PERSISTENT CHEST TUBE DRAINAGE (CTD) (>5 mL/kg/day) ON POD#4 OR PRESENCE OF MILKY DRAINAGE

- Send pleural fluid for triglycerides 1.1mmol/L, lymphocyte fraction >80%, chylomicrons
  - No: Continue diuresis
  - Yes*: Chyle (+) or Chyle (-) plus lymphocyte fraction >80%

*See Fluid and Lab Management pathway for guidelines regarding management once chylothorax diagnosed

PHASE 1
Chylothorax diet (see Nutrition Management pathway) for 5 days
Diagnostic imaging (U/S, ECHO to rule-out thrombus)

- Thrombus?
  - No
  - Yes: Treat with heparin +/- tPA

- Chest tube drainage <2 mL/kg/day?
  - No
  - Yes: -remove chest tube
    -continue chylothorax diet for 4 weeks after last chest tube removed

PHASE 2
Start TPN/NPO for 5 days
-attain longer-term vascular access

Note: For patients who had aortic arch reconstruction, notify surgeon to consider early thoracic duct ligation.
NC Children’s Chylothorax Algorithm

**PHASE 3**
- start Prednisone (1 mg/kg/day twice daily) duration of 5 to 7 days
- return to chylothorax diet and stop TPN when adequate enteral goal reached
- chest tube drainage <2 mL/kg/day?
  - yes: can stop TPN
  - no: return to chylothorax diet (see Nutrition Management pathway)

**PHASE 4**
- start octreotide (0.5 to 4 mcg/kg/hr IV continuous infusion) for 5 days
- octreotide 5 mcg/kg/dose IV q8h if limited IV access (↑ q24h by 5 mcg/kg/dose to max of 40 mcg/kg/day) for 5 days
- stop prednisone
- continue chylothorax diet
- chest tube drainage <2 mL/kg/day?
  - yes: -wean prednisone -continue chylothorax diet
  - no: -remove chest tubes -continue chylothorax diet for 4 weeks after last tube removed

- back to Phase 3 with slower wean of prednisone; -return to prednisone dose given prior to increase in drainage
- remove chest tubes -continue chylothorax diet for 4 wks

- return to Phase 2 for a minimum of 7 days
**NC Children’s Chylothorax Algorithm**

**DRAFT 5.21.12**

**PHASE 5**

If surgical intervention (e.g., Thoracic duct ligation)
- Re-start pathway after surgical intervention at Phase 1
- Consider chemical pleurodesis (see *chemical pleurodesis reference*) or pleuroperitoneal shunt if chest tubes continue to drain >2cc/kg/day

<table>
<thead>
<tr>
<th><strong>Chest tube drainage &lt;2 mL/kg/day?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No</strong></td>
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<tr>
<td>- Wean octreotide by 25% daily over 4 days</td>
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<tr>
<td>- Cardiac catheterization</td>
</tr>
<tr>
<td>- Discuss with surgical team options of thoracic duct ligation versus chemical pleurodesis (if chosen see <em>chemical pleurodesis reference</em>)</td>
</tr>
<tr>
<td><strong>Yes</strong></td>
</tr>
<tr>
<td>- Wean octreotide by 25% daily over 4 days</td>
</tr>
<tr>
<td>- Continue chylothorax diet (see <em>Nutrition Management pathway</em>)</td>
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</tbody>
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**Chest tube drainage <2 mL/kg/day?**

| **Yes** |
| - Back to Phase 4 with slower octreotide wean |
| - Return to octreotide dose given prior to increase in drainage |
| **No** |
| - Remove chest tubes |
| - Continue chylothorax diet for 4 weeks after last tube removed |
Nutrition Management Pathway for Pediatric Chylothorax

Initiate low LCT enteral formula

YES
- Provide Tolerex formula (order as “metabolic formula” and write “Tolerex 20kcal/oz” in the comments section)
- Initiate @1ml/kg/H or at half the rate of previously tolerated feeds
- Order Nutrition consult for goal rate/concentration of formula and lipids
- Continue Tolerex and IV lipids for 4 weeks after last chest tube removed

NO
- Provide Monogen formula: specify 20kcal/oz in CPOE
- Initiate @1ml/kg/H or at half the rate of previously tolerated feeds
- Order Nutrition consult for goal rate/concentration of formula
- Continue Monogen for 4 weeks after last chest tube removed

Patient with milk protein allergy or on amino-acid formula (i.e. Elecare or Neocate) prior to chylothorax?

NO
- Provide Monogen formula: specify 20kcal/oz in CPOE
- Initiate @1ml/kg/H or at half the rate of previously tolerated feeds
- Order Nutrition consult for goal rate/concentration of formula
- Continue Monogen for 4 weeks after last chest tube removed

YES
- Provide Tolerex formula (order as “metabolic formula” and write “Tolerex 20kcal/oz” in the comments section)
- Initiate @1ml/kg/H or at half the rate of previously tolerated feeds
- Order IV lipids 1g/kg/day and advance as per dietitian
- Order Nutrition consult for goal rate/concentration of formula and lipids
- Continue Tolerex and IV lipids for 4 weeks after last chest tube removed

Tolerating Feeds?

YES

Diarrhea:
- Continue tube feeds (diarrhea likely related to high MCT formula)
- Monitor for signs of further intolerance

NO
- Continue to advance feeds as per Dietitian

Vomiting:
- Hold tube feeding

Abdominal Distention:
- Hold tube feeding

Discharge Planning:
- Instruct Family on when to resume baseline home formula (should be on chylothorax formula for 4 weeks after last chest tube removed)
- Order Nutrition consult prior to discharge to instruct family on how to mix formula

Notes: (1) This is a general guideline and does not represent a professional care standard governing providers' obligations to patients. Care is revised to meet the individual patient needs. (2) This is a quality improvement document and should not be a part of the patient’s medical record.
NC Children’s Hospital Pediatric Congenital Heart Surgery Chylothorax Fluid and Laboratory Guidelines

[Refer to NC Children’s Hospital Chylothorax Management Algorithm]

1. For chest tube output replacement, replace in a range of [0.5 ml in to 1 ml in]: [1 ml out] based on patient needs with 5% Albumin
2. Avoid hyponatremia
3. Follow albumin level daily
4. Keep albumin level > 3 by administering 25% albumin in 1 Gram/KG doses
5. Follow ATIII level daily initially and keep at least > 80% of normal – follow less frequently than daily or discontinue following ATIII levels if not requiring product
6. Follow IgG level every Monday/Wednesday/Friday if requiring IVIG – follow less frequently or discontinue following IgG levels if not requiring IVIG
7. Administer IVIG to keep IgG in normal range
8. Consider following TEG daily initially to assist with replacement of products and assess clotting risk, discontinue following if normal and chylothorax is responding to therapies

References:


Notes: (1) This is a general guideline and does not represent a professional care standard governing providers’ obligations to patients. Care is revised to meet the individual patient needs. (2) This is a quality improvement document and should not be a part of the patient’s medical record.