

EMORY



Type I Laryngeal Clefts: To Stitch or Not to Stitch

Paula J. Harmon, MD
Emory University School of Medicine
Assistant Professor
Department of Otolaryngology/Head and Neck Surgery
Division of Pediatric Otolaryngology

Disclosures

- NONE

Objectives

- Review anatomy of laryngeal clefts
- Current methods of repair of Type I Laryngeal clefts
 - Benefits
 - Drawbacks
- Review new techniques in endoscopic laryngeal repair
 - Benefits
 - Drawbacks

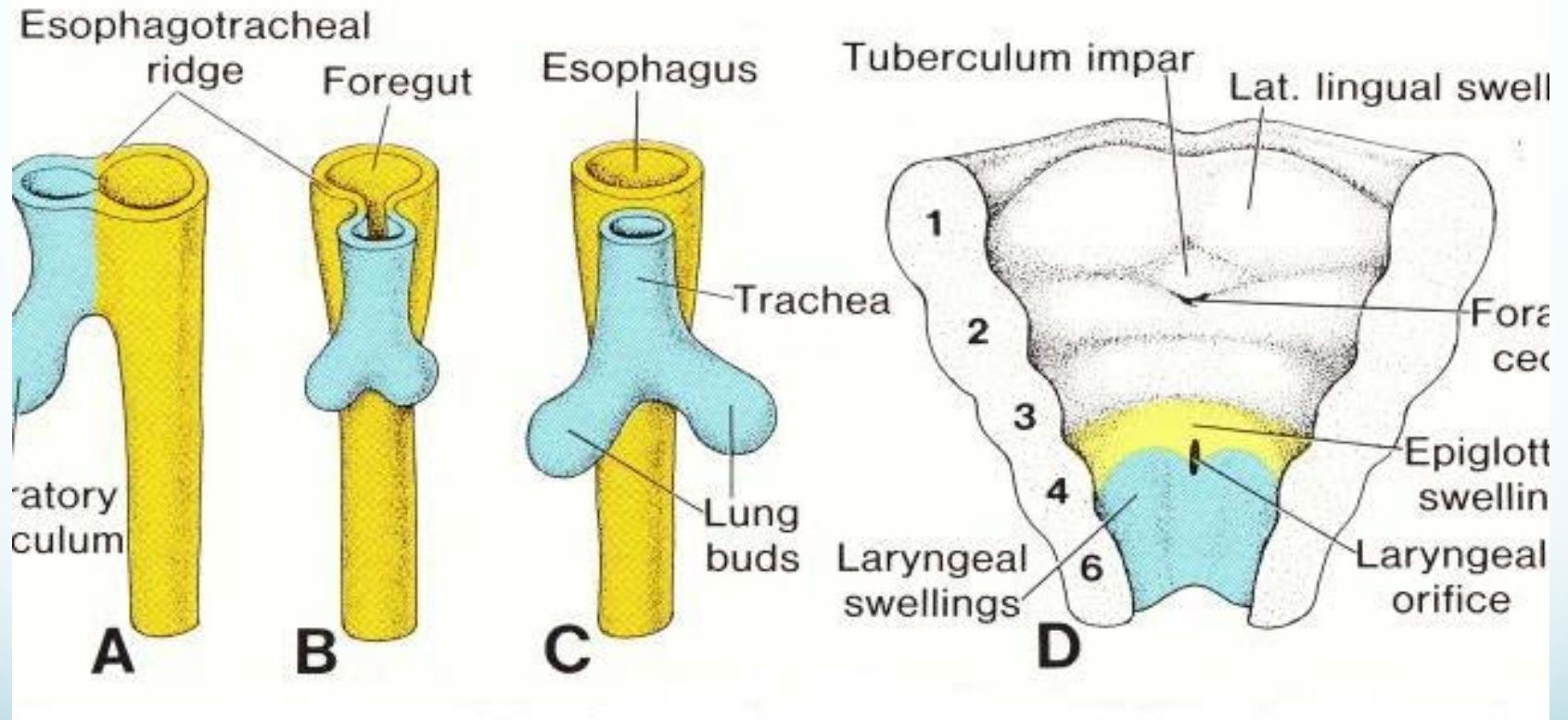
History of Laryngeal Clefts

- Rare congenital anomaly
- Congenital laryngeal anomaly occurs in 1 in 2000 live births
 - 0.3% are laryngeal clefts
- Boy:Girl... 5:3 ratio
- Associated with VACTERL, Opitz-Frias syndrome, Pallister-Hall syndrome

Embryology of Larynx

- Respiratory primordium develop from diverticulum on foregut
- Tracheobronchial groove arise on either side and fuse in the midline and form tracheoesophageal septum
- Fusion complete in 6th week of gestation
- Cricoid cartilage forms 5th week
- Incomplete fusion of tracheoesophageal septum or cricoid cartilage result in laryngeal cleft/T-E fistula

Laryngeal Development

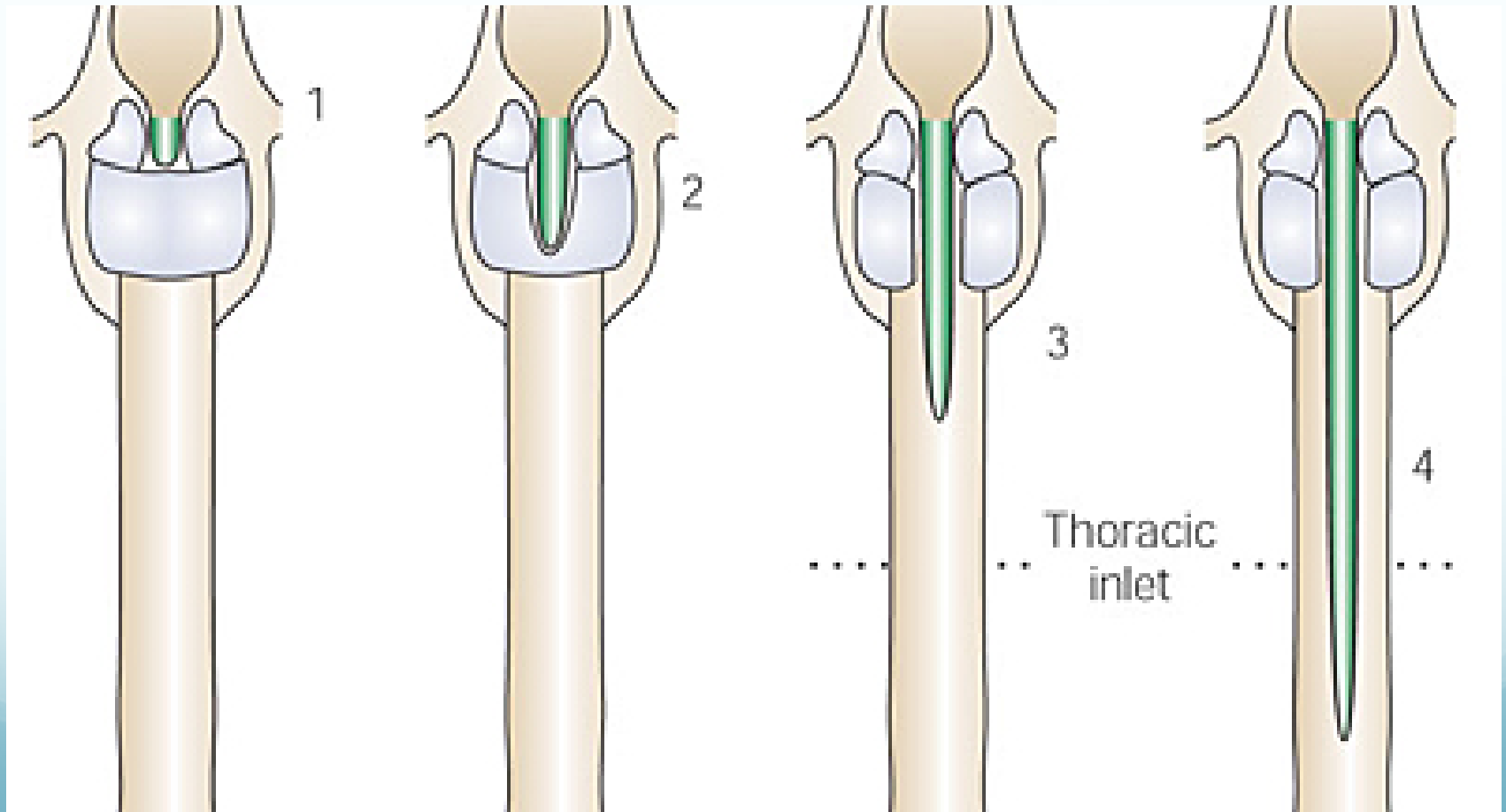


Laryngeal Clefts

Benjamin and Inglis classification of laryngotracheal clefts

Type	Laryngotracheal Defect
I	Supraglottic interarytenoid defect; the level of the cleft remains above the level of the (true) vocal cord
II	The cleft extends below the level of the (true) vocal cords and partially into the cricoid cartilage
III	The cleft extends completely through the posterior cricoid cartilage, with or without further extension into the cervical tracheo-esophageal wall
IV	Common tracheo-esophagus that extends into the thorax and may extend all the way down to the carina

Classification of Laryngeal Clefts



Clinical Significance

- Chronic Cough
- Aspiration
- Dysphagia
- Pneumonia
- Weight Loss
- Stridor
- Regurgitation
- Cyanosis
- Failure to Thrive

Current Methods of Treatment

- Diagnosis
 - Rigid endoscopy +/- esophagoscopy
 - Preoperative Modified Barium Swallow evaluation
- Conservative Management
 - Anti-reflux medication
 - Thickened feeds
 - Positioning
 - Nasogastric tube
- *Age, comorbidity status, severity of aspiration, and the ability to tolerate a feeding regimen should be taken into account when deciding on conservative or surgical management for children with a type 1 laryngeal cleft.*

Cleft Examples



Type 1 cleft

Type 2 Cleft



Type 3 Cleft



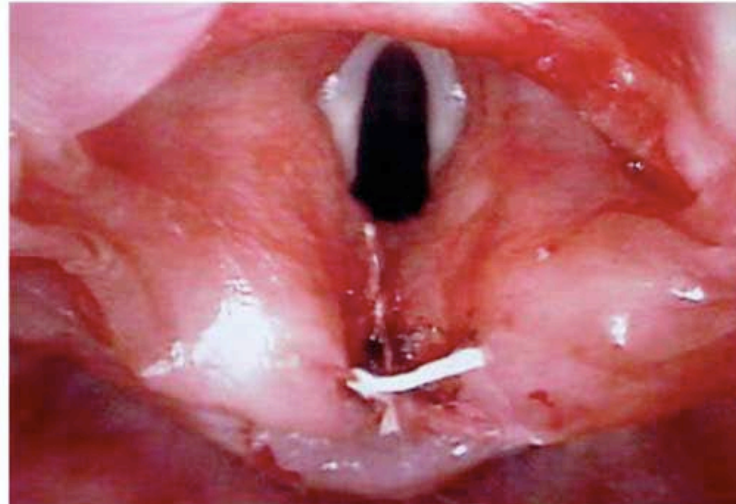
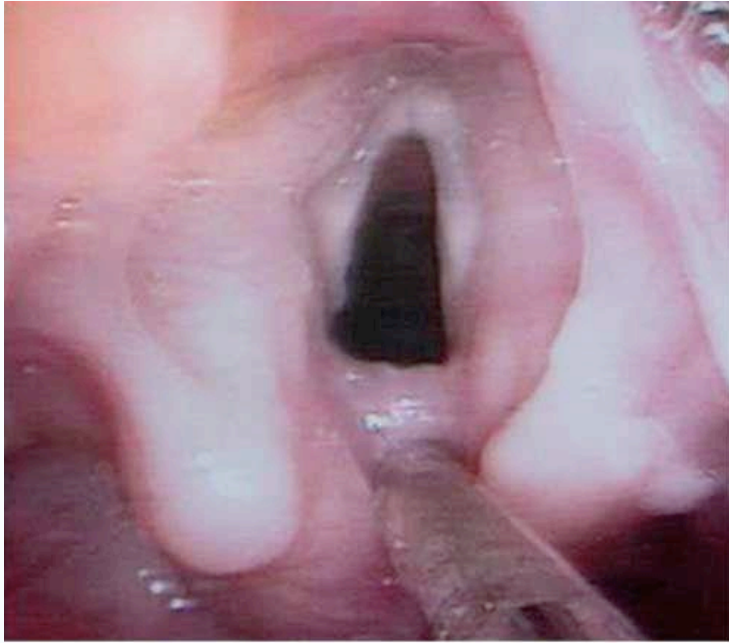
Current Repair Methods

- **Endoscopic Injection Laryngoplasty**
 - Bovine gelatin, Carboxymethylcellulose, Calcium hydroxylapatite, Collagen base, Hyaluronic acid base
- Filler material injected direct stab into the center of the interarytenoid area.
- Repeat injection often necessary

Current Repair Methods

- **Endoscopic Surgical Repair**
- Suspension laryngoscopy
 - Edges of cleft denuded with microlaryngeal scissors or Co2 laser
 - Denuded area apposed with 5.0 or 6.0 vicryl
- NG tube placed
- Intubation due to possible edema
- Pre/post op anti-reflux therapy

Current Repair Method



New Techniques in Endoscopic Repair

- Type Laryngeal Cleft repair with Fibrin Sealant
 - Proper candidate
- Suspension Laryngoscopy
 - Insufflation or apneic technique
- Denude the interarytenoid region (cleft edges)
- Reapproximation of mucosa with Fibrin Sealant.
- NG tube placed
- Patient intubated x 24-48 hours

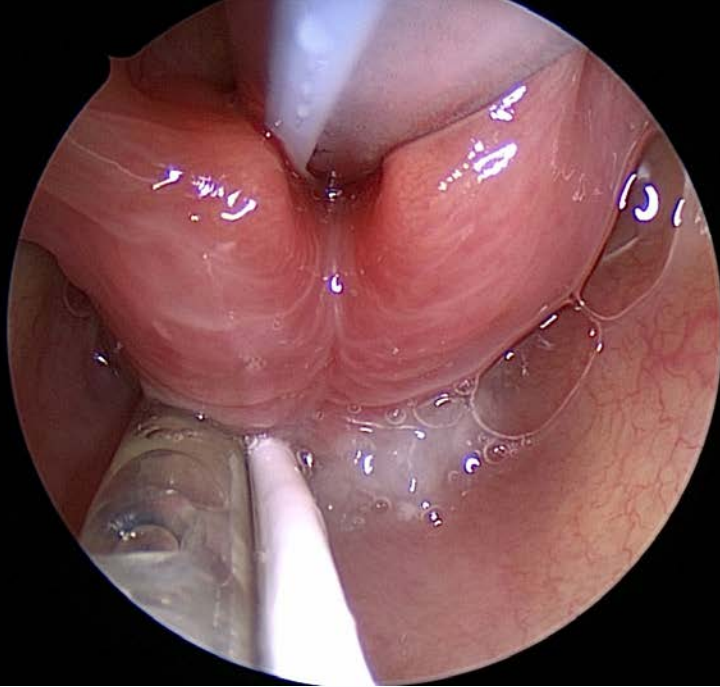


IMAGE
HD 1
KARL STORZ - ENDOSKOPE

Preop

Preop

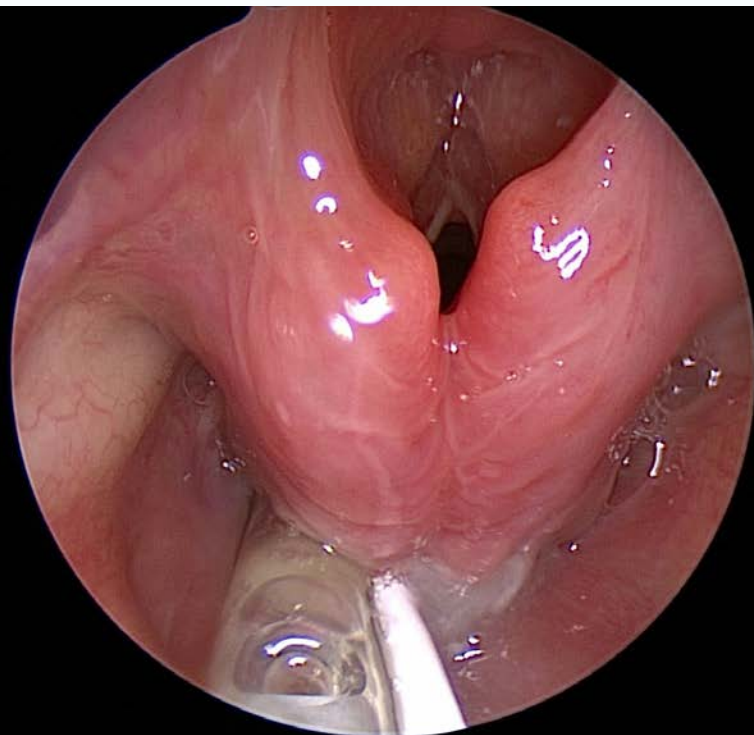


IMAGE
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KARL STORZ - ENDOSKOPE

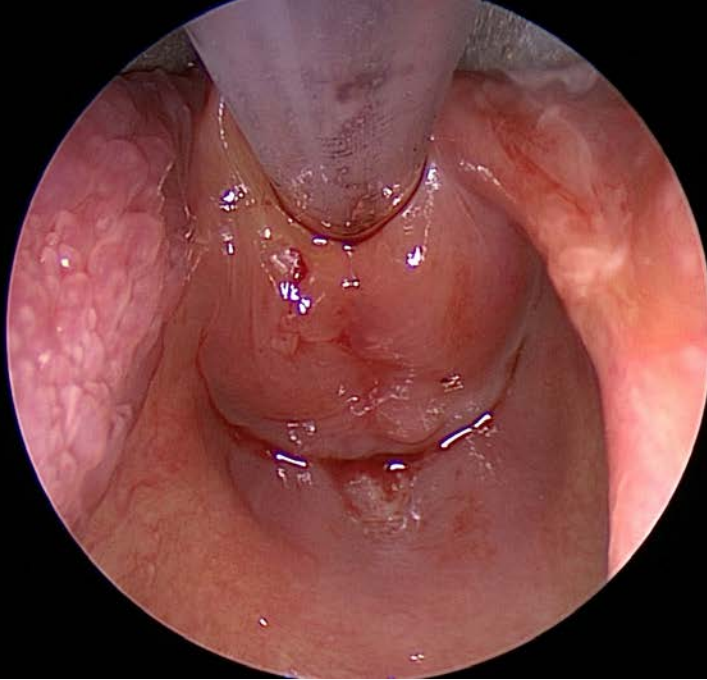


IMAGE
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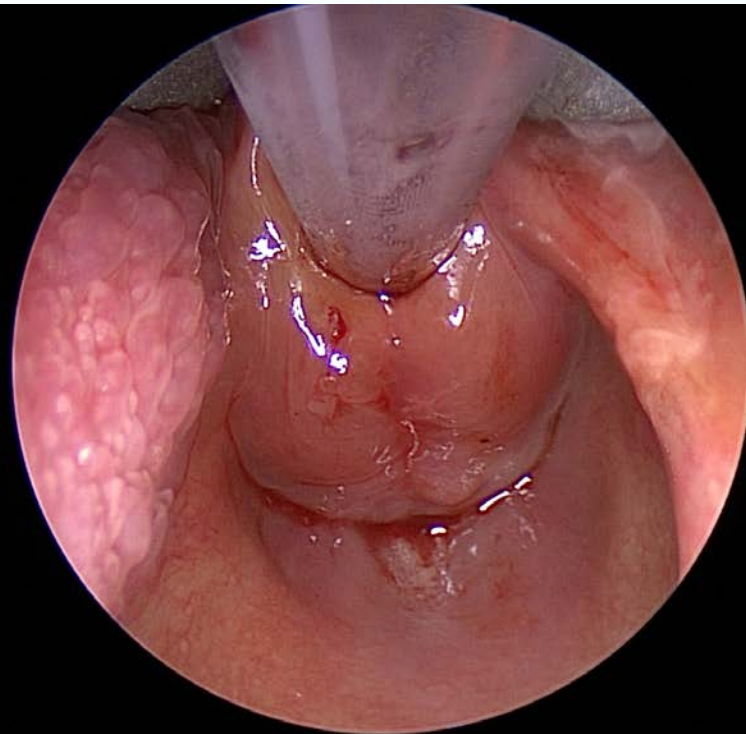
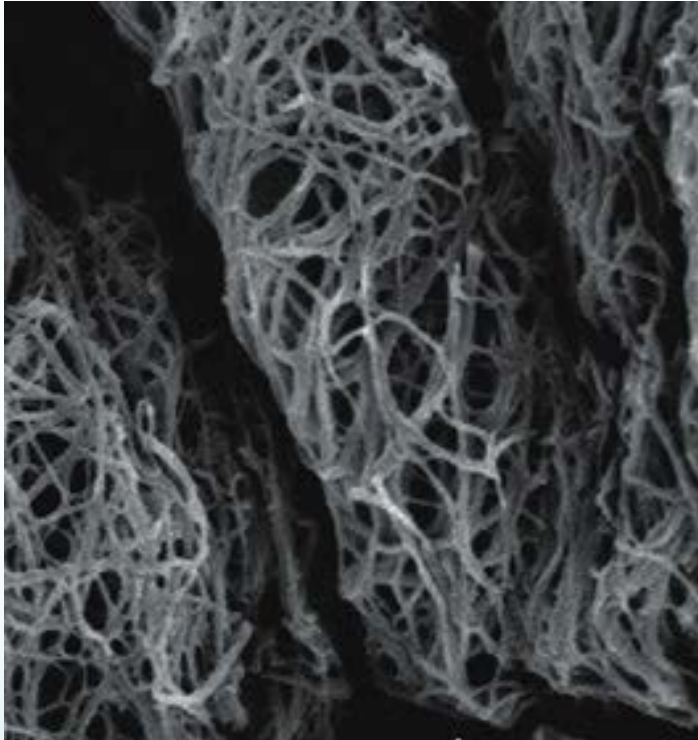
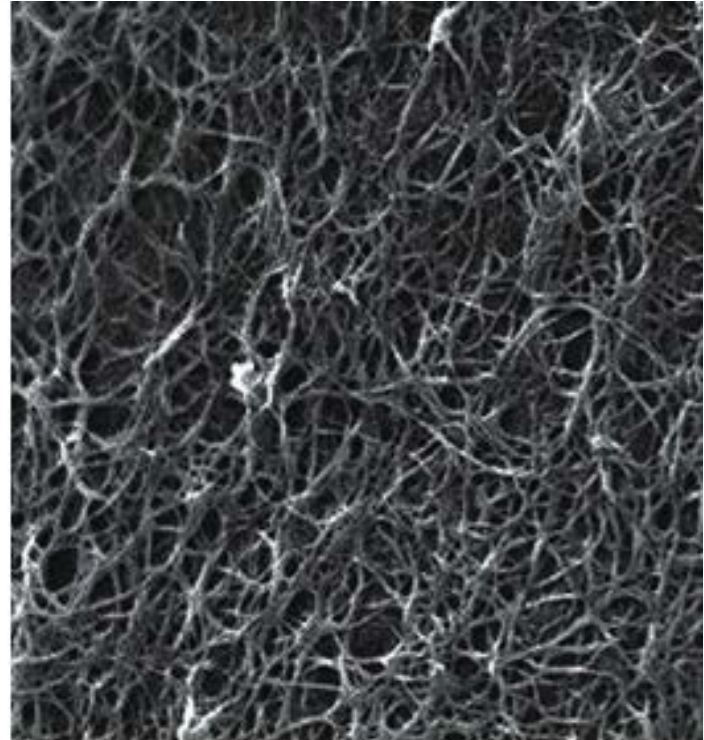


IMAGE
HD 1
KARL STORZ - ENDOSKOPE

Fibrin Sealant



Normal Physiologic Fibrin Clot



TISSEEL Fibrin Clot

1. Dunn C, Goa,K. Fibrin Sealant: A review of its use in surgery and endoscopy. *Drugs* 1999 Nov; 58 (5): 863-886
2. www.tisseel.com

Postoperative Assessment

- Speech therapy consultation
- Modified Barium Swallow evaluation
- Functional endoscopic evaluation of swallow

***continue reflux therapy in the initial postoperative period.

Case 1

- 9mo otherwise healthy female
 - Coughing, choking, frequent breaks during eating, croup cough, weight loss (FTT)
- Failed Modified Barium Swallow (MBSS) to all consistencies, with residual in pyriform
- Attempted laryngeal cleft repair
- After edema set in, fibrin glue was placed
- Postop MBSS
 - No laryngeal penetration or primary aspiration

Case 2

- 2.5 month female with VACTERL
 - Imperforate anus, tracheoesophageal fistula (TEF), esophageal atresia, ASD, Tricuspid Valve dysplasia
 - At time of consult, imperforate anus and TEF s/p repair
 - Patient with microaspiration, pulmonary infiltrates, failure to wean to extubate
- Rigid endoscopy revealed Type I cleft and tracheomalacia
 - s/p repair patient extubated and decreased respiratory distress
 - Unfortunately reintubated 1 month later after esophageal atresia repair. Scheduled for tracheostomy due to worsening tracheomalacia

Case 3

- 1.5 month female with hypoplastic left heart, VSD, tricuspid atresia s/p shunt day of life 2.
 - At time of consult, patient stable but with unexplained cyanotic spells
 - Characterized by cyanosis, choking, stridor desaturation, and tachycardia with spontaneous recovery
 - Oral feeding stopped—spells decreased
 - OPMS normal
 - Barium swallow normal
 - OR for assessment of cleft or fistula

Case 3 cont.

- Dx with deep interarytenoid groove, type I cleft and mild laryngomalacia
- Spells ceased postop
- 4 week post op assessment patient with well healed cleft, minimal edema.

Traditional endoscopic Pros vs. Cons

- Injection Laryngoplasty
- Pros
 - Decreased operative time
 - Limited manipulation
- Cons
 - Often requires repeat injection
 - Laryngeal edema
 - Overinjection
 - Reaction to filler
- Endoscopic Stitch
- Pros
 - Documented success rate
- Cons
 - Longer operative time
 - Increased manipulation (edema)
 - Potential for technical difficulty
 - Suture tracts shown to predispose to infections
 - Infection along needle tracts
 - Granulation formation

Fibrin Sealant

Pros vs. Cons

- Endoscopic Fibrin Sealant
- Pros
 - Decreased operative time
 - Decreased manipulation
 - Decreased technical difficulty
 - Eliminates suture tracts
 - Wound healing enhanced by immediate stimulation of fibroblasts
 - Well documented in thoracic literature
- Cons
 - Limited evidence based research in larynx
 - Need ideal candidate
 - Do not inject—risk of thromboembolic event
 - Does not provide rigid fixation

References

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