Chylothorax: Diagnosis and Nutrition Management

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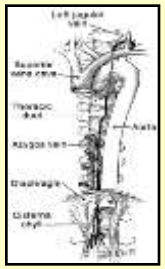
BACKGROUND – WHAT IS CHYLOTHORAX?

Chylothorax is the collection of chyle in the pleural cavity due to thoracic duct leak. **Chyle** is lymphatic fluid of intestinal origin and consists of chylomicrons, lymphocytes, electrolytes , fat-soluble vitamins, and ~ 200 kcal/L . Chyle flows at a rate of 1ml/min and up to >200ml/min after a high-fat meal. What plays an important role in the treatment is that long-chain triglycerides (LCTs) enter the bloodstream via chyle but the majority of medium-chain triglycerides (MCT) are directly absorbed into the portal system.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Cause: Injury to thoracic duct
- Traumatic non-iatrogenic (e.g. forceful cough)
- Traumatic iatrogenic (e.g. esophagectomy)
- Non-traumatic (e.g.lymphoma)

Presentation and Diagnosis:
Onset can be gradual and after a traumatic event can be delayed up to 10 days. Pleural fluids are typically identified by radiographic evaluation or by collection of fluids from preexisting chest tubes. A milky white or turbid appearance is indicative of chylothorax. However, it may not be milky in a fasting or malnourished patient. To confirm the diagnosis, pleural fluid is biochemically analyzed for chylomicrons, triglycerides and other characteristic components of chyle.

Signs and Symptoms include pleural effusions, dyspnea, tachypnea, cough and chest pain

Complications include malnutrition, fluid imbalance, secondary immunodeficiency, respiratory distress, and increased risk of thrombosis

Treatment
- Continuous drainage
- Fat restricted/MCT diet
- Gut rest & TPN
- Replace fluid and electrolytes
- Avoid EFA deficiency (min. 2-4% of total kcal from EFAs)
- Somatostatin and analogues (Octreotide)
- Surgical intervention for persistent chyle loss

INTRODUCTION TO CASE STUDY

This patient is a 7 year old male who was admitted on 4/29/2011 for excision of a neurofibroma in the neck/thorax region.

NUTRITION ASSESSMENT

Medical History: Diagnosed with neurofibromatosis 1 (NF1) in fall 2006. Resection of a cervical neurofibroma in 2008. Patient has impaired speech likely related to NF1.

Diet History: Prior to admit, good appetite, prefers fast food, especially anything with bacon and cheese per mom's report.

What is Neurofibromatosis?

It is a neurocutaneous genetic disorder that causes tumors to form on nerve tissues (neurofibromas). NF 1 is the most common form of Neurofibromatosis, occuring in 1 in 3,000 to 4,000 individuals in the United States. Neurofibromas are usually benign tumors but may become malignant.


Plexiform neurofibroma (bestpractice.bmj.com)

Issues During Course of Stay: Patient sustained injury to thoracic duct from surgery with significant fluid output from chest tubes (1060 mL), evolving hyponatremia and lymphopenia suggestive of chylothorax. Due to ongoing respiratory distress patient was intubated twice throughout hospital course. Nutrition support was interrupted frequently and PO intake was poor. Chest tubes remained until 12 days after surgery for complete chyle drainage. Patient had recurrent hyponatremia → transient SIADH was suspected.

Anthropometrics (admit): Weight: 30 kg (75-90th % for age)
BMI: 18 (75-85th % for age)

Lab values: ↓ albumin, lymphocytes, sodium, chloride, magnesium, phosphorus, ionized calcium
↑ CO2

Estimated Requirements
- Calories: 1370-1600 kcal/day (BMR of 1140 x 1.2-1.4)
  → Increased to 1600-1824 kcal/day (BMR of 1140 x 1.4-1.6)
- Protein: 2-3 gm/kg
- Fluid: 1680 ml/day (maintenance)

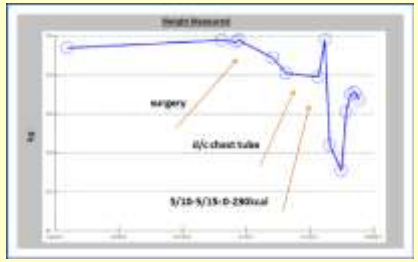
NUTRITION DIAGNOSIS

Inadequate oral intake (NI-2.1) related to NPO status with intubation and now poor PO as evidenced by need for nutrition support.

INTERVENTION

- S/p surgery PPN/TPN → adjusted electrolytes to accommodate low serum levels , provided high protein
- Transitioned to NG feeds with Lipistart (nutritionally complete formula high in medium chain triglycerides and very low in long chain triglycerides)
- Decreased NG feeds from continuous to 16 hours to help increase appetite and encourage PO intake
- Revised calorie needs to adjust for increased work of breathing
- Low-fat, high Na oral diet to avoid chyle increase and hyponatremia
- Calorie count to monitor PO intake
- Due to minimal PO intake, switched from low-fat to regular diet to encourage PO

MONITORING AND EVALUATION



- Chest tube output
- Laboratory values
- PO intake (calorie counts)
- Weight

Outcome: Chylothorax resolved, on 5/28 (29 days later) patient transitioned from low-fat/MCT-rich to regular EN formula and diet

References:
1. Heffner J, Sahn S, & Hollingsworth H. Diagnosis and management of chylothorax and cholesterol effusions.UpToDate, May 2011.
2. Soto-Martinez M. Chylothorax: Diagnosis and management. Ped Resp Reviews. 2009;10(4):199-207.