Thoracic Duct Embolization for Chylous Fistula; A Cost Comparison with TPN

ABSTRACT

Background: Chylous fistula post neck dissection is a rare and at times difficult to manage complication. Because of the potential dangers of this condition, more aggressive approaches are sought when conservative care fails. The authors conducted a cost comparison between total parenteral nutrition (TPN) and percutaneous embolization of the thoracic duct (TD) in two patients following neck dissection.

Design: The authors used itemized hospital charges from two patients who had neck dissections in late 2014 and underwent embolization of the thoracic duct shortly thereafter. Patient treatment was directed by a single practitioner at two tertiary referral hospitals in the same metro area.

Subjects: Two individuals receiving modified radical neck dissection for malignant disease in the fall of 2014 with clinical evidence of chylous fistula within 48h post-operatively. Both of these patients failed to improve on TPN therapy inpatient and underwent embolization of the thoracic duct by Interventional Radiology.

Results: Following embolization both subjects had quick resolution of their condition and were able to be discharged to home without indwelling drains and/or dietary restrictions. Cost-comparison with an average expected course of 10 days of TPN demonstrated a similar cost of care with embolization.

Conclusion: Thoracic Duct embolization is a potentially clinically advantageous, and cost effective alternative to proceeding with TPN therapy.

Interventions for Chylous Fistulas

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Pros</th>
<th>Cons</th>
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<tbody>
<tr>
<td>TPN</td>
<td>Non-invasive</td>
<td>Metabolic disturbances including hyperglycemia and electrolyte imbalances</td>
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<td></td>
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<td>Several weeks for resolution of chylous fistula, overall failure rate up to 50%, requiring surgical intervention later</td>
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<tr>
<td>Neck Exploration</td>
<td>Quick resolution</td>
<td>Requires general anesthesia and associated risks to vital structures due to inflamed operative field</td>
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<tr>
<td>Embolization</td>
<td>Minimally invasive intervention to known associated mortality and minimal morbidity</td>
<td>Some radiologists unfamiliar with technique</td>
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Description of Patients

Patient #1: 57 year old female with SCCa of epiglottis who had total laryngectomy with bilateral neck dissection and >700ml/day chylous fistula. Embolized PCD#5 with immediate resolution

Patient #2: 58 year old male with SCCa of hypopharynx treated with chemoradiation and salvage neck with >1400ml/day chylous fistula. Embolized PCD#9 with immediate resolution

Cost Comparison With Inpatient TPN

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Patient Charges</th>
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<tbody>
<tr>
<td>TPN</td>
<td>$10,000 - $50,000</td>
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<tr>
<td>Embolization</td>
<td>$10,000 - $30,000</td>
</tr>
<tr>
<td>Embolization Plus Professional Fee*</td>
<td>$10,000 - $40,000</td>
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TPN Costs based on ten days of therapy which has been shown to be the length of time a chylous fistula will take to respond to conservative therapy if it is to be successful

Thoracic Duct Embolization Process

A. Lymphangiogram performed to identify cisterna chyli
B. Trans-abdominal cannulation performed and contrast injection identifies thoracic duct
C. Thoracic duct examined at surgery site
D. Thoracic duct lumen obliterated with combination of fibrin glue and vascular coils

Conclusion and Future Directions

- While considered an expensive option, embolization of the thoracic duct via interventional radiology methods can be comparable in cost to a moderate course of inpatient TPN with a much shorter treatment time for the patient to endure
- Larger collection of patients with standardized treatment would be necessary to draw further conclusions about cost effectiveness of this treatment approach as well as to compare to surgical interventions which can vary widely in scope
- Early embolization should be explored as a standard option in patients with large volume chylous fistulas at centers who possess this capability.

References


Chylous Fistula After Neck Dissection

- Complicates around 1-2% of comprehensive neck dissections
- About 75% occur from injury to thoracic duct on left side where it drains into venous system
- Multiple consequences include local wound infection as well as losses due to contents of chylous fluid
- Wound breakdown, vascular exposure
- Malnutrition due to albumin loss; dehydration
- Immunodeficiency due to loss of immunoglobulins
- Large volume leaks (>500mL/day) rarely respond to conservative therapy leading to operative intervention


Patient Charges

*One institution did not provide this value