



Laryngotracheoplasty

Historical Background or Introduction

- Early investigations with cricoid splitting was described by Killian and Galebsky in the early 20th century. Great advances were made regarding the technique in the 1970's and the modern-day correlate was first described in detail by Cotton in 1978.

Cotton R. Management of subglottic stenosis in infancy and childhood. Review of a consecutive series of cases managed by surgical reconstruction. *Ann Otol Rhinol Laryngol.* 1978 Sep-Oct;87(5 Pt 1):649-57.

Pathophysiology or Scientific Premise

- Laryngotracheoplasty (LTP or LTR) aims to perform scar lysis and prevention of restenosis by a number of techniques.
- Subglottic and tracheal stenosis are usually caused by iatrogenic airway manipulation (i.e. intubation and/or tracheotomy). The Cotton-Meyer staging system is the most common staging method of the subglottis, but can be used to describe tracheal obstruction as well. Otherwise, McCaffrey offers an alternate classification system that encompasses laryngotracheal stenosis.
- Laryngotracheal stenosis should be assessed in quality to determine its suitability for augmentation or resection of the stenotic area. To this end, stenosis should be characterized by: severity (percentage of obstruction of lumen), vertical length, distance from the glottis, and quality (membranous vs. framework disruption).

Myer CM III, O'Connor DM, Cotton RT. Proposed grading system for subglottic stenosis based on endotracheal tube sizes. *Ann Otol Rhinol Laryngol* 1994;103:319-323.

McCaffrey TV. Classification of laryngotracheal stenosis. *Laryngoscope* 1992;102:1335-1340.

Indications and Contraindications

- It is imperative that causes of laryngeal inflammation (such as uncontrolled laryngopharyngeal reflux) be appropriately managed and controlled prior to surgical treatment.
- Extralaryngeal or distal airway obstruction (such as tracheomalacia) that is not addressed during the LTR is a relative contraindication. Preoperative aspiration can be either an absolute or relative contraindication.



- Isolated grade I, II, and some grade III subglottic stenosis is treated well with LTR. Posterior glottic stenosis is addressed with a posterior graft.

Cotton RT, Myer CM. Contemporary surgical management of laryngeal stenosis in children. *Am J Otolaryngol*. 1984 Sep-Oct;5(5):360-8.

Treatment Method

- Defect analysis determines the combination of anterior and/or posterior grafting that is necessary for optimal results. The airway is stented following LTR to stabilize the cartilage graft(s). This can be accomplished with an endotracheal tube in single-stage approaches or with a formal stent in second-stage approaches.
- Graft integrity for the first several weeks is mostly dependent on the shape and fit of the graft as well as on suture integrity.

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Jefferson ND, Cohen AP, Rutter MJ. Subglottic stenosis. *Semin Pediatr Surg*. 2016 Jun;25(3):138-43.

Management of Complications

- Pneumothorax: this should always be tested for intraoperatively after harvesting costal cartilage graft and if detected it can be repaired primarily. If detected postoperatively, treatment is based on severity and can include placement of a chest tube.
- Unintentional extubation is an avoidable and severe complication that may result in acute airway compromise and death. Regaining control of the airway is imperative and depends on the clinical scenario.
- Neck infection: the mainstay of treatment is prevention, with antibiotics routinely used perioperatively and continued while drains are in place.
- Alar rim necrosis (if the patient is nasotracheally intubated) must be continuously evaluated for and prevented by tube position adjustments and taping techniques.
- Failure of extubation can be due to edema, restenosis (due to scar or granulation), graft failure, and respiratory failure.

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