

Laryngeal Trauma



Karen Stierman, M.D.

F.B. Quinn, M.D., FACS

October 06, 1999

Introduction



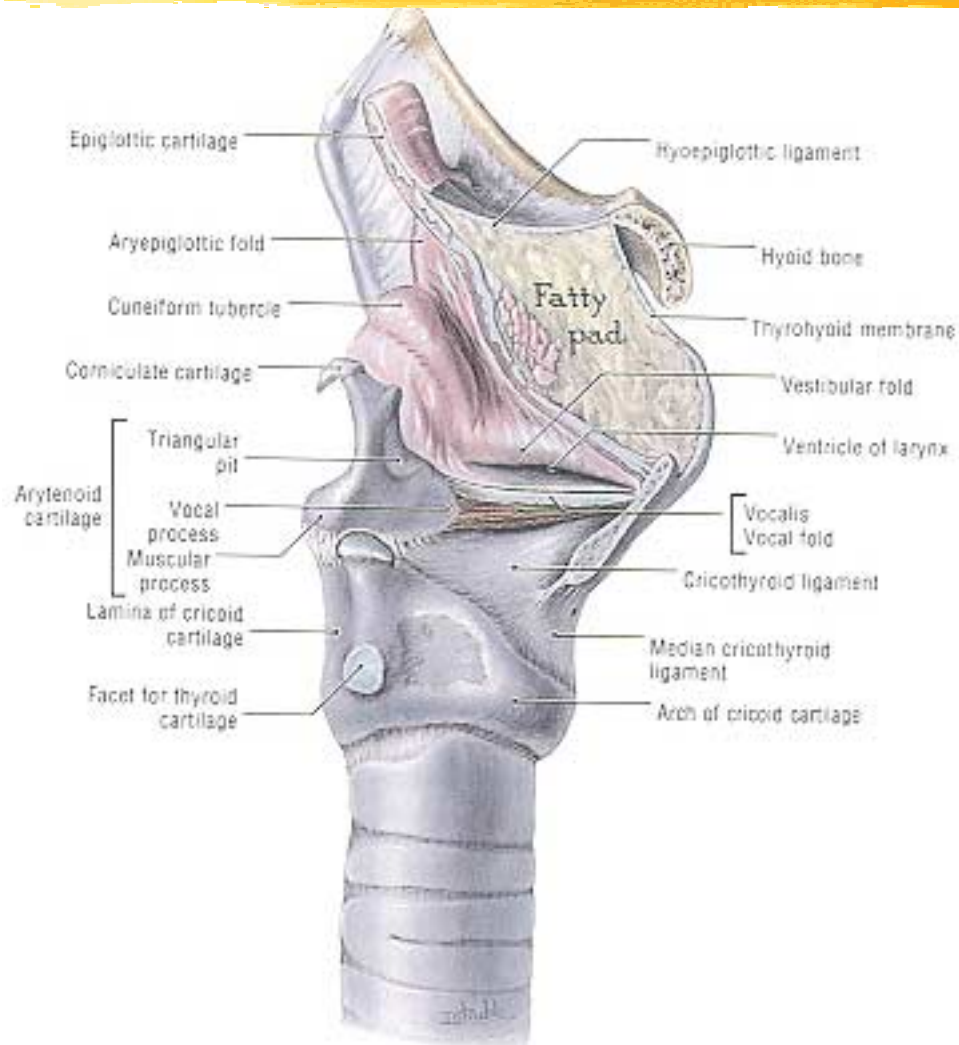
- Incidence: 1:14,583-42,528 ER VISITS
- 4/10 blunt laryngeal trauma expire at scene
- Airway
- Protective
- Voice

Anatomy and Physiology of Larynx




- Airway, tracheobronchial protection, voice
- Hyoid, thyroid, cricoid
- Innervation - RLN, SLN
- Supraglottis - soft tissue
- Glottis - ca joint, cartilage, neuromuscular coordination
- Subglottis - cricoid, narrowest in infants

Anatomy and Physiology of Larynx



Mechanism of Injury



- Blunt -mva, strangulation, clothesline, cspine
- Penetrating
 - GSW: damage related to velocity
 - Knife: easy to underestimate damage

History



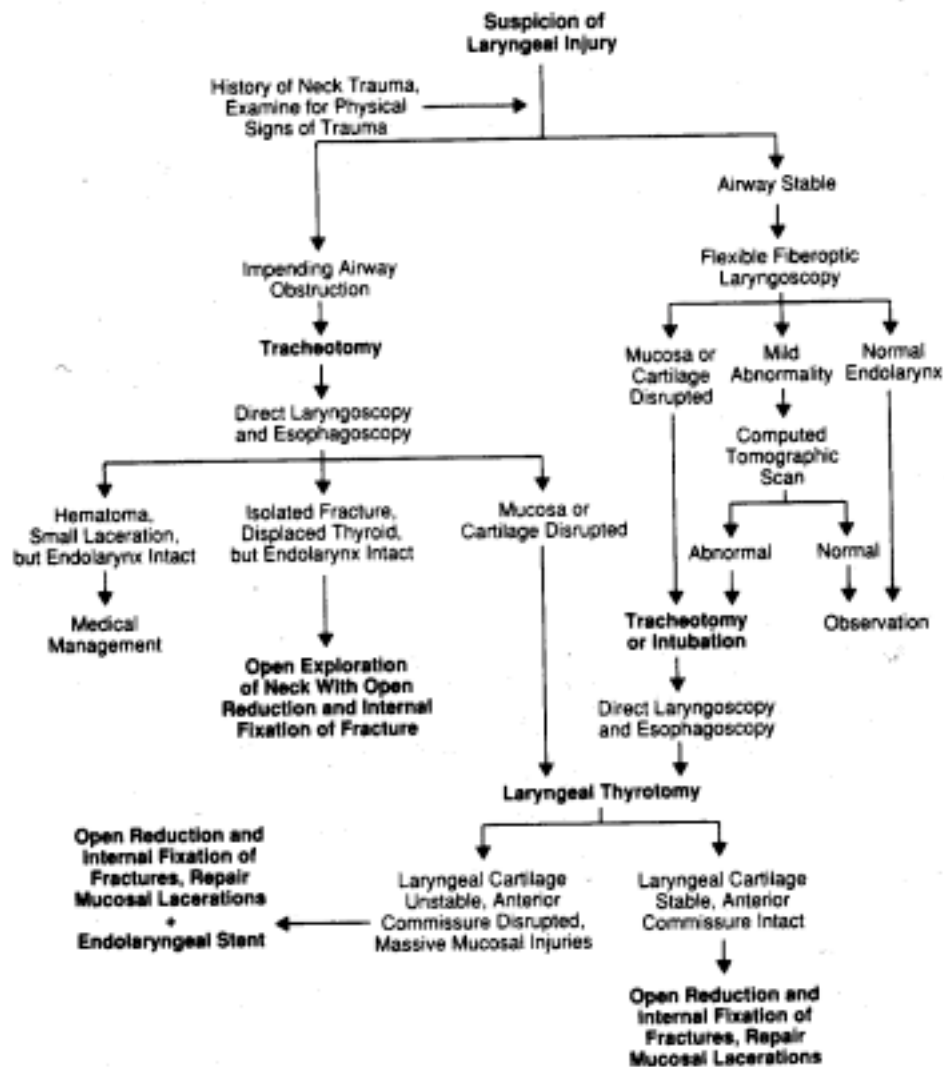
- Hoarseness or change in voice
- Dysphagia
- Odynophagia
- Difficulty breathing - more severe injury
- Anterior neck pain

Physical exam



- Stridor -inspiratory, expiratory or both
- Subcutaneous emphysema
- Hemoptysis
- Laryngeal tenderness, ecchymosis, edema
- Loss of thyroid cartilage prominence
- Associated injuries - vascular, cspine, esophageal

Acute Management of Laryngeal Trauma




Airway Management



- Tracheotomy under local anesthesia is preferred method for adults
 - CT
 - Fiberoptic intubation or DL with direct visualization
- Pedi - inhalation anesthesia with spontaneous respirations followed by rigid endoscopic intubation

Radiographic Imaging




- C-spine
- CT if airway stable and mild abnormality on flexible exam.
 - Good for intermediate cases with scope limited by edema
- Angiography and contrast esophagrams considered

Medical Management



- Edema
- Small hematoma with intact mucosa
- Small glottic or supraglottic lacerations which do not involve A.C., free margin of V.C. and no exposed cartilage
- Single nondisplaced stable thyroid cart. fx.
- Humid. O2, airway obs., elevate HOB, H2 blockers, steroids, +/- abx.

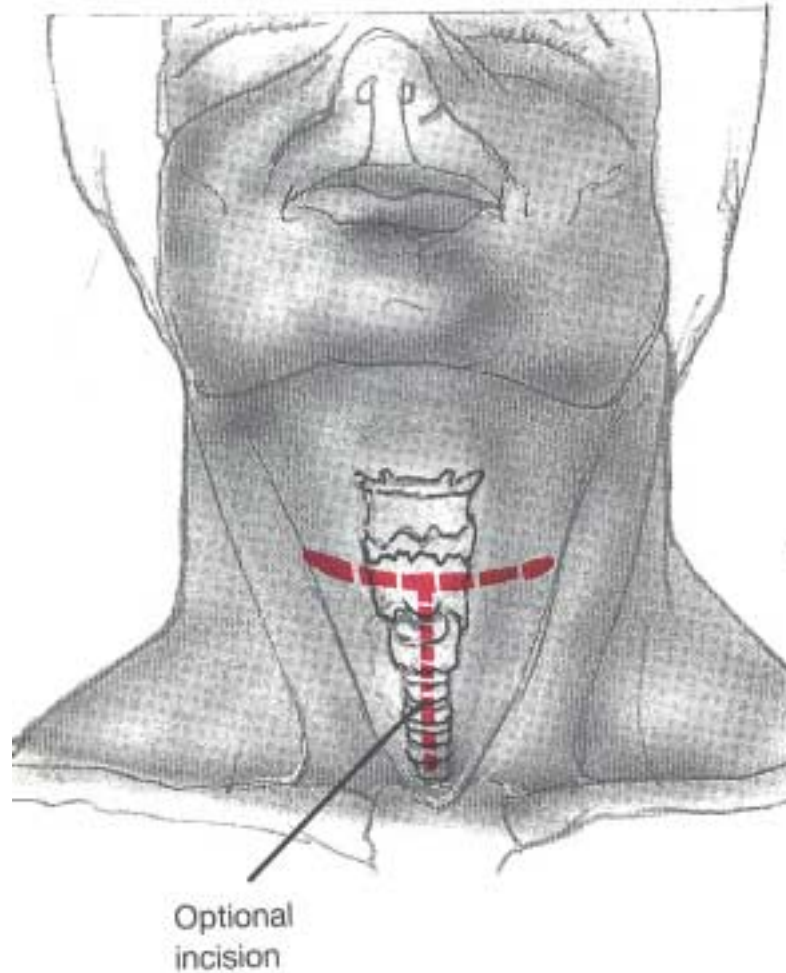
Surgical Management



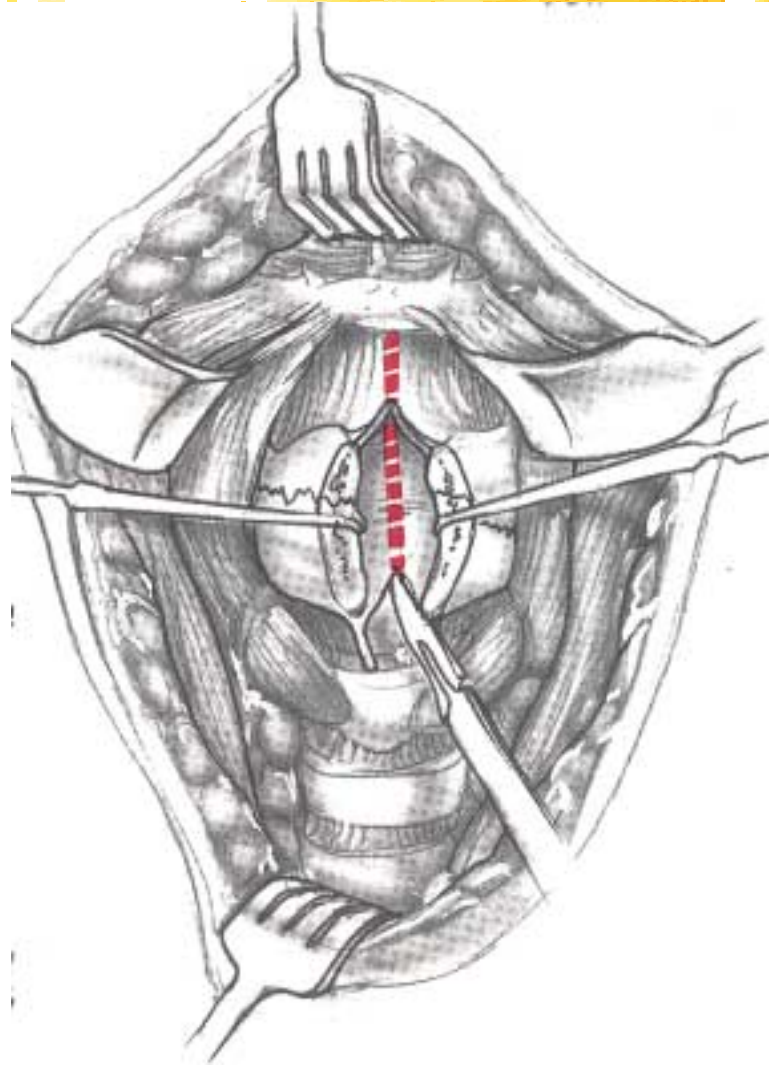
- Trach, DL, bronch, esophagoscopy
- Explore within 24 hours
 - Lacs involving A.C. or free margin of V.C.
 - Large mucosal lacs, exposed cartilage
 - Multiple displaced cartilage fx
 - Avulsed or dislocated arytenoids
 - Vocal cord immobility

Laryngeal exploration and repair

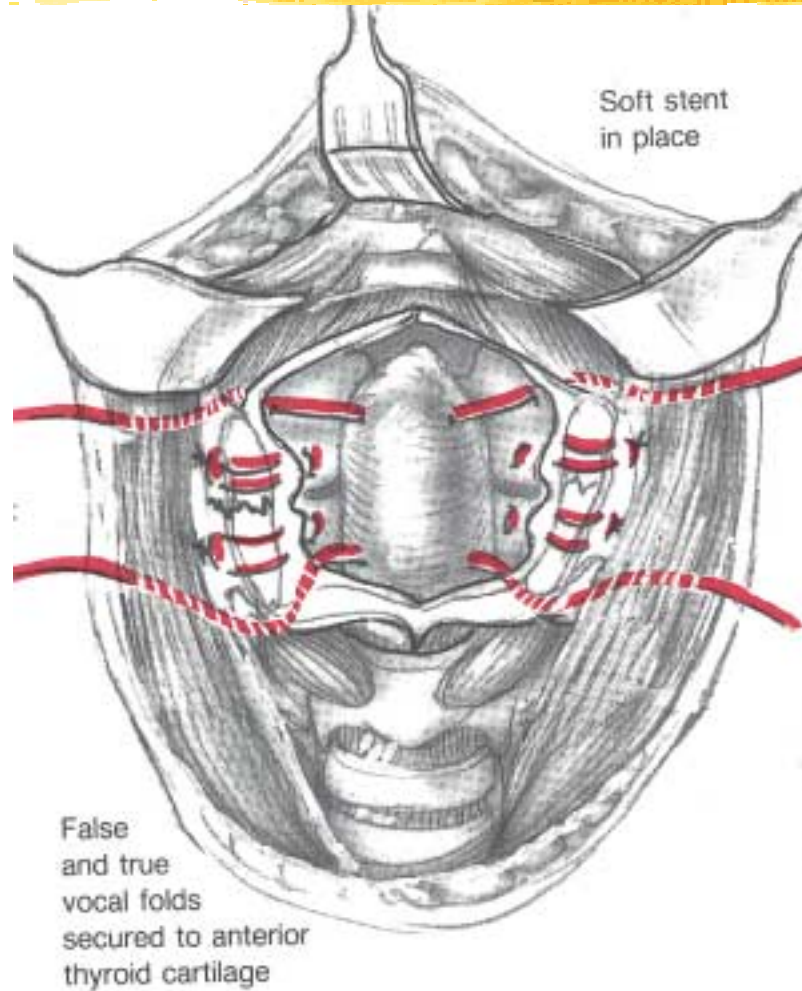
232-1. Incisions for repair of laryngeal fracture



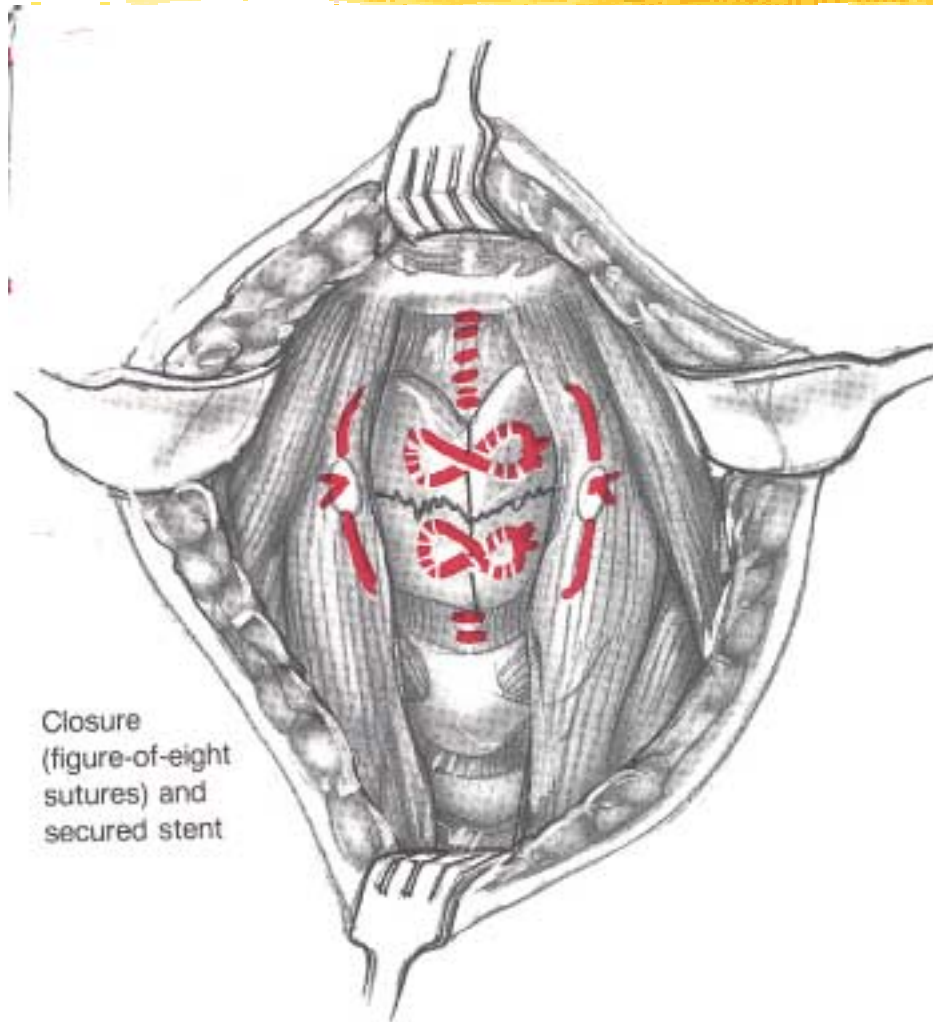
Laryngeal exploration and repair



Laryngeal exploration and repair



Laryngeal exploration and repair



Closure
(figure-of-eight
sutures) and
secured stent

Goals of Laryngeal exploration

- Cover all cartilage to prevent granulation tissue and fibrosis
- Primary closure ideal, can undermine mucosa or use advancement flaps from epiglottis or pyriforms
- Palpate arytenoids and reposition if necessary
- Resuspend anterior commissure, ORIF Fxs.

Endolaryngeal stenting



- Necessary for disrupted A.C., multiple displaced fractures, and/or multiple and severe mucosal lacerations
- Provides support and prevents stenosis but can cause iatrogenic injury(remove after 2 weeks)
- 4 point fixation allows safe recovery

Endolaryngeal stenting

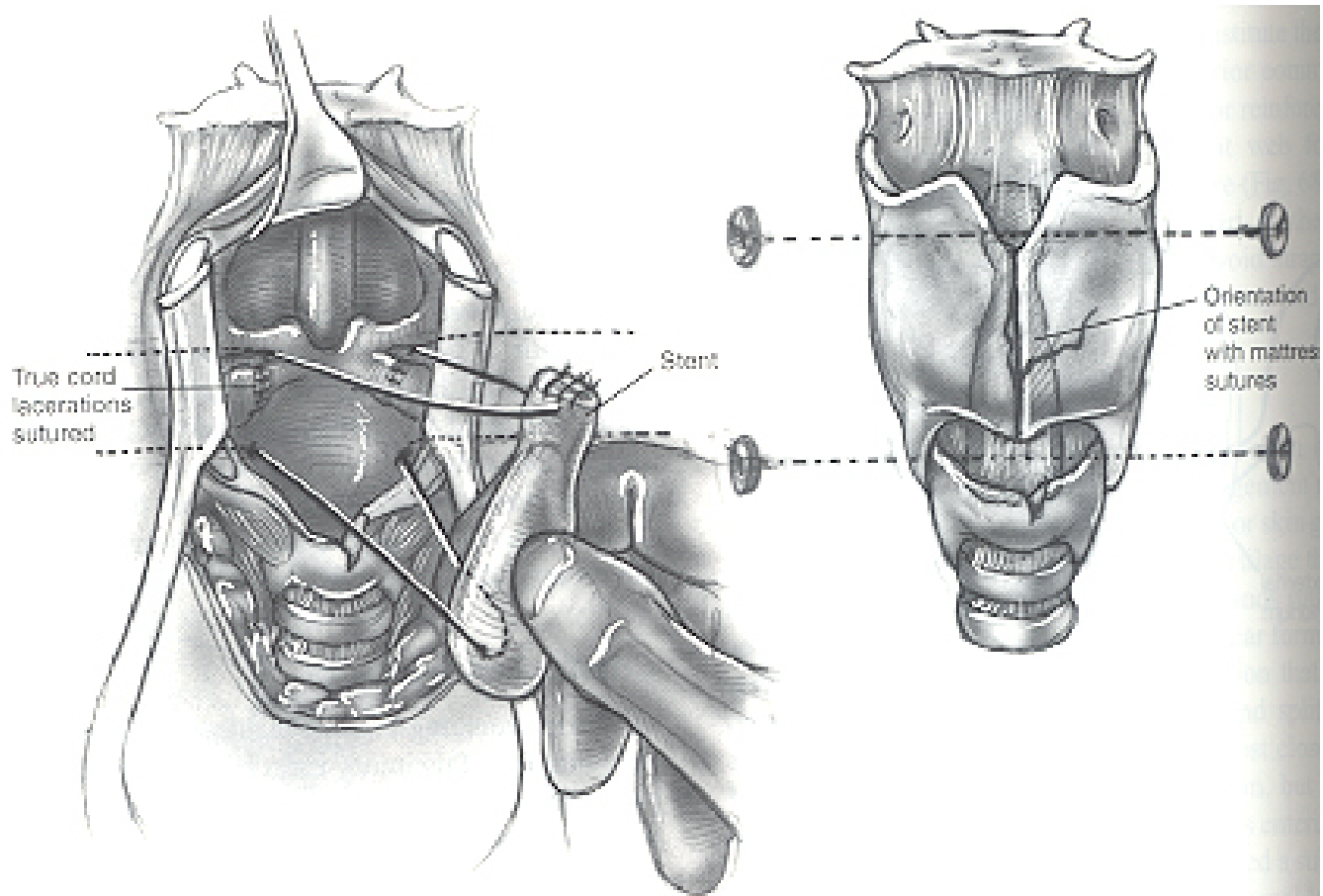




FIG. 68-6. Fixation of Portex endolaryngeal stent using nonabsorbable sutures.

Schaefer's classification system




- Looked at 139 laryngeal trauma patients over 27 years
- Classified as Group I - IV and treated according to flow diagram
- 2/139 had poor airway on follow-up (unable to decannulate). 112/115 with good voice
- Time to decannulation 14-35 days, except in those patients with stents (35-100 days)

Schaefer's classification system



- Group I - minor hematoma or lacs, no fx or airway compromise, flexible scope +/- CT, medical management
- Group II -mod. edema, lacs, no exposed cart. nondisplaced fx. varying airway, trach +/- CT
- Group III - Massive edema, disrupted mucosa, displaced fx, cord immobility, varying airway, trach and endoscopy
- Group IV multiple unstable fx, a.c. trauma, required a stent

Special considerations



- LT separation - usually immediate death, if not: trach then suture cricoid to 2nd tracheal ring. Assoc. with BRLN injury and stenosis
- RLN injury - direct repair if possible but poor chance for functional return
- Pedi - Proportionally smaller airway tolerated less edema however pedi larynx more flexible so more soft tissue injury

Complications



- Granulation tissue - most common, prevention key, can lead to fibrosis and stenosis of larynx or trachea, tx is site specific and includes laser excision, laryngofissure and cricoid split
- Immobile vocal fold - cricoarytenoid joint or RLN injury. If arytenoid mobile, may observe for return of nerve function

Conclusions



- Key to recognition is high index of suspicion
- Assess airway first and base management on flow diagram
- Don't forget about associated vascular or esophageal injuries

Case presentation




- 92 yom s/p MVA presented to ER c/o pain in neck and hoarseness

Physical exam




- Anterior neck contusion and hematoma
- Pain with palpation of larynx

Fiberoptic exam



- Unable to see mucosa or cartilage disruption but the larynx seems somewhat abnormal in appearance

CT scan



- Fx of the thyroid cartilage posterior and laterally with some displacement, fx of midline thryoid cartilage

Management



- Trach/DL/esophagoscopy, laryngeal thyrotomy with repair of unstable fx and mucosal lacerations.