



## *AAST Acute Care Surgery Didactic Curriculum*

### **Pulmonary Injury**

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#### Highlights:

- To avoid strictures of extensive repairs or end-to-end anastomoses of the trachea or a major bronchus, skeletonization right on the structure should be avoided
- Absorbable sutures with knots outside the lumen are appropriate for tracheobronchial repairs
- Adding a protective tracheostomy to a routine tracheal repair is no longer performed
- An interposed muscle buttress composed of the well-vascularized detached sternal head of the SCM muscle is appropriate with combined tracheoesophageal, trachea-carotid artery, or esophagus-carotid artery injuries
- A variety of technical “tricks” will allow for resection of >5 cm of a strictured trachea with an end-to-end anastomosis at a reoperation

#### **Diagnosis**

#### Highlights:

- Physical Examination
  - Palpable cervical crepitus
  - Air bubbling out of penetrating cervical wound (trachea)
  - Continuous high volume air leak through thoracostomy tube (mainstem bronchus)
  - Acute airway occlusion from cricotracheal or carinal disruption
- Findings on Cervical and/or Chest X-Ray
  - Cervical subcutaneous air
  - Pneumomediastinum
  - Late (day or two after blunt trauma) whiteout of entire lung from late edema at point of transection of mainstem bronchus
- Diagnosis Confirmed
  - Laryngoscopy/flexible bronchoscopy
  - Thoracic CT—See Moser reference below. Not indicated if bronchoscopy locates and defines magnitude of injury

## **Operative Management**

### Highlights:

- Routine Perforation of Trachea
  - Minimal dissection to preserve blood supply at 3 and 9 o'clock
  - Minimal debridement if tissue still attached to trachea
  - Absorbable 3-0 interrupted sutures with knots outside
  - No tracheostomy needed
- Big Hole in Anterior Trachea
  - Tracheostomy thru hole
  - Up higher, sew sternal head of sternocleidomastoid muscle to cover the defect
  - Resection, end-to-end anastomosis "NEVER" done at first operation
- Injury to Membranous Trachea with Missing Tissue
  - Add median sternotomy, create three-sided pericardial flap based superiorly, flap flipped up into posterior tracheal defect. (Symbas PN, Justicz AG, Ricketts RR. Rupture of the airways from blunt trauma: treatment of complex injuries. *Ann Thorac Surg* 1992; 54: 177-183.)
- Combined Tracheal Injury with Injury to Esophagus or Carotid Artery
  - Strap muscles are too thin and have too tenuous a blood supply to be a buttress
  - So, for combined injuries in the neck, detach the sternal head of the SCM muscle and fix this with absorbable sutures between the two repairs. If both the sternal and clavicular heads of the SCM muscle are detached, the muscle will retract toward the mastoid process and may not reach the area between the two repairs. (Losken A, Rozycki GS, Feliciano DV. The use of the sternocleidomastoid muscle flap in combined injuries to the esophagus and carotid artery of trachea. *J Trauma* 2000; 49: 815-817.)
- End-to-End Anastomosis of the Trachea at a Later Reconstruction (For stricture or for takedown of temporary tracheostomy)
  - Circumferential dissection with care to preserve blood supply at 3 and 9 o'clock to gain 3 cm in length. Other methods of gaining length include the following: gain 1.5 cm—cervical flexion with chin stitched to chest; laryngeal lowering procedure—gain 2 cm (Montgomery WW. Suprahyoid release for tracheal anastomosis. *Arch Otolaryngol* 1974; 99: 255-260); Intrathoracic (right hilar) release for decreasing tracheal tension. In Urschel HC Jr, Cooper JD (eds). *Atlas of Thoracic Surgery*. New York: Churchill Livingstone; 1995: 122-123)
  - Absorbable sutures with knots outside the lumen
  - SCM muscle or 3-sided pericardial flap as buttress
- End-to-End Anastomosis of Ruptured Mainstem Bronchus
  - Similar to end-to-end repair of trachea.
  - See Symbas article (*Ann Thorac Surg* 1992; 54: 177-183 and Kiser article (*Ann Thorac Surg* 2001; 71: 2059-2065) in prior text