Laryngeal Trauma

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Grand Rounds Presentation
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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

Suspicion of Laryngeal Injury

History of Neck Trauma, Examine for Physical Signs of Trauma

Airway Stable

Flexible Fiberoptic Laryngoscopy

Mucosa or Cartilage Disrupted

Computed Tomographic Scan

Mild Abnormality

Normal Endolarynx

Laryngoscopy or Intubation

Tracheotomy or Intubation

Observation

Laryngeal Thyrotomy

Open Reduction and Internal Fixation of Fractures, Repair Mucosal Lacerations + Endolaryngeal Stent

Laryngeal Cartilage Stable, Anterior Commissure Intact

Open Reduction and Internal Fixation of Fractures, Repair Mucosal Lacerations

Laryngeal Cartilage Unstable, Anterior Commissure Disrupted, Massive Mucosal Injuries

Direct Laryngoscopy and Esophagoscopy

Tracheotomy or Intubation

Mucosa or Cartilage Disrupted

Isolated Fracture, Displaced Thyroid, but Endolarynx Intact

Medical Management

Hematoma, Small Laceration, but Endolarynx Intact

Direct Laryngoscopy and Esophagoscopy

Impending Airway Obstruction

Tracheotomy

Airway Stable
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 cartilage fracture
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

Optional incision
Laryngeal exploration and repair
Laryngeal exploration and repair

Soft stent in place

False and true vocal folds secured to anterior thyroid cartilage
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 thyroid cartilage
Management

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