Ethanol Lock Therapy in Children with Intestinal Failure: Infection Prevention and Vascular Preservation

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I have no relevant disclosures.

Intestinal Failure

- Intestinal failure (IF) patients require a central venous catheter for parenteral nutrition (PN), etc.
- Risks
  - Central line associated blood stream infections (CLABSI)
    - Intestinal failure associated liver disease
  - Repeated line placements
    - Disruption of nutritional rehabilitation
  - Venous thrombosis
- Intestinal transplantation
Ethanol Lock Therapy

- Decreased infection rates\textsuperscript{1-4}
  - Bactericidal and fungicidal
- Concerns \textsuperscript{5-6}
  - Line integrity
  - Thrombosis

Objectives

Primary
- Examine the association between ethanol lock therapy (ELT) and CLABSI rates in IF patients receiving home PN.

Secondary
- Evaluate the rates of central venous thrombosis and catheter rewires, repairs, and replacements while on and off ELT.

Study Design

- Retrospective cohort study, unplanned crossover
  - Children’s Hospital of Philadelphia Intestinal Rehab Program receiving home PN
    - 2011 - 2014
  - Silicone, tunneled central line
  - Daily locks
  - 70\% ethanol
  - ≥ 4 hours while off PN
### CHOP ELT Guidelines

<table>
<thead>
<tr>
<th>Eligibility Criteria:</th>
<th>Exclusion Criteria:</th>
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<tbody>
<tr>
<td>• ≥ 6 mo of age</td>
<td>• ≤ 6 mo of age</td>
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<tr>
<td>• Anticipated line duration ≥ 3 mo</td>
<td>• Allergy or intolerance to ethanol</td>
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<tr>
<td>• 1+ CLABSI</td>
<td>• Polyurethane or other material catheter</td>
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<td>• Only silicone catheters</td>
<td>• Pregnant or breastfeeding</td>
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<td>Plus one of the following:</td>
<td>• Central line tunnel or exit site infection</td>
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<td>• Short Bowel Syndrome</td>
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<td>• Immunocompromised</td>
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<td>• Listed for transplant</td>
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<tr>
<td>✤ Final concentration of ELT is 70%</td>
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<td>✤ Recommended dwell time: 4 – 24 hours</td>
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### Data Collection

- CLABSI
- Central line
  - Replacement
  - Rewire
  - Repair
  - Associated thrombosis
- All data per 1,000 catheter days
- On and off ELT
- Start – first central line while being followed at CHOP
- End – central line discontinued or transfer of care

### Results

- 26 patients
- 6 months to 22 years at ELT initiation
- 537 days off and 447 days on ELT
Patient Demographics

- Age, y: 2.6 (1.1, 4.3)
- Sex, % female: 38
- Etiology of IF, %:
  - Volvulus: 19
  - Gastroschisis: 15
  - Intestinal Atresia: 23
  - Necrotizing Enterocolitis: 23
  - Pseudoobstruction: 15
  - Hirschsprung disease: 8
  - Other: 15

Small intestinal length, cm: 62.5 (30, 109)
Intestinal stenosis, %: 65
Colon in continuity, %: 65

Intact ICV, %: 35

Patient Demographics Off ELT On ELT p-value RR NNT
- Total Catheter days: 13954 11817 0.77
  - Median, (IQR): 389 (67, 692) 351 (285, 628)
- Total CLABSI: 7.1 0.8 <0.001 0.11 159
  - CVC Replacement: 7.4 0.8 <0.001 0.11 151
  - Rewire: 3.6 2.3 0.59 0.64 769
  - Repair: 0.3 1.4 0.03 4.67

Central Line Outcomes

- Staphylococcus: 38 6
- Klebsiella: 26 1
- Enterobacter: 10 0
- Candida: 20 0
- Escherichia: 71
- Enterococcus: 16 2
- Streptococcus: 31
- Other: 23 0
- Polymicrobial: 34 1

Other organisms: Citrobacter, Pseudomonas, Acinetobacter, Leuconostoc, Neisseria, Serratia, Bacillus, Stenotrophomonas, Rhizobium

CLABSI Organisms Off ELT On ELT

Other organisms: Citrobacter, Pseudomonas, Acinetobacter, Leuconostoc, Neisseria, Serratia, Bacillus, Stenotrophomonas, Rhizobium

1 CVC, central venous catheter
Study Evaluation

Advantages
• Number of patients
• Patients as own controls
• Length of follow up

Disadvantages
• Small sample size
• Retrospective
• Lack of data prior to care at CHOP

Conclusions

• 70% ELT was associated with a significant reduction in the rates of CLABSI (89%) and central line replacement (93%).
• No increase in the rate of central line associated thrombus formation associated with ELT.
• ELT is effective at preventing CLABSI in children with intestinal failure
• ELT may reduce the need for line replacement without an increased incidence of central line associated thrombosis.

Thank You!

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Questions

References