

Pathway Purpose: To standardize the diagnostic, intraoperative, and postoperative care of patients with complete tracheal rings, with or without congenital heart disease, undergoing a slide tracheoplasty procedure

Inclusion Criteria: All patients with suspected or confirmed complete tracheal rings undergoing slide tracheoplasty

Exclusion Criteria: None

***Upon admission to CICU, initiate the Slide Tracheoplasty Order Set**

Preoperative Phase

Diagnostic workup prior to surgery:

- CT Angiography of chest and neck
- Echocardiogram
- Microlaryngoscopy and bronchoscopy (MDLB)
 - If patient has undergone MDLB at outside institution prior to admission at SMCH, SMCH Otolaryngology/Head & Neck Surgery (OHNS) to review the recording and decide if an additional MDLB is needed on a day prior to the tracheoplasty or if an MDLB performed on the day of surgery immediately prior to tracheoplasty is sufficient.

Management considerations prior to surgery:

- **Airway:**
 - Avoid preoperative intubation if possible.
 - If child arrives intubated, attempt to extubate. If unable to extubate successfully, **schedule urgent operative date.**
- **Cultures:**

If MDLB with Bronchoalveolar Lavage (BAL) is performed by OHNS please send:

 - Gram stain
 - Culture
 - Cell count with differential

For concerns of active infection consider sending:

 - Fungal
 - Acid-fast Bacilli (AFB)
 - KOH Prep
 - Respiratory Viral Panel (+ COVID)
- **Medications:**
 - **Avoid steroids of all types including systemic, inhaled and drops**

Intraoperative Phase

- **Perioperative antibiotics** (CICU team to order antibiotics; anesthesia team to administer)
 - See Tables on Page 2 for antibiotic type and duration
 - See <https://online.lexi.com/lco/action/home> for dosing guidelines
- **Airway** (OHNS and anesthesia to maintain airway)
 - OHNS: if needed, perform MDLB to confirm anatomy immediately prior to tracheoplasty
 - OHNS: intubate proximal to tracheal stenosis
 - OHNS: perform bronchoscopy procedures as needed throughout the case to determine length of slide tracheoplasty and patency of airway.
- **Post slide tracheoplasty:**
 - OHNS: perform confirmatory MDLB to evaluate anastomosis and estimate endotracheal tube (ETT) size
 - OHNS: intubate through anastomosis with cuff distal to anastomosis. If cuff cannot be placed distal to anastomosis, consider cuffless ETT or keep cuff deflated.

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Associated Order Set: pending

Associated Policies: N/A

Last Updated: 12/12/2023



Postoperative Phase

Antibiotic type (For dosing, see: <https://online.lexi.com/lco/action/home>)

*No antifungal coverage required post operatively

Clinical Factors	Antibiotic Choice
Standard	Cefazolin
History of Pseudomonas infection	Cefepime
History of MRSA infection	Cefazolin AND Vancomycin
History or Pseudomonas and MRSA	Cefepime AND Vancomycin
Suspicion for anastomotic dehiscence; mediastinitis prevention	Discuss agents with Cardiothoracic (CT) Surgery and OHNS teams; target broad spectrum with oral flora coverage

Antibiotic duration

Clinical Factors	Duration
Standard	48 hours
Intubation >48 hours or required reintubation	7 days
Suspicion for anastomotic dehiscence; mediastinitis prevention	Discuss course with CT Surgery and OHNS teams

Airway Clearance

- Bedside provider (RN/RT/MD/APP) to perform suctioning **ONLY TO DISTAL TIP OF ETT**. Appropriate distance should be confirmed by direct measurement.
- OHNS to perform bronchoscopy as needed for central airway clearance (mucus plugging or emergency) or to evaluate the anastomosis as needed.

Airway management

- Deliver continuous normal saline humidification while intubated to reduce crusting or accumulation secretions on/around the anastomosis.
- Target low-pressure (<20cmH2O) ventilator settings. Negative-pressure ventilation is ideal.
 - **If over 20mmHg required, please notify ENT Fellow/Attending within 1 hour.**
- Obtain daily Chest X-ray while intubated.

Sedation and Analgesia:

- Goal to encourage spontaneous breathing with the aim of early extubation, while avoiding brisk patient movement/thrashing that may cause trauma to the airway during intubation
- Goal SBS -1 to -2; ok to use neuromuscular blockade if necessary to avoid brisk patient movement/thrashing
- Sedative and Analgesics to be administered at the discretion of the CVICU provider based on timing of extubation

Postoperative Phase

Extubation guidelines

- Target extubation on POD 1 or as early as possible based on cardiopulmonary comorbidities (See below for recommended modalities.)
- Administer dexamethasone (0.5 mg/kg, Max 15 mg/dose) x 2 doses (first dose on the evening prior to extubation, second dose on the morning of extubation).
- **Avoid other steroids (systemic, inhaled, or drops).**
- OHNS to perform bronchoscopy as needed at time of extubation
- OHNS to **perform pulmonary flex bronchoscopy or MDLB 1 week post- extubation**

Support modality after extubation, in order of preference:

1. Nasal Cannula (NC) + Humidification, through 1 week post- extubation MDLB
2. High Flow Nasal Cannula
3. Non-invasive Positive Pressure Ventilation (NIPPV) (CPAP/BiPAP, bag mask ventilation)

POD 0-7: AVOID unless strictly necessary

POD >7: Ok to use, if necessary.

Notify OHNS fellow/attending prior to or upon initiation.

- * At all time points: Heliox and Racemic Epinephrine are OK to administer
- * Continue Normal Saline humidification (blowby or via NC) following extubation

Vocal Cord Assessment

Endoscopic swallow evaluation (OHNS) 1 week post-extubation, in coordination with MDLB, prior to any feeding advancement

Postoperative Feeding Advancement

Consult Feeding Team (OT, SLP, OHNS) for case-by-case recommendations for feeding advancement

Follow up Bronchoscopy Schedule

1. POD 7 or 1 week after extubation
2. POD 14-31 or 2-3 weeks after first bronchoscopy (patient to remain locally if discharged)
3. Six weeks after second bronchoscopy
4. Four to six months after third bronchoscopy
5. One year after slide tracheoplasty
6. Annual bronchoscopy thereafter

Discharge Criteria

- Acceptable bronchoscopy (with vocal fold assessment) 1 week post- extubation
- Acceptable cardiopulmonary status, as assessed by the clinical team
- Tolerating pre-admission feeding regimen or adequate PO/NG if not fed preoperatively. Ok to discharge on NG feeds if clinically appropriate.
- Ensure follow up appointments secure (see Table)

Appointment	Timing from discharge
Pediatrics	2 weeks
Admission for MDLB Note: Patient to stay locally until this is completed.	2 weeks
Feeding/swallowing evaluation (ENT/OT)	As needed
Cardiology	4 weeks

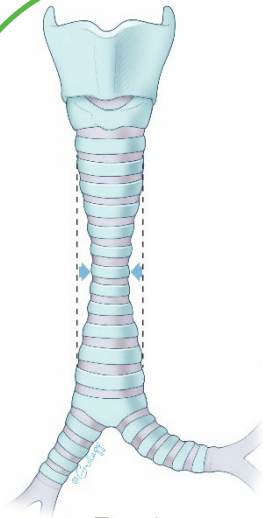


Fig. 1

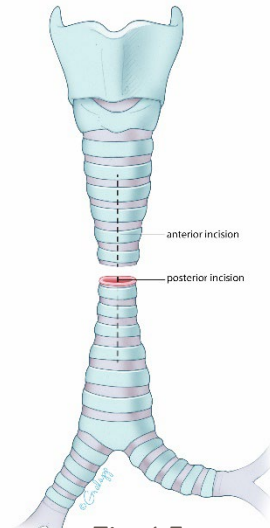


Fig. 1.5

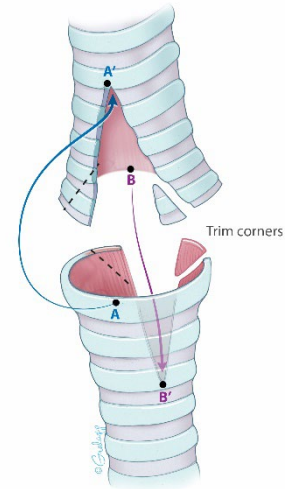


Fig. 2



Fig. 3



Fig. 4

Pathway Measure

Time to extubation

Tracheoplasty OR time

Postoperative intensive care length of stay

References:

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2. DeMarcanonio MA, Hart CK, Yang CJ, Tabangin M, Rutter MJ, Bryant R, Manning PB, de Alarcón A. Slide tracheoplasty outcomes in children with congenital pulmonary malformations. *Laryngoscope.* 2017 Jun;127(6):1283-1287. doi: 10.1002/lary.26404. Epub 2016 Nov 15. PMID: 27859296.
3. Manning PB, Rutter MJ, Border WL. Slide tracheoplasty in infants and children: risk factors for prolonged postoperative ventilatory support. *Ann Thorac Surg.* 2008 Apr;85(4):1187-91; discussion 1191-2. doi: 10.1016/j.athoracsur.2007.11.019. PMID: 18355493.
4. Richardson CM, Hart CK, Johnson KE, Gerber ME. Slide Tracheoplasty: Complete Tracheal Rings and Beyond. *Otolaryngol Clin North Am.* 2022 Dec;55(6):1253-1270. doi: 10.1016/j.otc.2022.07.014. PMID: 36371139.
5. Sidell DR, Hart CK, Tabangin ME, Bryant R 3rd, Rutter MJ, Manning PB, Meinen-Derr J, Balakrishnan K, Yang C, de Alarcon A. Revision thoracic slide tracheoplasty: Outcomes following unsuccessful tracheal reconstruction. *Laryngoscope.* 2018 Sep;128(9):2181-2186. doi: 10.1002/lary.27145. Epub 2018 May 4. PMID: 29729016.