless of feeding method.

5. It is also important to provide enough essential fatty acids (the long chain fatty acids linoleic acid) to prevent essential fatty acid (EFA) deficiency [3].

#### Total parenteral nutrition

Total parenteral nutrition (TPN) is the feeding method, in which nutrients are supplied via parenteral route. The adequate amount of essential fatty acids is provided via TPN. The sources of fat in parenteral preparations are soybean oil or a mixture of soybean and sunflower oils. Since the fat in TPN is delivered directly into the blood stream, it never enters the lymphatic system and, therefore, has no effect on the thoracic duct[2].

#### **Medical management**

In addition to dietary management to control pleural effusion, an effective drainage of the effusion via thoracentesis or chest tube placement is necessary to optimize respiratory status. One of the major concerns of chest tube drainage system is loss of key proteins and fluid through the drainage fluids. Regular laboratory assessment of albumin and immunoglobulin levels will indicate whether supplementation of these proteins is needed in an individual case [1].

#### **Surgical Management**

• Surgical management of a chylothorax remains controversial and quite variable from hospital to hospital.

• Some surgeons will ligate the thoracic duct after a prolonged drainage, while others plan surgery based on volume of drainage and rate of decline in drainage [3].

• Some hospitals use pleurodesis, the stripping of the pleura off the surface of the lung, to control fluid drainage.

• Still others use irritant agents (such as talc) to scleroses the pleura to the lung.

• Some physician may perform percutaneous embolisation

• It is also reported in the literature is placement of a pleuroperitoneal shunt to shift the fluid from the thoracic cavity to the abdominal cavity where it can be reabsorbed.

# New approach for management of chylothorax in children

The new approach in the management of chylothorax is continuous or intermittent infusion of Octreotide injection. Octreotide is known to decrease splanchnic, hepatic, and portal blood flow, thereby decreasing the volume of lymph fluid and decrease the thoracic duct flow. Octreotide also inhibits the absorption of triglycerides and decreases acetylcholine release in the intestine. Acetylcholine is known to increase lymph flow so reduced acetylcholine would result is decreased lymph flow [2].

# Nursing management of chylothorax Maintain effective breathing pattern

• Monitor and record vital signs

• Assess breath sounds, respiratory rate, depth and rhythm

- Maintain semi fowler position
- Encourage patient to perform deep breathing exercises
- Provide relaxing environment
- Administer supplemental oxygen as ordered
- Assist client in the use of relaxation technique
- Administer prescribed medications as ordered
- Maximize respiratory effort with good posture and effective use of accessory muscles.
- Encourage adequate rest periods between activities
- Encourage ambulation

#### Nutritional management

The primary goals of nutritional management of chyle leaks are to:

• Decrease production of chyle fluid in order to avoid aggravating the effusion, ascites or chest tube drainage;

• Replace fluid and electrolytes and Maintain or replenish nutritional status and prevent malnutrition.

• Various nutritional strategies were applied in the management of Chylothorax

• Exclusive Medium Chain Triglyceride (MCT) feeds, which are absorbed directly into the portal venous system without going through the intestinal lymph vessels and the thoracic duct. Short and Medium chain triglycerides are more easily absorbed than long chain triglyceride.

• Advice fat free diet, fat should be less than 0.5gm per serving and it should not be more than 3gm per day

• Encourage to take green leafy vegetables and fruits

• Inform the dietician to set a diet pattern and menu for a client

• Administer fat soluble vitamins and fatty acids supplementation

#### Maintain the patency of chest tube

• Ensure tube patency by watching for fluctuations of fluid or air bubbling in the underwater seal chamber. Record the amount, color, and consistency of chest tube drainage.

• Monitor vital signs during procedure. Watch out for signs of respiratory distress after the procedure

• The unit and all tubing should be below patient's chest level to facilitate drainage

• Tubing should have no kinks or obstructions that may inhibit drainage

- Ensure all connections between chest tubes and drainage unit are tight and secure
- Tubing should be anchored to the patients skin to prevent pulling of the drain
- Ensure the unit is securely positioned on its stand or hanging on the bed

• Ensure the water seal is maintained at 2cm at all times.

#### Assist the client in daily living activities

• Establish Rapport and Assess patient's general condition

- Monitor and record Vital Signs
- Adjust client's daily activities and reduce intensity of level of activity

• Discontinue activities that cause undesired psychological changes

• Encourage patient to have adequate bed rest and sleep

• Provide the patient with a calm and quiet environment

• Assist the client in ambulation

• Ascertain client's ability to stand and move about and degree of assistance needed or use of equipment

- Give client information that provides evidence of daily or weekly progress
- Encourage the client to maintain a positive attitude
- Assist the client in a semi-fowlers position

• Assist the client and family members in learning and demonstrating appropriate safety measures

#### Management of pain

- Assess the level of pain by using pain scale
- Check the vital signs
- Administer the pain medication as per doctors order
- Encourage the patient to involve in activities
- Provide distraction therapy
- Provide comfortable position and quite environment

• Assess the effectiveness of therapeutic management for pain

#### Pharmacological management

• Somatostatin, or its analogue octreotide, has been used with success in a number of pediatric cases of postoperative and iatrogenic chylothorax. The effective doses of IV somatostatin range from 3.5 to 12 mcg/kg/h.

• Watch for side effects of octreotide such as diarrhea, hypoglycemia and hypotension

• Administer diuretics as per doctors order

• Assess the vital signs, inform the doctor if there is a slow or uneven heart rate

• Frequently assess the CBC and LFT results

• Administer the antibiotics for prevention of lung infection

#### **Prevention of infection**

- Assess the general condition of the baby
- Check the vital signs and laboratory report for any signs of infection
- Assess the site of chest tube insertion for redness, swelling, and any discharge
- Change the dressing by using aseptic technique
- Assess the color of the pleural drainage

• Frequently change the drainage from the drainage bottle

- Assist the physician in changing the chest tube
- Administer the antibiotics as per doctors order [7].

#### CONCLUSION

Chylothorax is a very rare complication of cardiac surgery. There are many causes for chylothorax but cardiac and thoracic surgery is most common cause for chylothorax. The reason for chylothorax must be diagnosed, because the treatment for chylothorax is based on underlying causes. The important medical management for chylothorax is MCT diet and administration of octerotide drugs. If conservative medical management doesn't work, appropriate surgical treatment is considered.

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Nil

#### CONFLICT OF INTEREST No interest

#### STATEMENT OF HUMAN AND ANIMAL RIGHTS

All procedures performed in human participants were in accordance with theethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethicalstandards. This article does not contain any studies with animals performedby any of the authors.

#### REFERENCES

- 1. Elizebeth C, Sunddaby SS. (2004). Management of chylothrax in children. Journal of pediatric nursing, 30(4), 290-295.
- 2. Amina B, Iiham B, Lamia K, Zineb G. (2012). A patient with traumatic chylothorax. *International journal of general medicine*, 5, 759-762.
- 3. Cheung Y, Leung MP, and Mei MY. (2001). Octereotide for treatment of postoperative chylothorax. *Journal of pediatric*, 139, 157-159.
- 4. Pratap U, Salvik Z, Ofoe V.D, Onuzo O. (2001). Octereotid for treatment of postoperative chylothorax after cardiac surgery in children. *Annals of thoracic surgery*, 72, 1740-1744.
- 5. Buttiker V, Fanconi S, and Burger R. (1999). Chylothorax in children. Chest, 116, 682-687.
- 6. http://nurseslab.com/pleural effusion.
- 7. Emily H, Chan BS, Jennifer L and William G. (2005). Post operative chylothorax after cardiothoracic surgery in children. *Annals of thoracic surgery*, 5(80), 1864-1870.