Minimally Invasive Management of Tracheo-Esophageal Fistula with T-tube

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Abstract

OBJECTIVES:
- Describe a minimally-invasive technique for management of tracheo-esophageal fistulae (TEF)
- Analyze outcomes of TEF management with T-tube

METHODS:
- Retrospective case series at an academic practice in a regional referral center.
- 2 patients with TEF who were not candidates for open surgical repair were successfully managed with a Montgomery T-tube (MTT)
- Outcome measures included resumption of oral diet, need for further procedures, and fistula size.

RESULTS:
- Both patients had T-tubes sized to stent the fistula and maintain airway without an esophageal stent.
- Fistulae were successfully controlled in all patients with full resumption of oral intake and maintenance of voice.
- There was no stent migration or fistula enlargement.
- No patients had closure of fistula.

CONCLUSION:
- MTT stenting is a safe and minimally invasive way to manage TEF in patients who are not candidates for open repair.

Introduction

- TEF: communication between trachaea and esophagus
- Aspiration/pulmonary sequelae leading to impaired voicing and intolerance of oral intake
- Traditional TEF management: tracheal/esophageal resection/reconstruction, esophageal stent, tracheal stent, cuffed tracheotomy tube.
  - Extensive and invasive procedures
  - Potential mortality/mortality: leakage, fistula recurrence/enlargement, stent migration/erosion, aspiration
  - Sparse literature regarding minimally invasive management and outcomes

Methods and Materials

- Chart review: operative reports, office and speech therapy notes
  - Patient inclusion criteria:
    - Diagnosed tracheo-esophageal fistula
    - Not candidates for surgical resection
  - Literature review via PubMed and Ovid
    - Terms included “tracheo-esophageal fistula”, “management”
  - MTT insertion
    - Visualize TEF via esophagoscopy and tracheoscopy
    - Measure distance from stoma to fistula and fistula size
    - Secure airway with Endotracheal Tube
    - Remove granulation, steroid injection / topical Mitomycin-C
    - MTT fitting and placement: transcervical and endolaryngeal
    - Balloon dilation of MTT limbs
    - Bronchoscopy/suction of surgical debris

Results

<table>
<thead>
<tr>
<th>Patient</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age / Sex</td>
<td>15 / F</td>
<td>61 / F</td>
</tr>
<tr>
<td>Etiology</td>
<td>Penetrating neck trauma</td>
<td>Post-radiation tracheal stenosis</td>
</tr>
<tr>
<td>Prior surgery</td>
<td>Tracheal reconstruction + tracheostomy</td>
<td>Tracheal stents x3 + tracheostomy through stent</td>
</tr>
<tr>
<td>Time from insult to TEF</td>
<td>45 mo</td>
<td>53 mo</td>
</tr>
<tr>
<td>TEF size (initial/final)</td>
<td>8 mm / 4mm</td>
<td>20 mm / 11mm</td>
</tr>
<tr>
<td>Other airway interventions</td>
<td>Endoscopic transoral suture repair x2</td>
<td>Transcervical repair (strap muscle interposition flap)</td>
</tr>
<tr>
<td>Recovery of voice</td>
<td>Maintained</td>
<td>Maintained</td>
</tr>
<tr>
<td>Recovery of full PO intake</td>
<td>Maintained</td>
<td>Maintained</td>
</tr>
<tr>
<td>Complications related to MTT</td>
<td>Crusting</td>
<td>Mucus plug</td>
</tr>
<tr>
<td>Proximal stenosis</td>
<td>Proximal &amp; distal stenosis</td>
<td></td>
</tr>
<tr>
<td>Circoid mucosal erosion</td>
<td>Fungal colonization</td>
<td></td>
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<tr>
<td>Local tracheal irritation</td>
<td>Leakage around MTT</td>
<td></td>
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<tr>
<td>Bacterial colonization</td>
<td></td>
<td></td>
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<tr>
<td>Leakage around MTT</td>
<td></td>
<td></td>
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<tr>
<td>Confounding issues</td>
<td>Transient TVC paralysis</td>
<td>Nitinol stent sequelae</td>
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<tr>
<td>Occasional laryngospasm</td>
<td>L TVC paralysis</td>
<td></td>
</tr>
<tr>
<td>Smoking (8 mo duration)</td>
<td>Tracheal breakdown after open repair</td>
<td></td>
</tr>
<tr>
<td>Lung/bone metastases</td>
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</tbody>
</table>

Discussion

- Common etiology: poor party wall integrity
- Indications for MTT management:
  - Non-candidate for open surgical repair
  - Long segment tracheal stenosis, poor tissue integrity
  - Failure of open repair
  - May be used in conjunction with primary repair techniques
- Technique: bidirectional approach with direct visualization from above and insertion via tracheostoma.
  - Adjustment of superior/inferior limbs to maximize coverage and minimize local irritation.
- Outcomes:
  - No migration or fistula enlargement noted as frequently seen with esophageal stents and tracheotomy tubes
  - Easier management with voice preservation and decreased aspiration compared to cuffed tracheotomy tube
  - In office non invasive evaluation/troubleshooting with endoscopy through tube
  - Emphasis on patient education regarding MTT care
  - Good outcomes related to voice and swallowing despite suboptimal wound healing conditions (smoking, metastatic cancer, local foreign body reaction).

Conclusions

- MTT stenting can be used as the primary treatment modality for TEF in conjunction with other airway procedures.
- MTT stenting advantages:
  - Subsequent adjustments and office-based evaluation can be accomplished in a minimally invasive manner.
  - Allows for maintenance of oral intake and better voice outcomes without migration and minimal aspiration.
  - Maximizes patient comfort by minimizing airway sailage and easier management of secretions.
- MTT stenting is a safe & minimally invasive way to manage TEF and associated complications in non-candidates for open repair.
- Further evaluation of cost efficiency & QoL can further delineate the benefits of MTT stenting in TEF management.

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References