Diseases of Trachea and Chest wall

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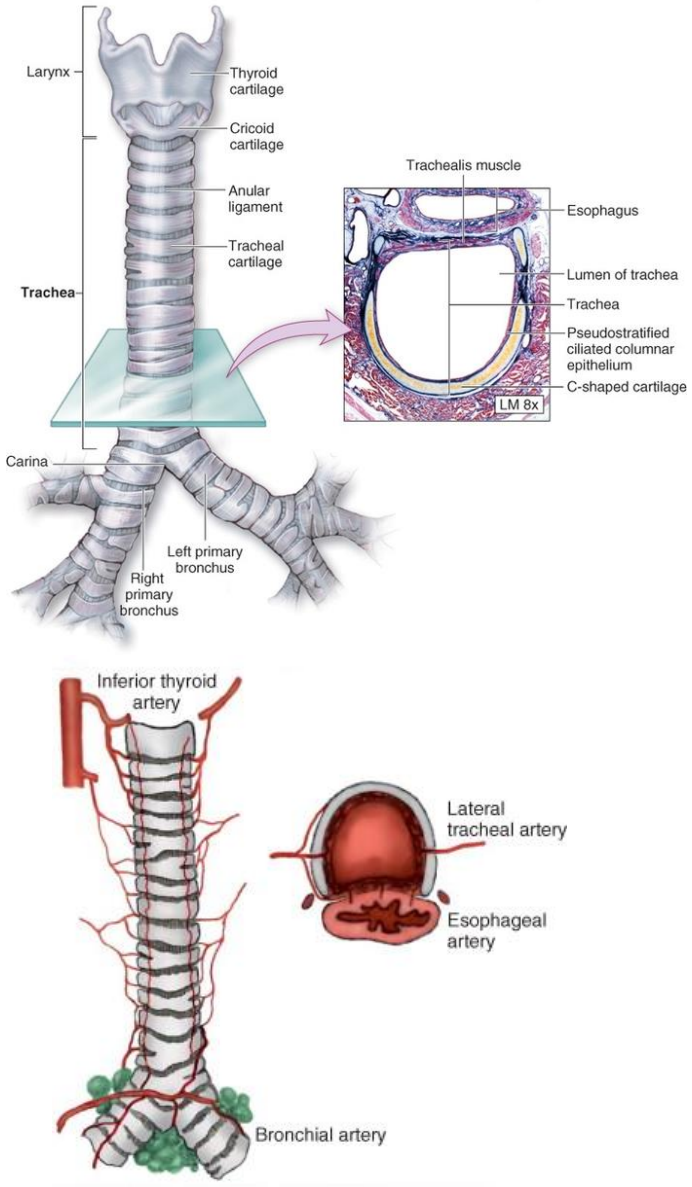
Agenda

- Trachea disease
- Acquired chest wall disease

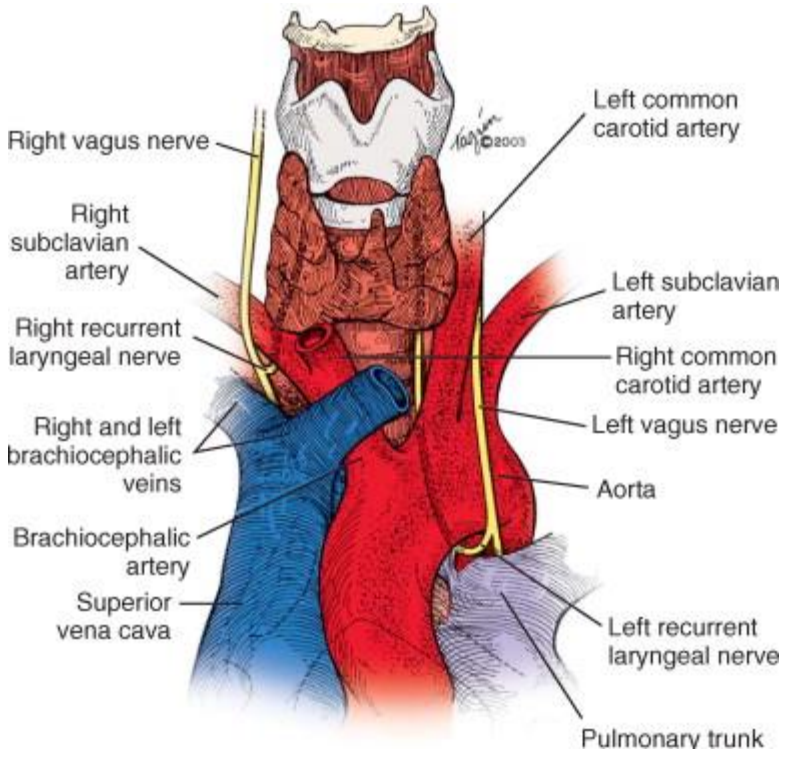
TRACHEAL DISEASE

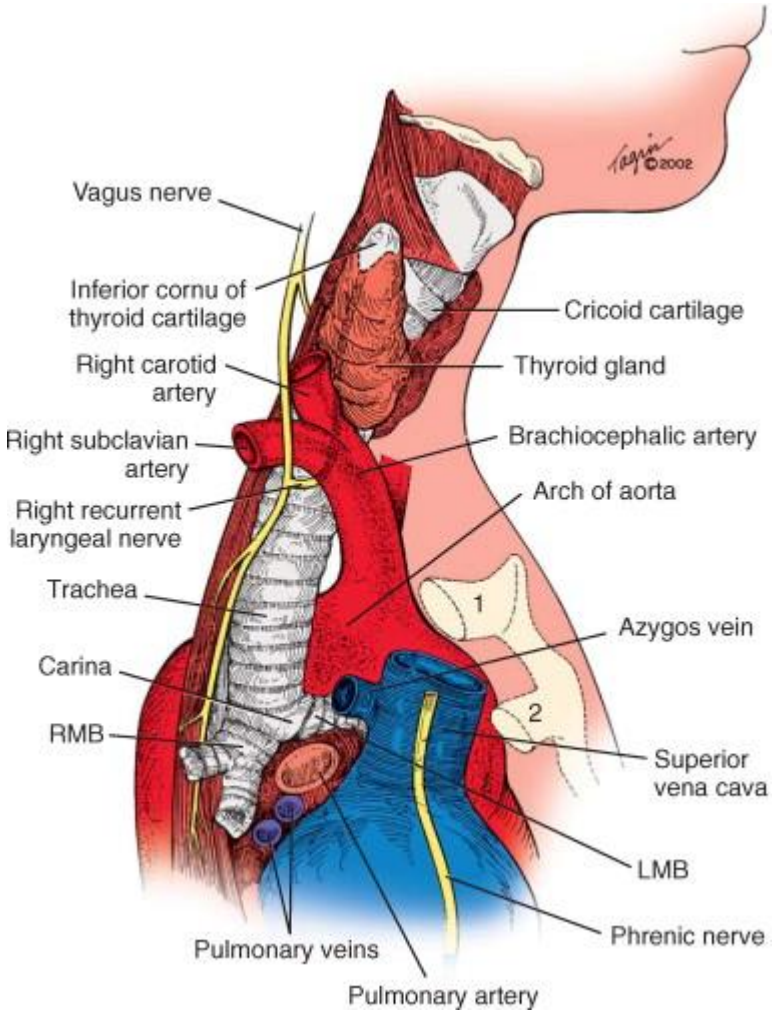
Anatomy of Trachea



- C-ring structure
- Blood supply from inferior thyroidal artery and bronchial artery
- Segmental vascular supply
- Submucosal blood supply (perfusion pressure 20~20mmHg)
- Recurrent laryngeal nerve

Recurrent Laryngeal Nerve



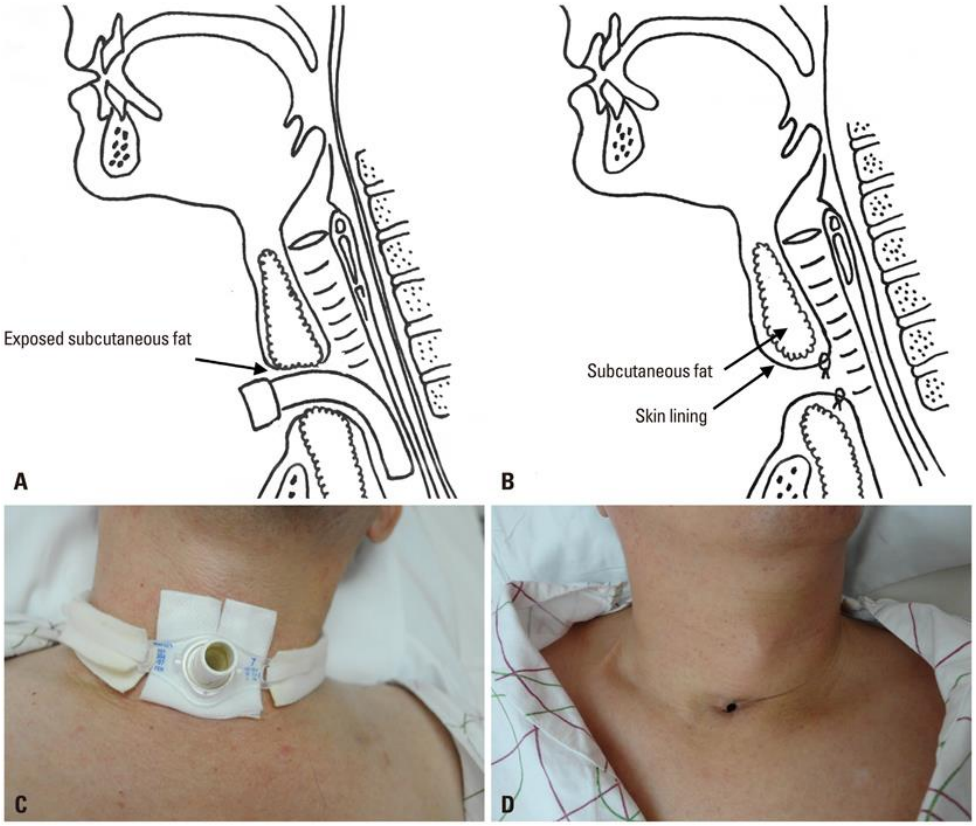


Disease of Trachea

- Benign disease
  - Tracheal stenosis
  - Tracheal perforation
  - Tracheo-esophageal fistula, Tracheo-innominate artery fistula
  - Tracheal malacia

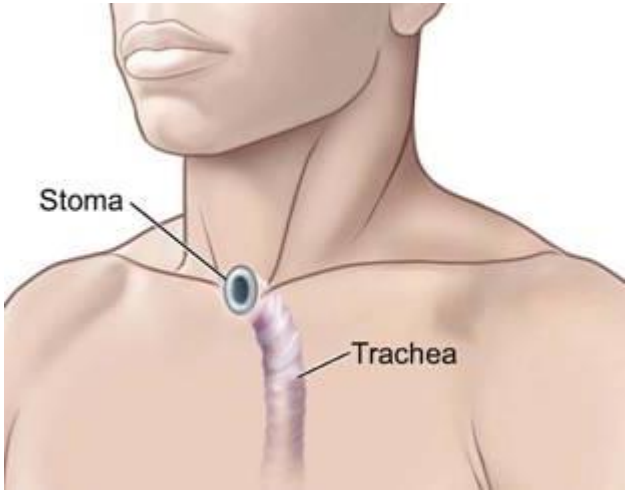
- Malignant disease
  - Primary tracheal tumor
  - Secondary tracheal tumor

Tracheostomy



Standard tracheostomy

Tracheal fenestration



Permanent stoma
(mediastinal tracheostomy)

Tracheostomy tube

Portex tube

Vocalaid tube

Koken tube

Adjustable tube

Primary Tracheal Tumor

- Most common pathology
  - Adenoid cystic carcinoma
  - Squamous cell carcinoma
- Symptoms
  - Adult onset asthma
  - Stridor
- Diagnostic tools; CT, bronchoscopy, BUS
- Treatment
  - Surgical resection; Length of resection and radial margin
  - Endoscopic procedures
  - Radiotherapy

Secondary Tracheal Tumor

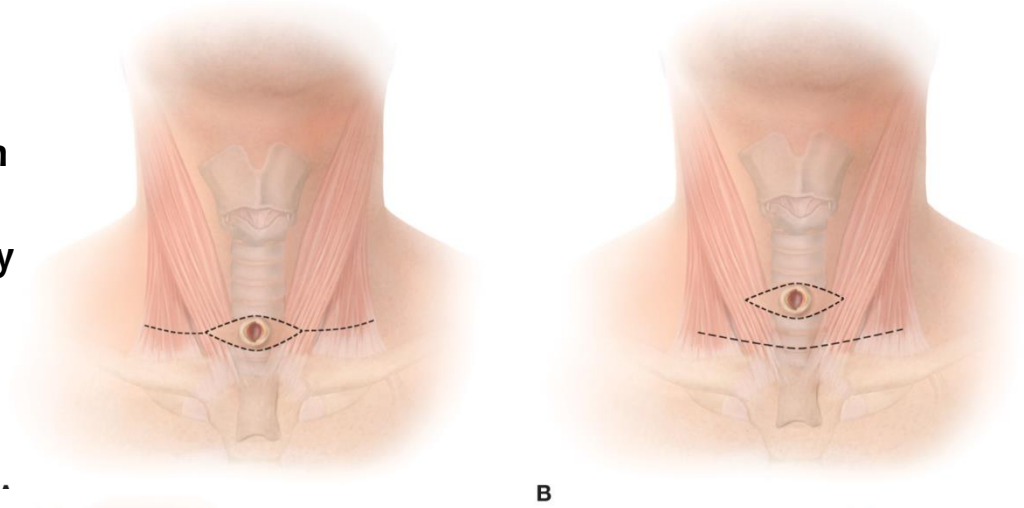
- Most common pathology
  - Direct invasion from lung, esophagus, thyroid..
  - Metastasis; breast cancer, renal cell carcinoma..

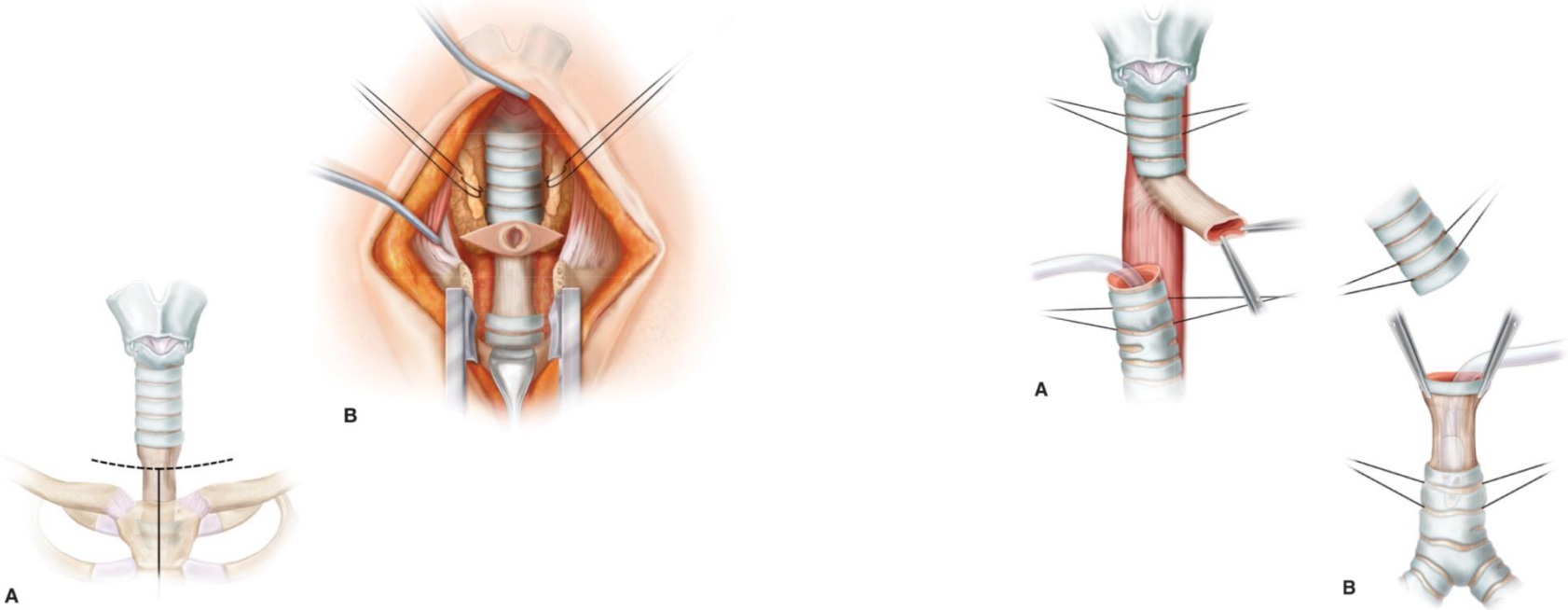
- Treatment
  - Surgical resection with en bloc manner
  - Conservative treatment; to maintain the airway patency

End-to-End Anastomosis of Trachea

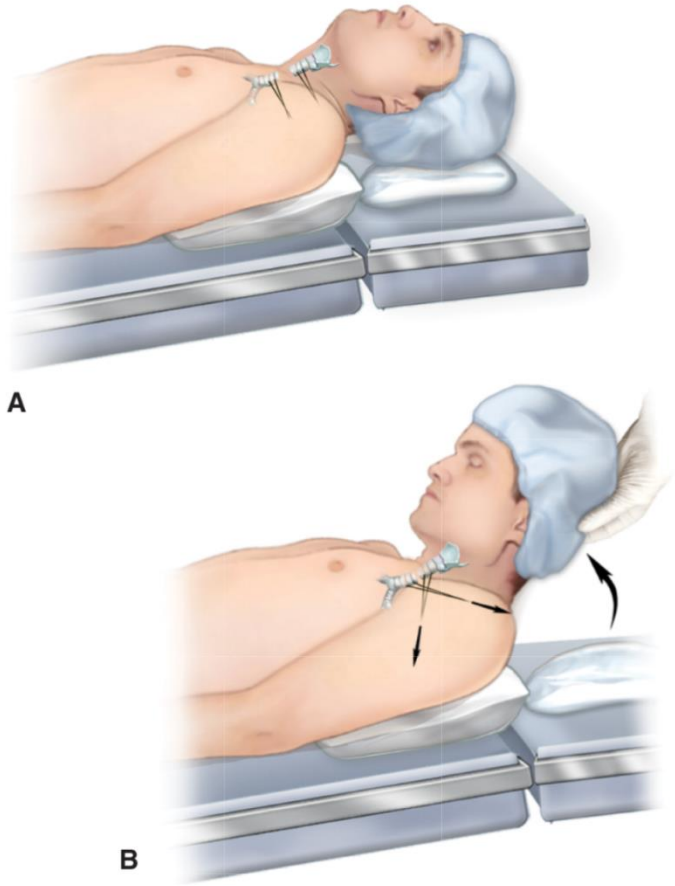
Incision

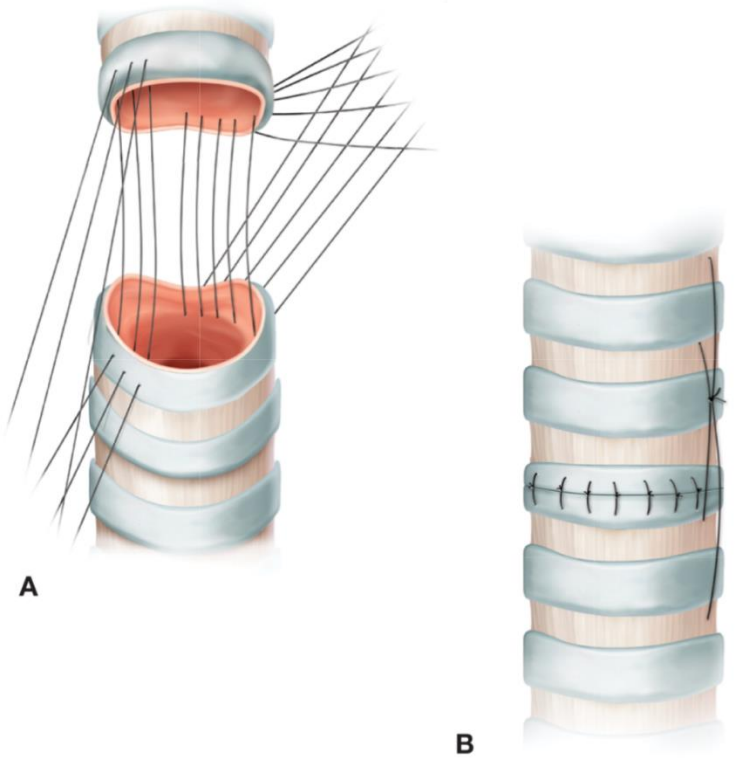
- **Low collar incision**
- **Sternotomy**
- **Right thoracotomy**



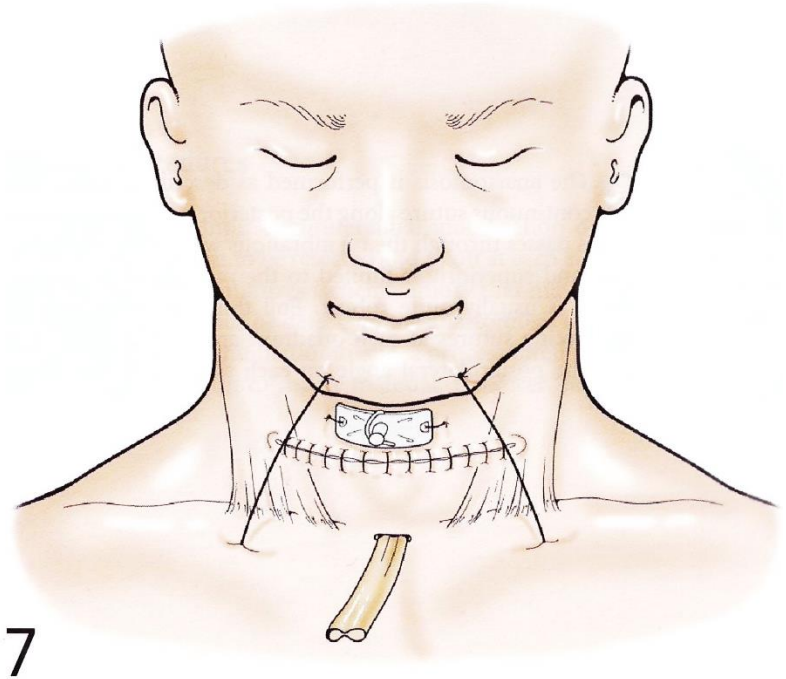


End-to-End Anastomosis of Trachea





End-to-End Anastomosis of Trachea



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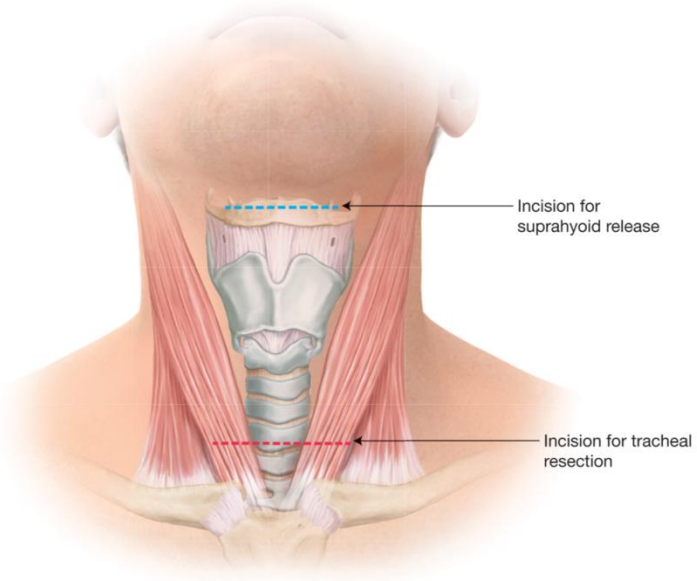
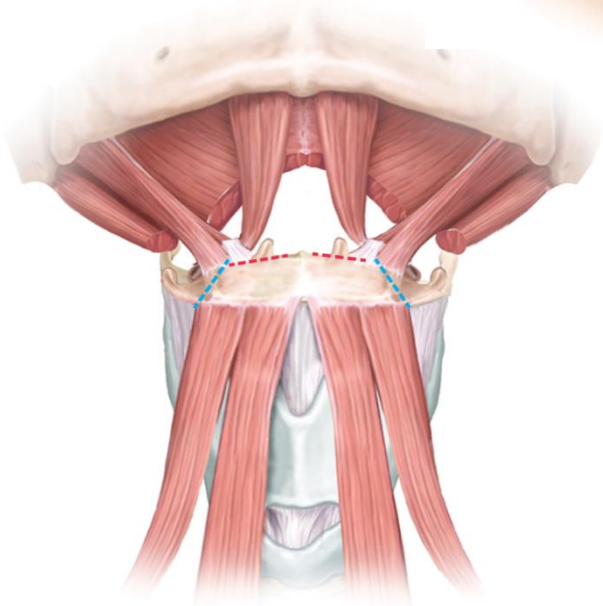
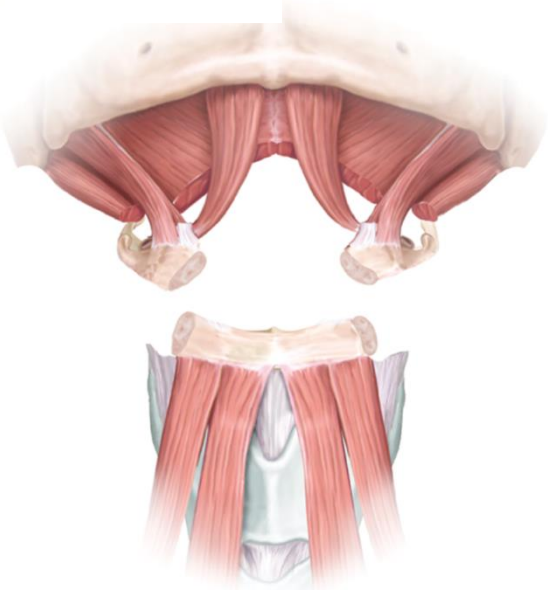
- Possible resection length; about 4-6cm
- Contraindication
  - Expected prolonged intubation (mechanical ventilation)
  - Steroid use
- Principles of postOp. management
  - Early extubation
  - Keep neck flexion
  - Bronchial toileting

Release Maneuver

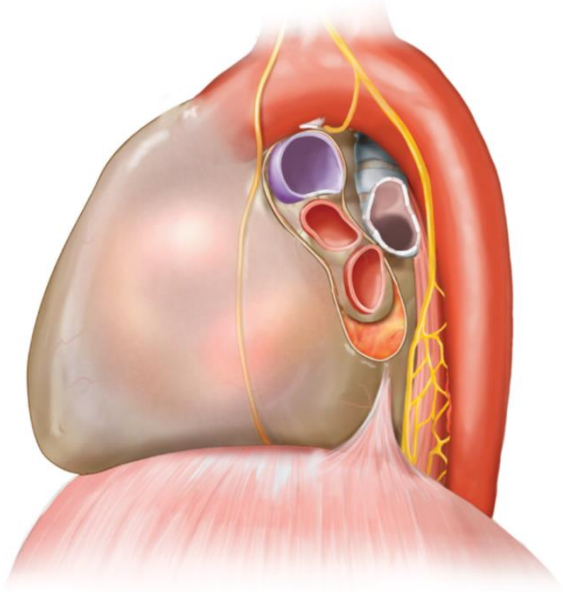
Suprahyoid release

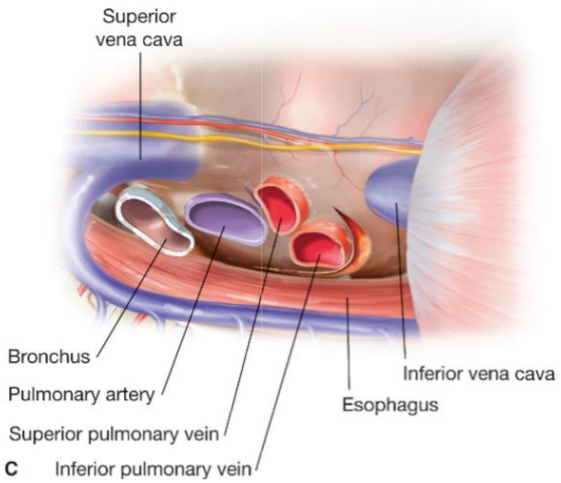


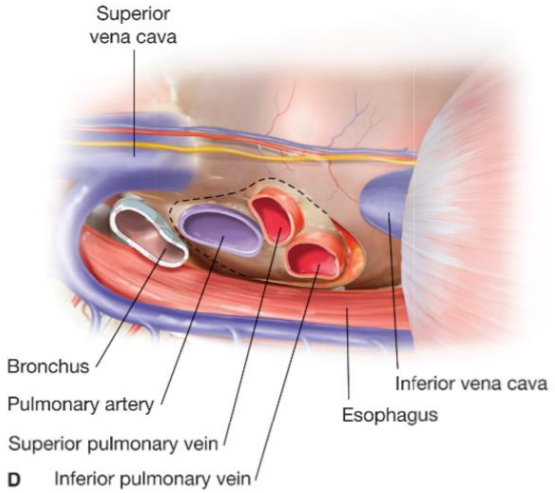




Release Maneuver



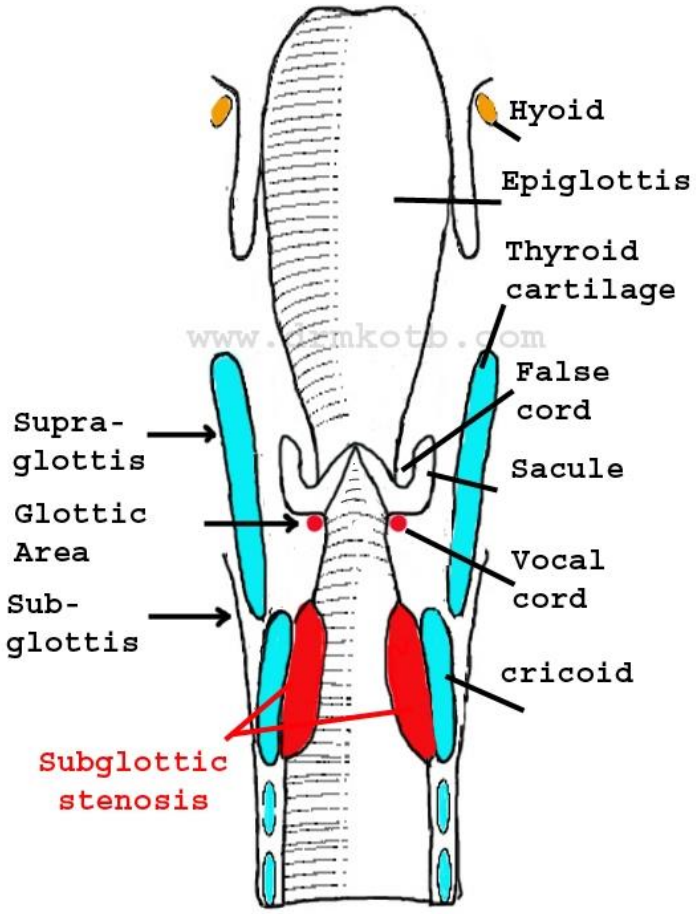




Hilar release

Intubation related Injury

- Subglottic stenosis
- Stoma stenosis
- Cuff-related stenosis
- Tracheal laceration (perforation)



Subglottic stenosis

Tracheal stenosis

- Most common cause
  - Prolonged intubation (subglottic stenosis) & tracheostomy (cuff related stenosis)
  - High cuff pressure
    - Cuff pressure < 23~25mmHg
    - Cuff pressure < Capillary perfusion pressure of mucosa

- Management
  - Bougination
  - T-tube
  - Silicon stent
  - End-to-end anastomosis

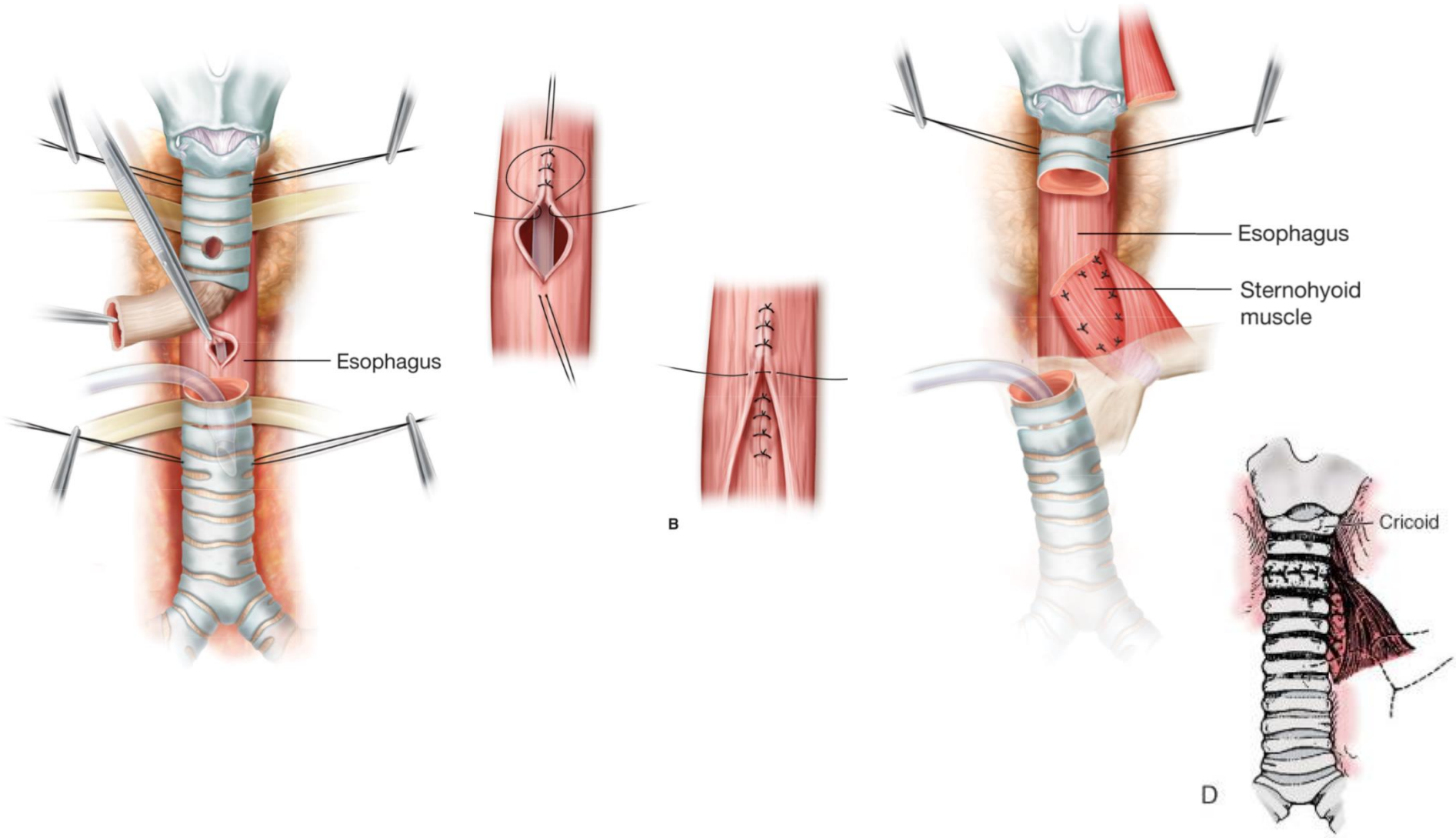
Tracheal Perforation

- Post-intubation tracheal tear
- Cause
  - Intubation injury
  - Procedure-related injury
- Treatment
  - Conservative care
  - Surgical repair
  - Tracheal stenting

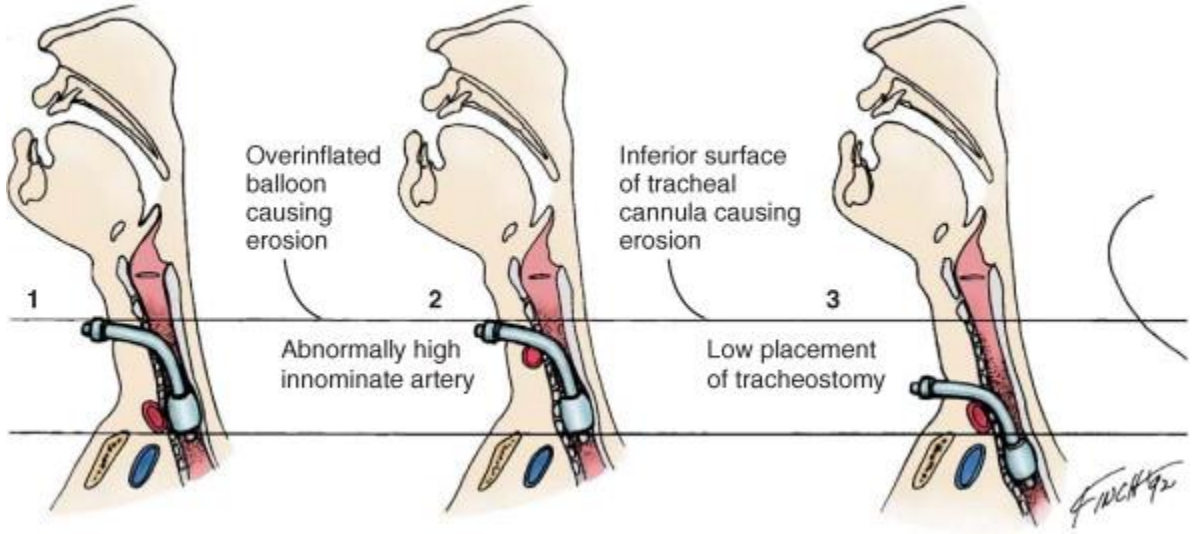
Tracheo-esophageal fistula

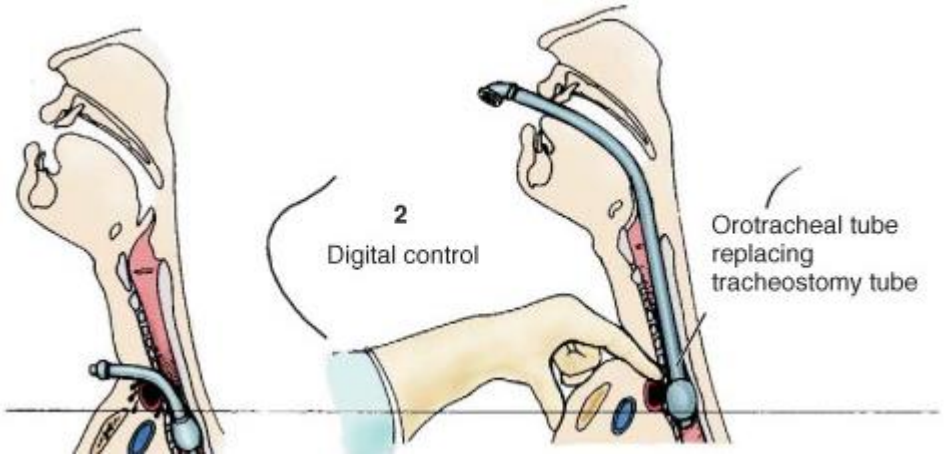
- Key of treatment; ventilator!
- Weaned off the ventilator
  - One-stage repair
- Keep the ventilator
  - Remove nasogastric tube
  - Tracheostomy tube; low pressure, below the fistula
  - Gastrostomy and feeding jejunostomy
  - Frequent suctioning
  - Weaning from the ventilator

Repair of TEF

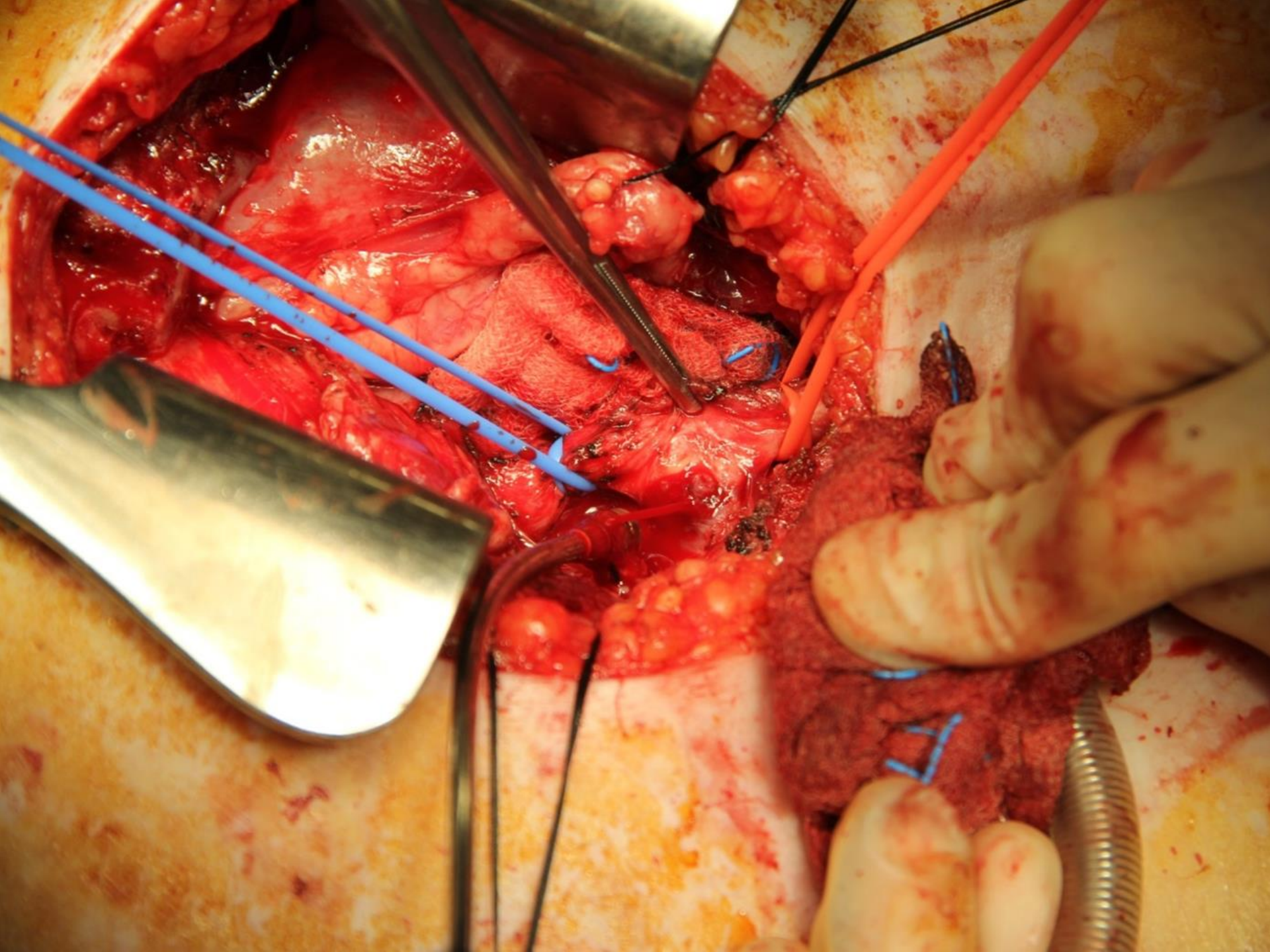


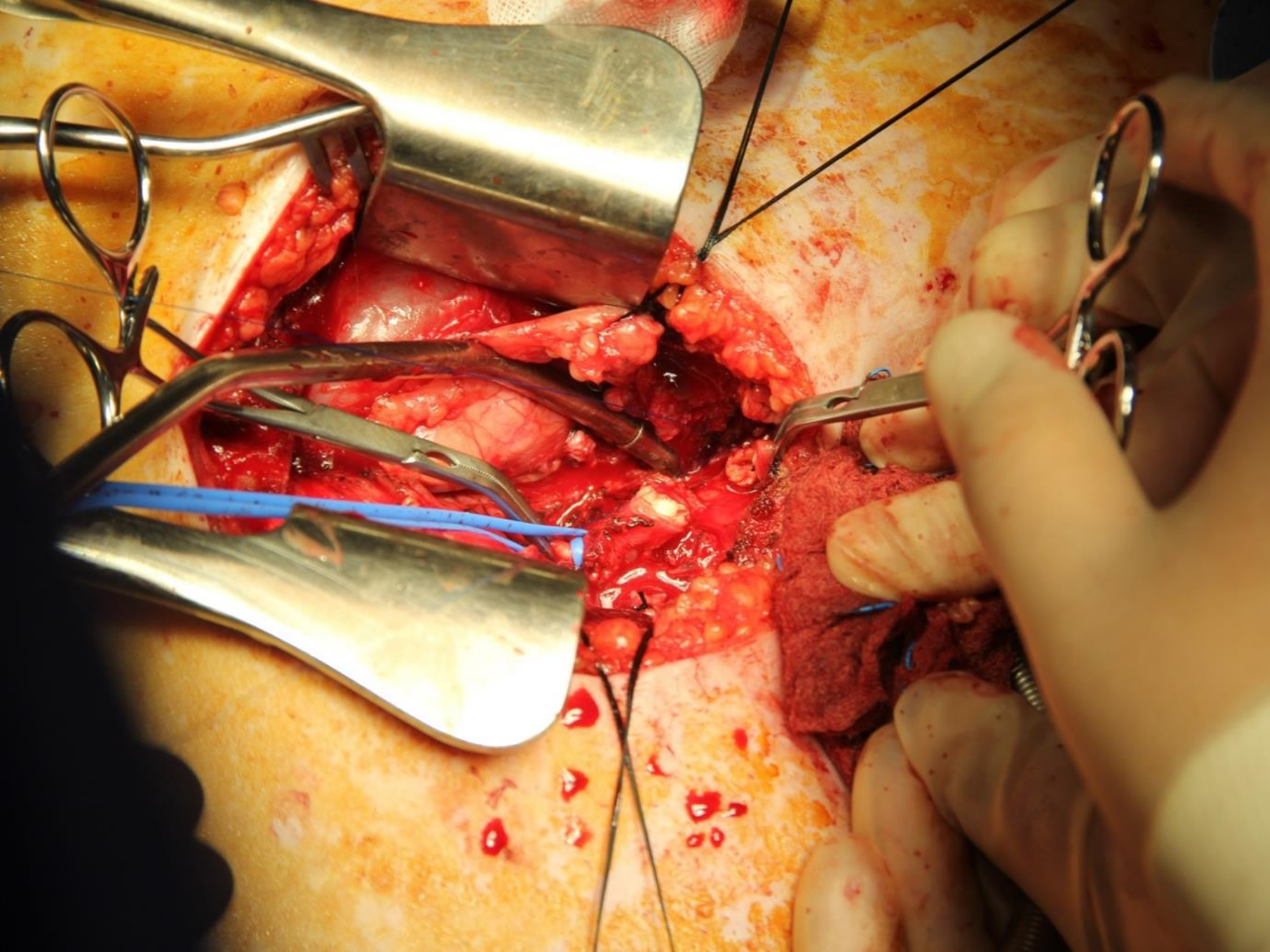
Tracheo-innominate artery fistula

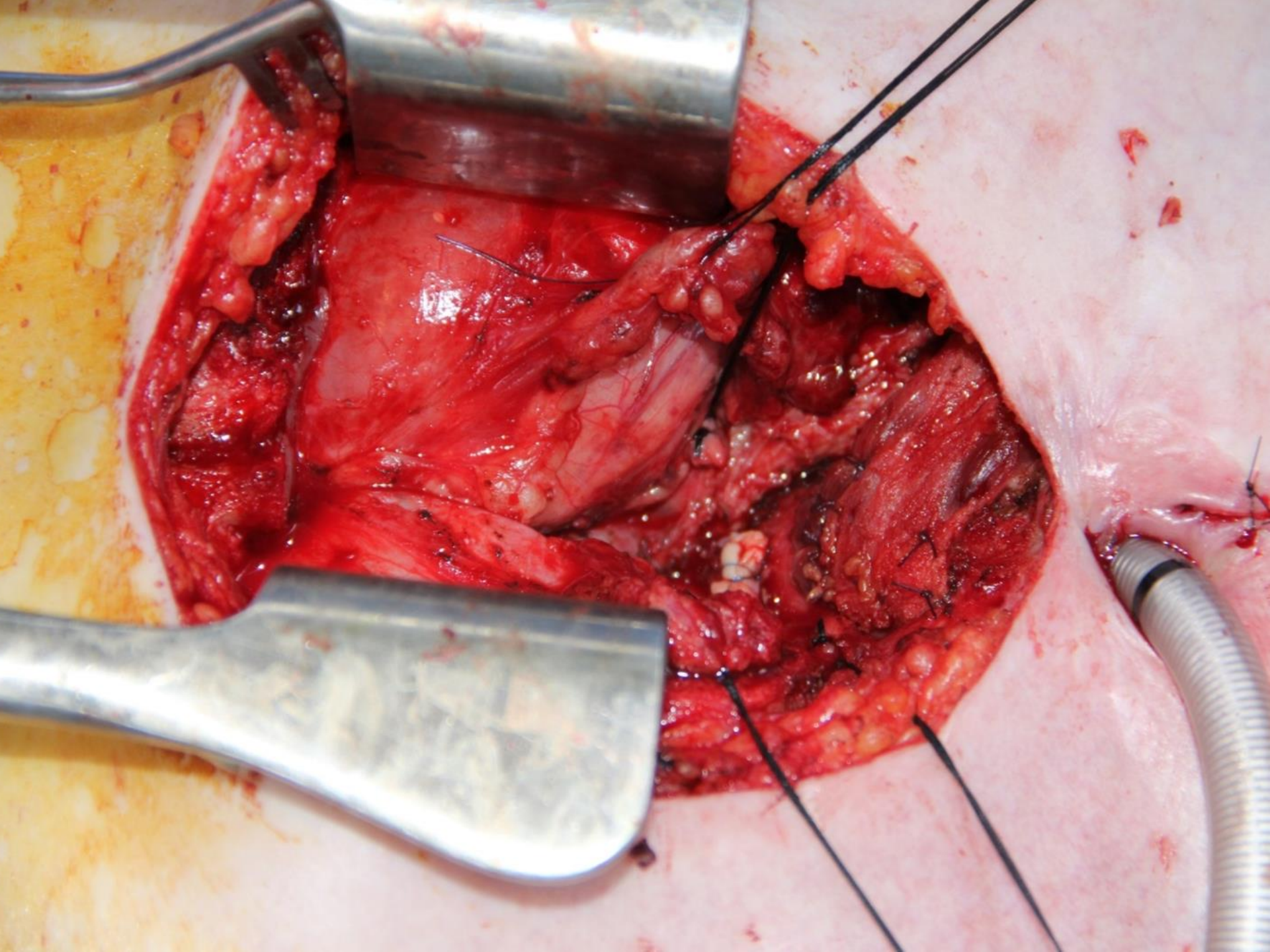




- **Mortality; more than 80%**
- **Principles of management**
  - **Keep airway**
  - **Control of bleeding**
  - **Resuscitation**

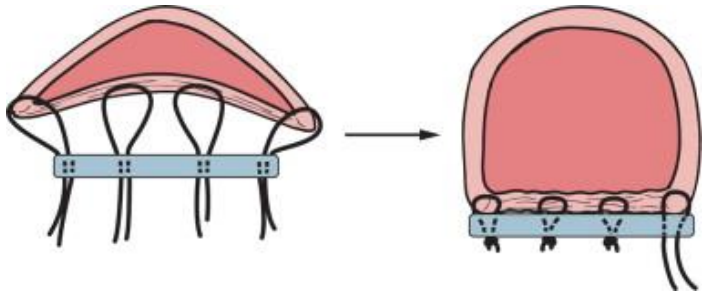




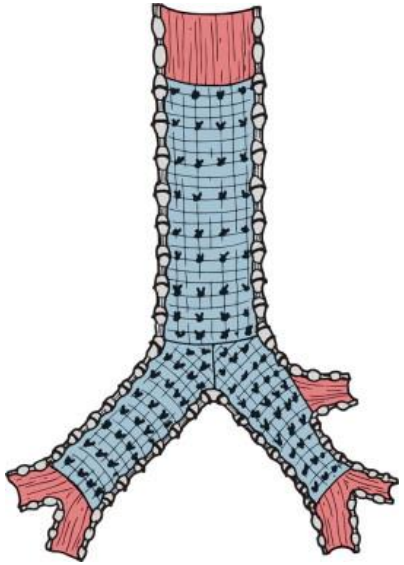


Tracheomalacia

- Segmental vs. Diffuse
- Congenital vs. Acquired (trauma, postintubation injury, emphysema..)

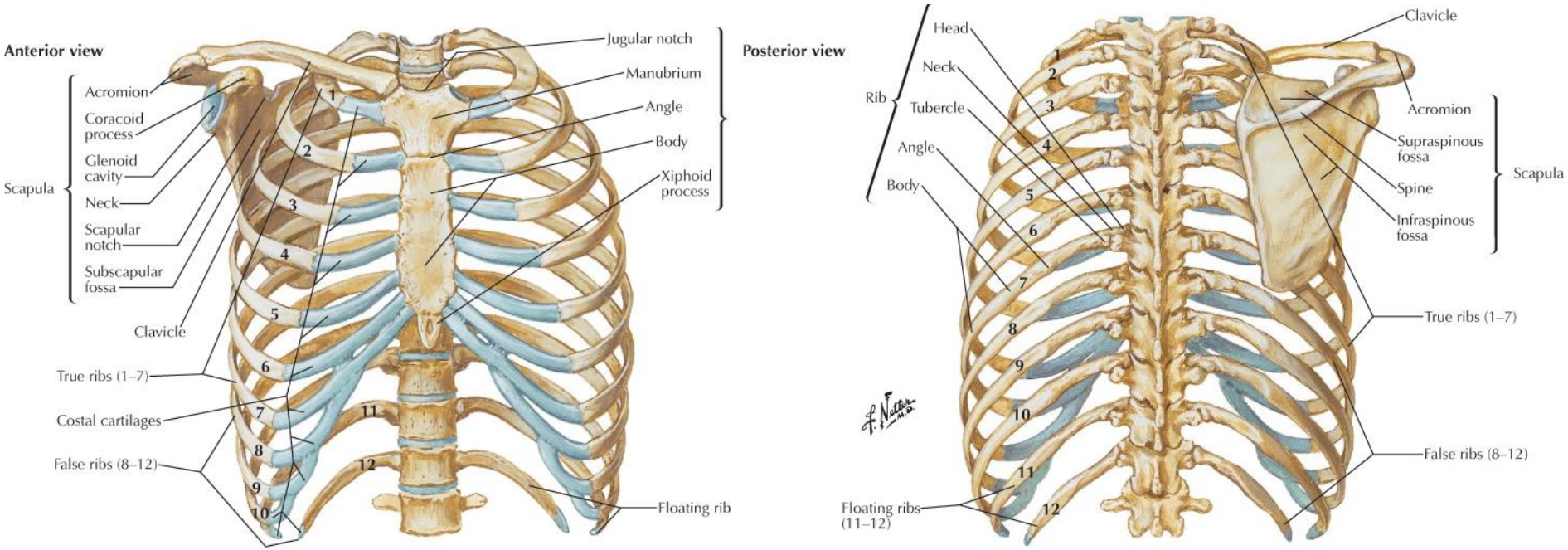


- Diagnosis
  - Dynamic airway CT
  - Functional bronchoscopy
- Benefit from surgical treatment
  - Segmental tracheomalacia
  - Patients with good lung function
- Operation
  - Tracheoplasty (splinting)
  - Tracheal stenting



ACQUIRED CHEST WALL DISEASE

Chest wall anatomy



Acquired Chest Wall Disease

- Chest wall tumor; rare (300 case / year in USA)
  - Benign chest wall tumor
  - Malignant chest wall tumor
    - Most common; Lung cancer direct invasion
  - (bone and cartilage tumor vs. soft tissue tumor)

- Infectious chest wall disease
  - Osteomyelitis; rib, sternum
  - Sternoclavicular joint infection

- Radionecrosis

- Most important symptom; chest wall pain

Diagnostic Tools

- Chest CT
- PET or bone scan (metastasis evaluation)
- MRI

- Ultrasound sonography

- Biopsy
  - Needle aspiration
  - Core needle biopsy
  - Excisional biopsy

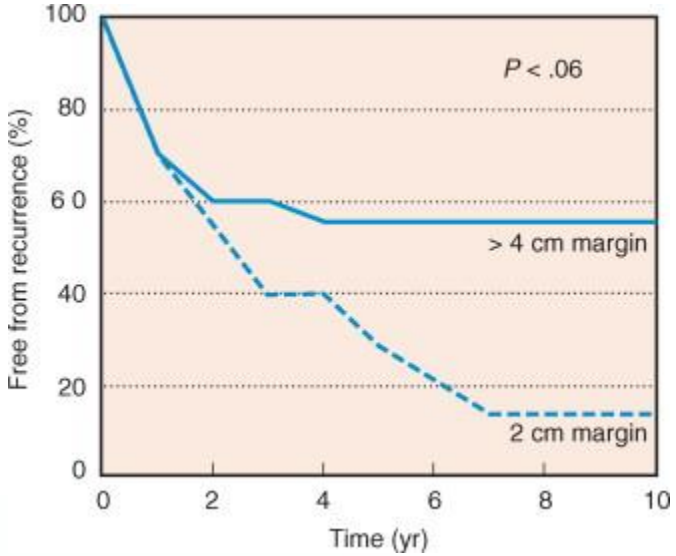
Primary chest wall neoplasms

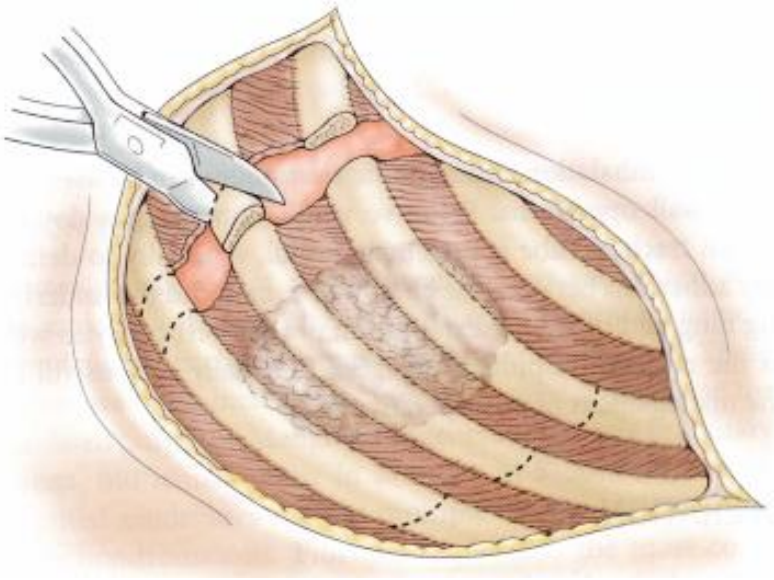
	Bone and cartilage tumor	Soft tissue tumor
Benign	Osteochondroma Chondroma Fibrous dysplasia Eosinophilic granuloma	Lipoma Fibroma Neurilemmoma Fibrolipoma
Malignant	Chonrosarcoma Plasmacytoma Osteosarcoma Ewing's carcinoma	Desmoid Fibrosarcoma Malignant fibrous histiocytoma Leiomyosarcoma Hemangiosarcoma Primitive neuroectodermal sarcoma

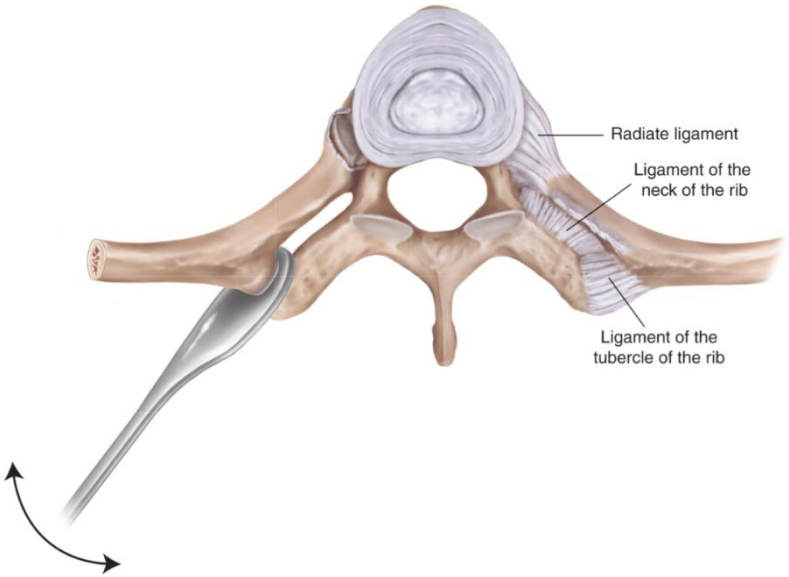
Principle of chest wall resection

- Resection
  - En bloc resection (Obtain the proper resection margin)
  - Start with the easier side to expose
- Restoration of skeletal stability
  - Normal breathing (prevent paradoxical movements)
  - Protection of intrathoracic organs
  - Restoration of physiologic volume of rib case
  - Satisfactory cosmetic results
- Soft tissue coverage

Surgical Technique







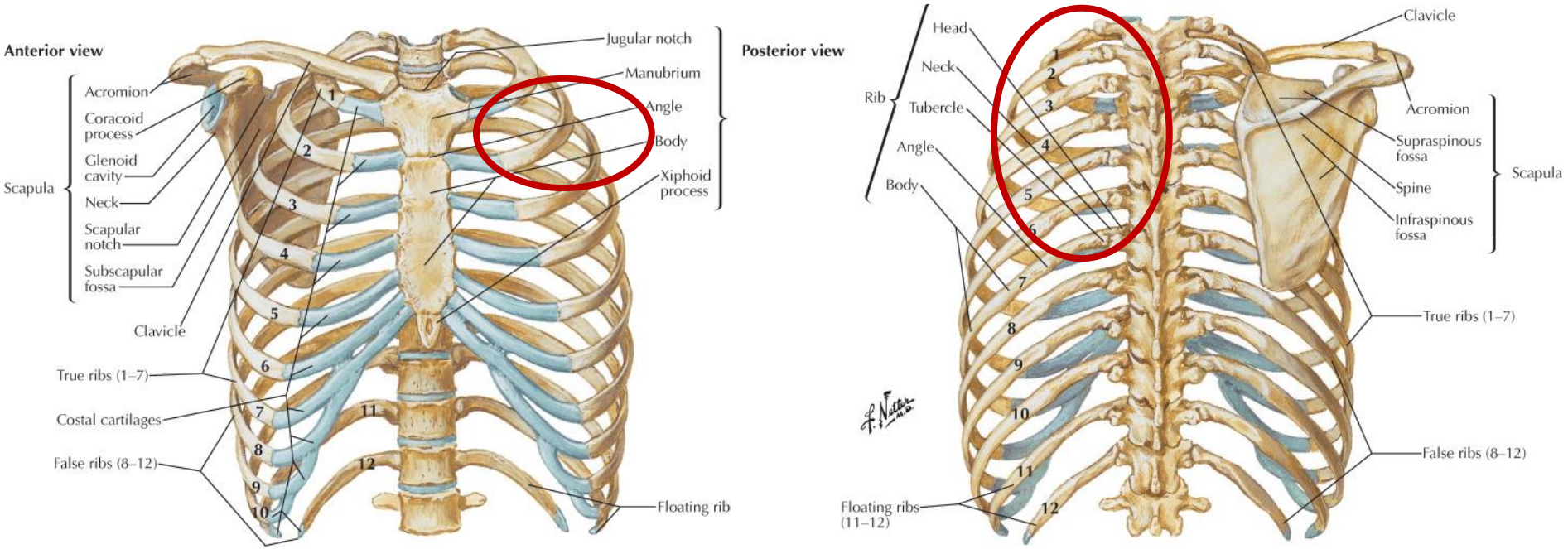
Consideration for chest wall defects

- Location
- Size
- Depth
  - Partial thickness
  - Full thickness
- Duration
- Condition of local tissue
  - Irradiation
  - Infection
  - Residual tumor
  - Scarring
- General condition of patient
  - Chemotherapy
  - Corticosteroid
  - Chronic infection
- Lifestyle and type of work
- Prognosis

Factors for Paradoxical Movements

- Size of defect
  - No absolute length
  - >5cm of two consecutive ribs
- Location of defect
  - Non-critical area; apical (1-3th ribs) or posterior area
  - Critical area; lateral, anterior, basal and SC joint

Non-critical area



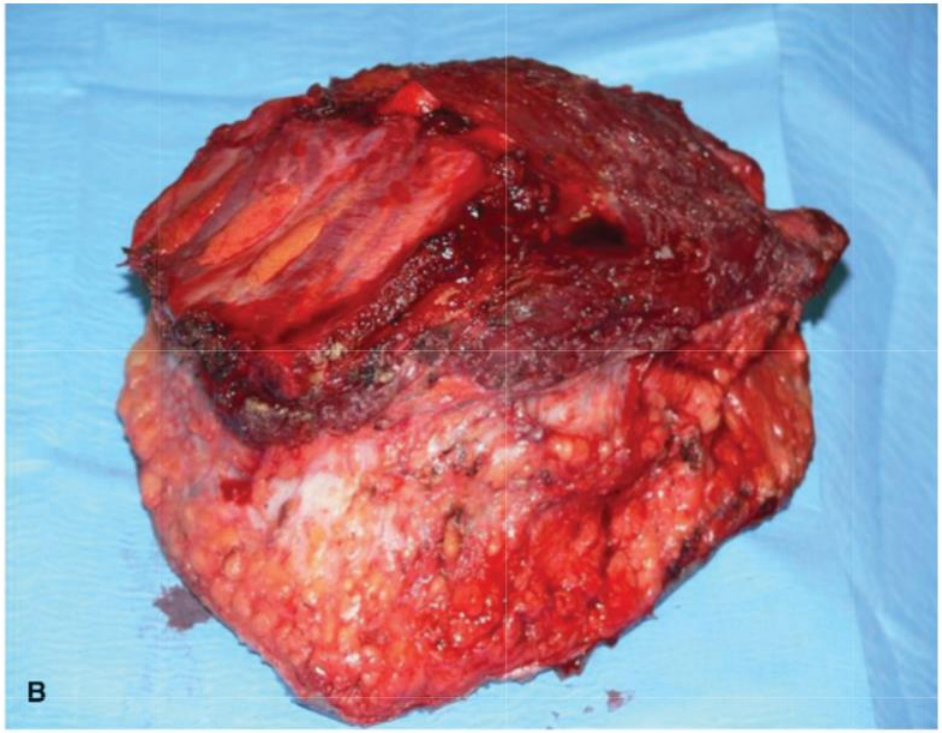
Ideal materials for reconstruction

- Strong enough to withstand physiologic stresses
- Elastic and flexible
- Light and smooth
- Incorporable into host tissue
- Solid
- Securely flexible
- Biocompatible
- Durable and not subject to deterioration over time
- Resistant to infection and radiation
- Not dangerous in case of blunt trauma
- Radiolucent and nonmagnetic
- Inexpensive
- Readily available

Alloplastic and Synthetic Materials

- Plates and Struts
  - Metal
    - Tantulum steel
    - Stainless steel
  - Other materials
  - Lucite
  - Fiberglass
- Synthetic Materials
  - Sheets and meshes
  - Polytetrafluorethylene (Teflon) sheeting and patch
  - Nylon
  - Polypropylene
  - Prolene mesh
  - Vicryl mesh
- Solid and Firm Prosthetics
  - Acrylic
  - Teflon
  - Silastic
  - Silicone
  - Composite
  - Marlex mesh combined prosthesis


A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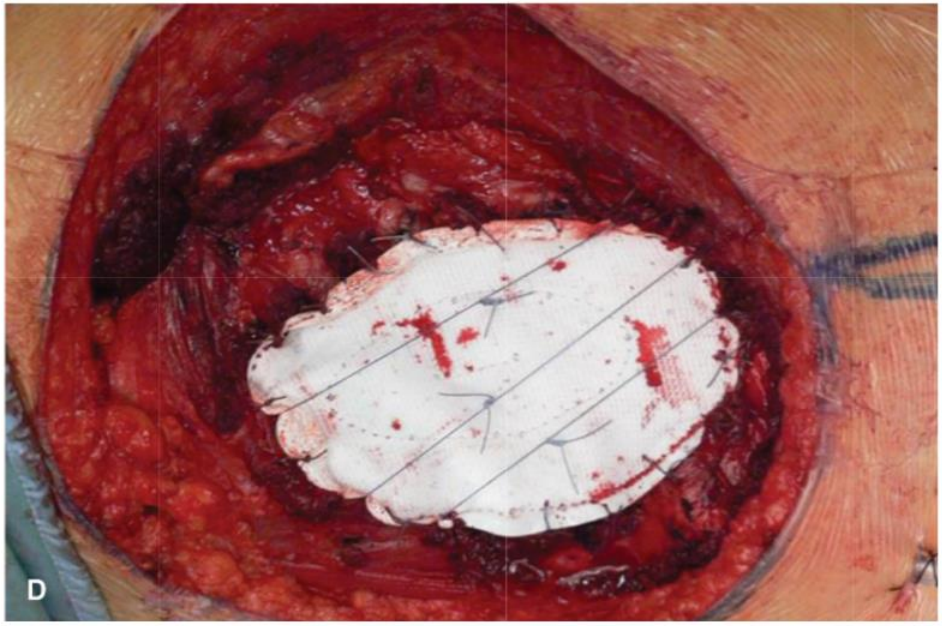
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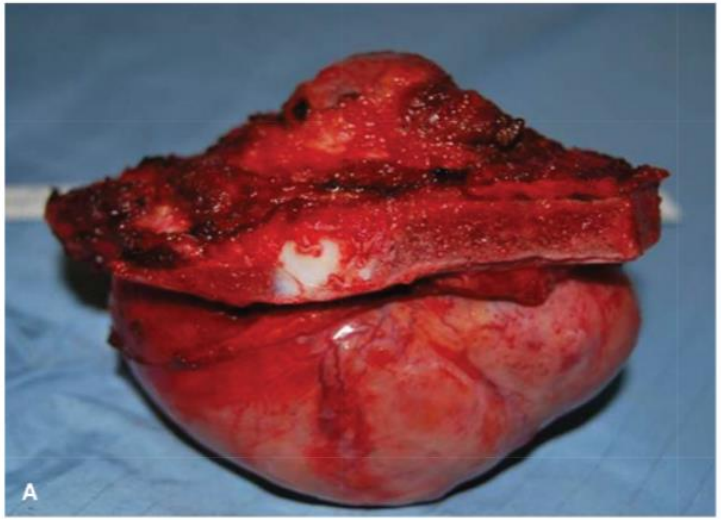
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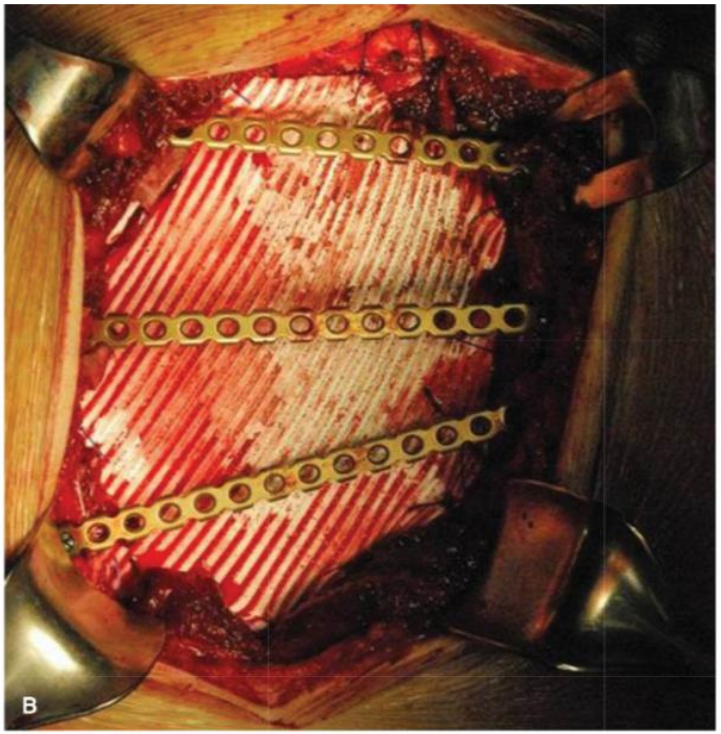
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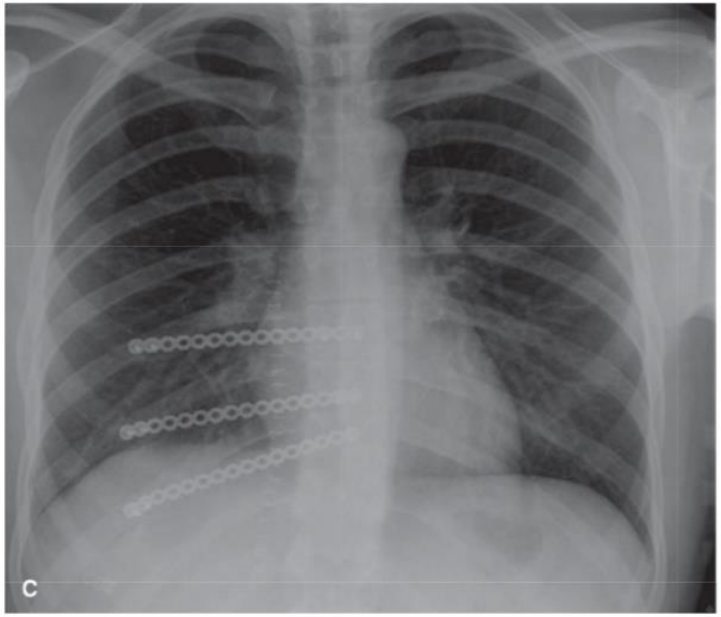
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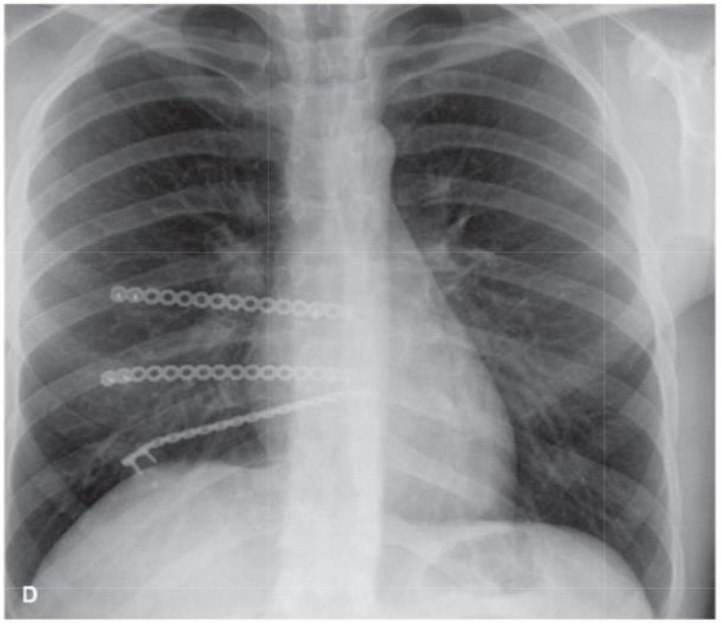
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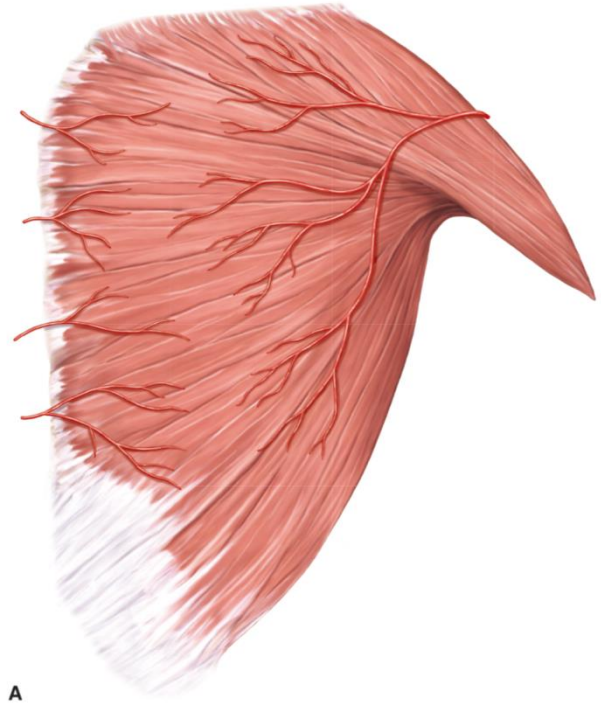
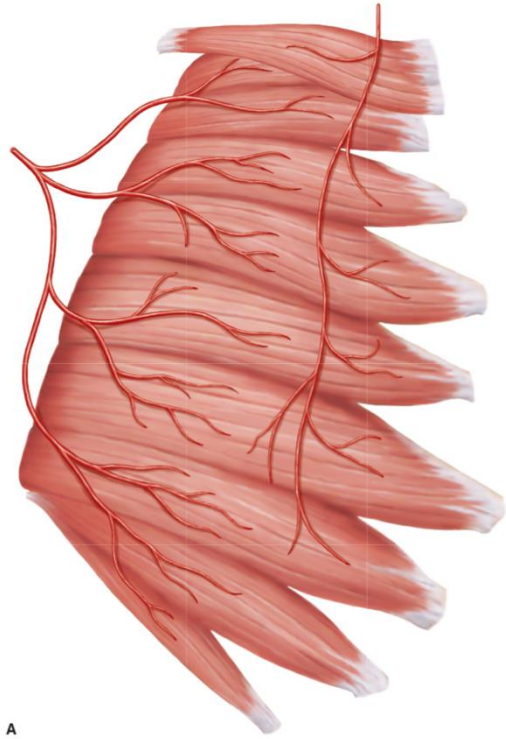
Muscle flap



Pectoralis major

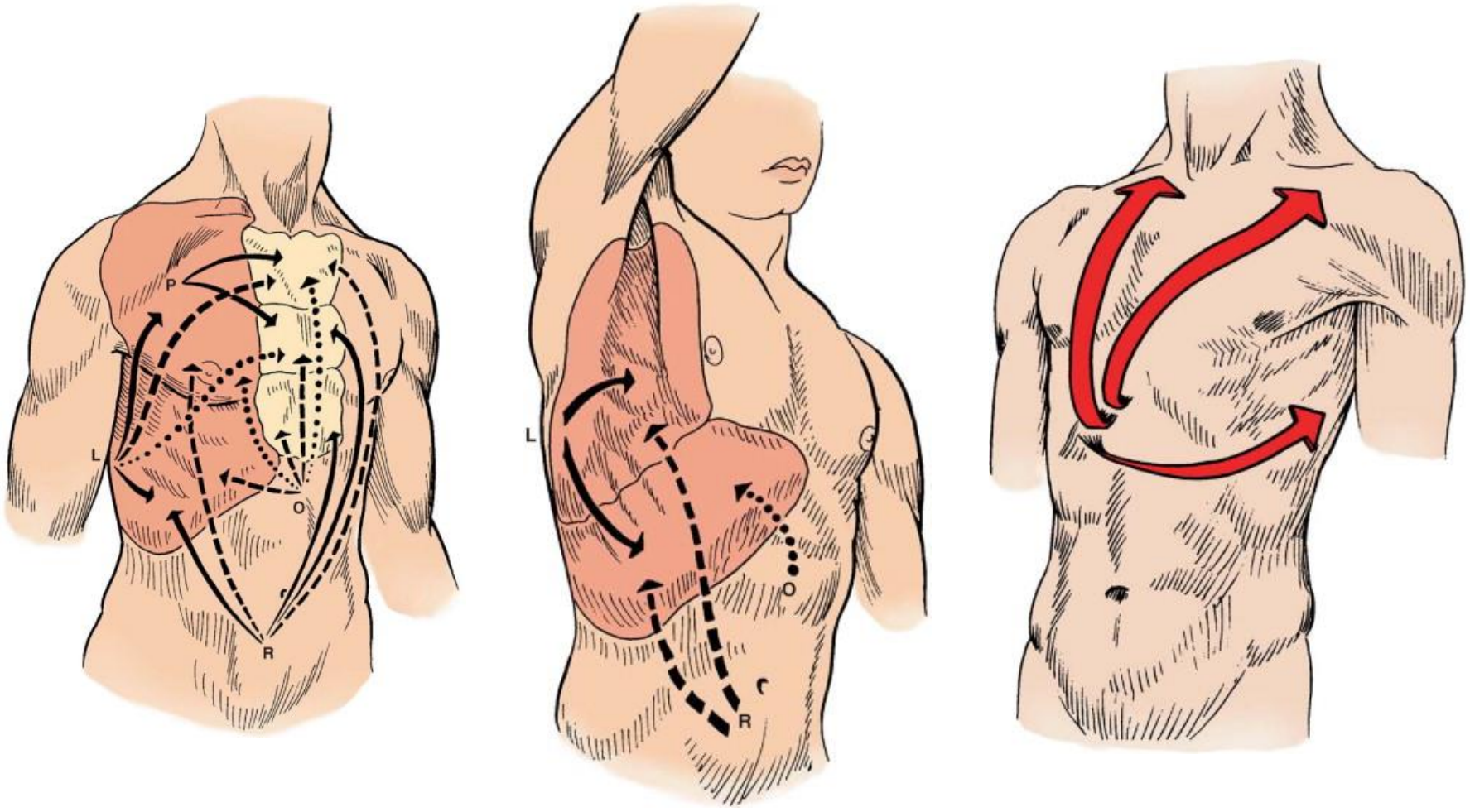
Latissmus dorsi



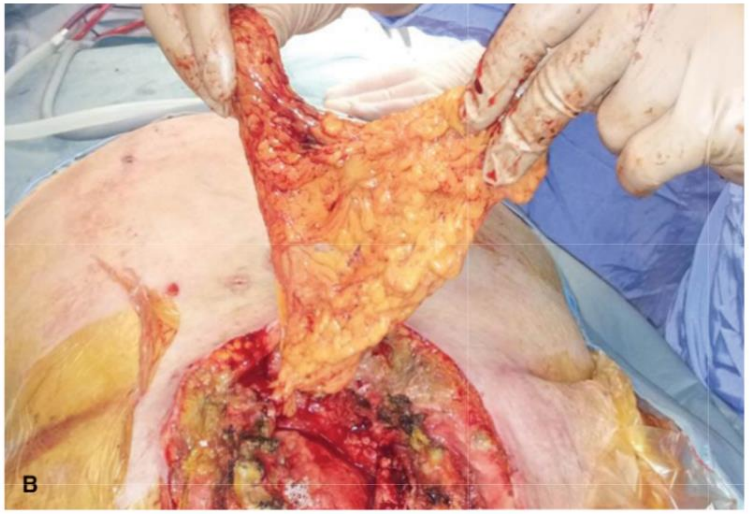
Serratus anterior

Rectus

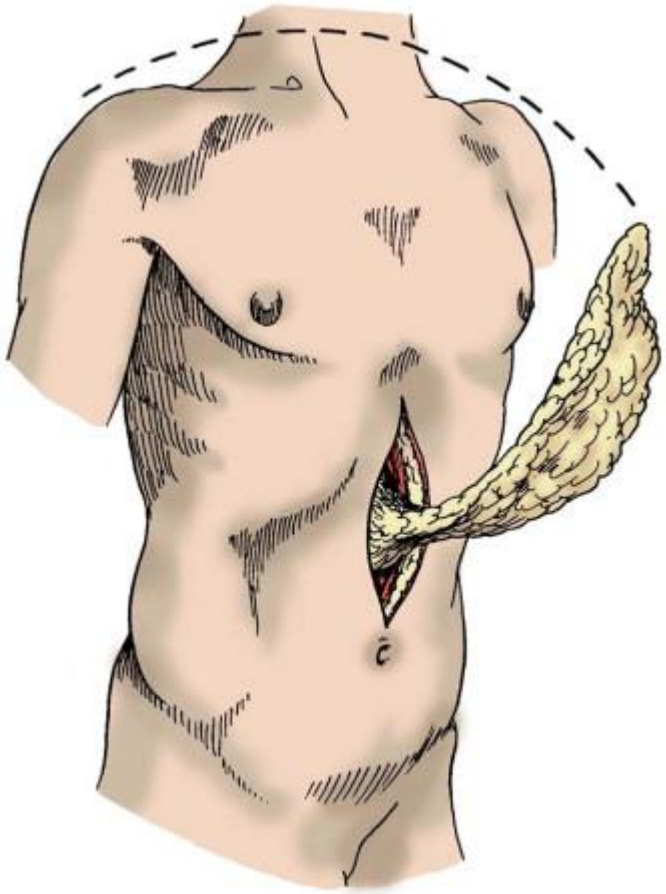
Muscle flap

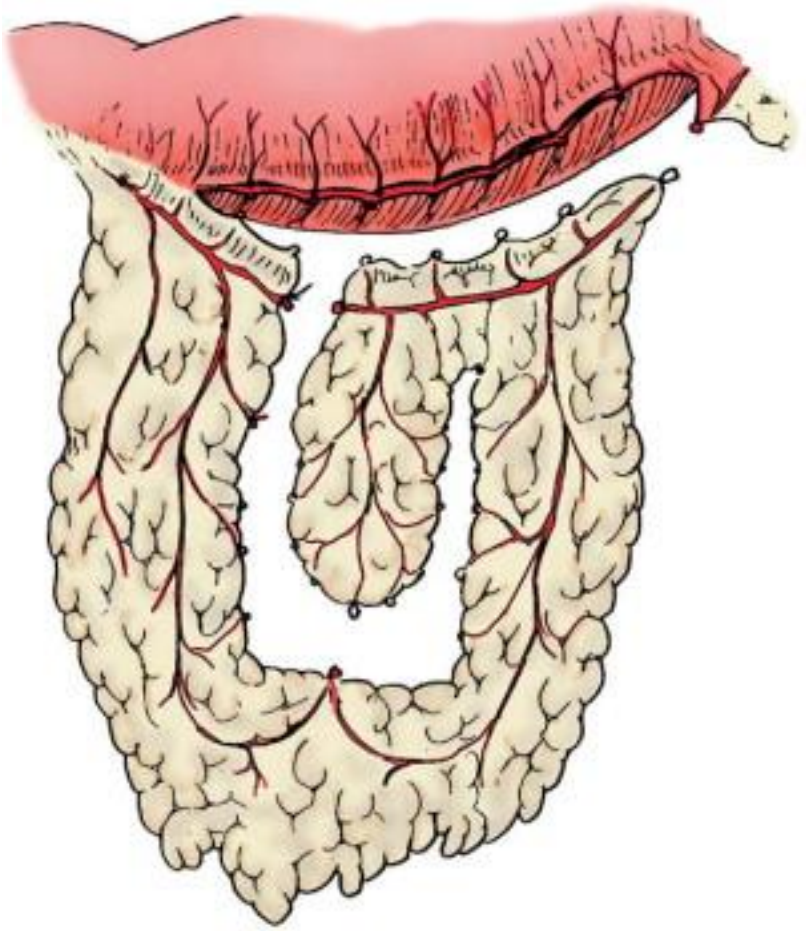


Omental flap

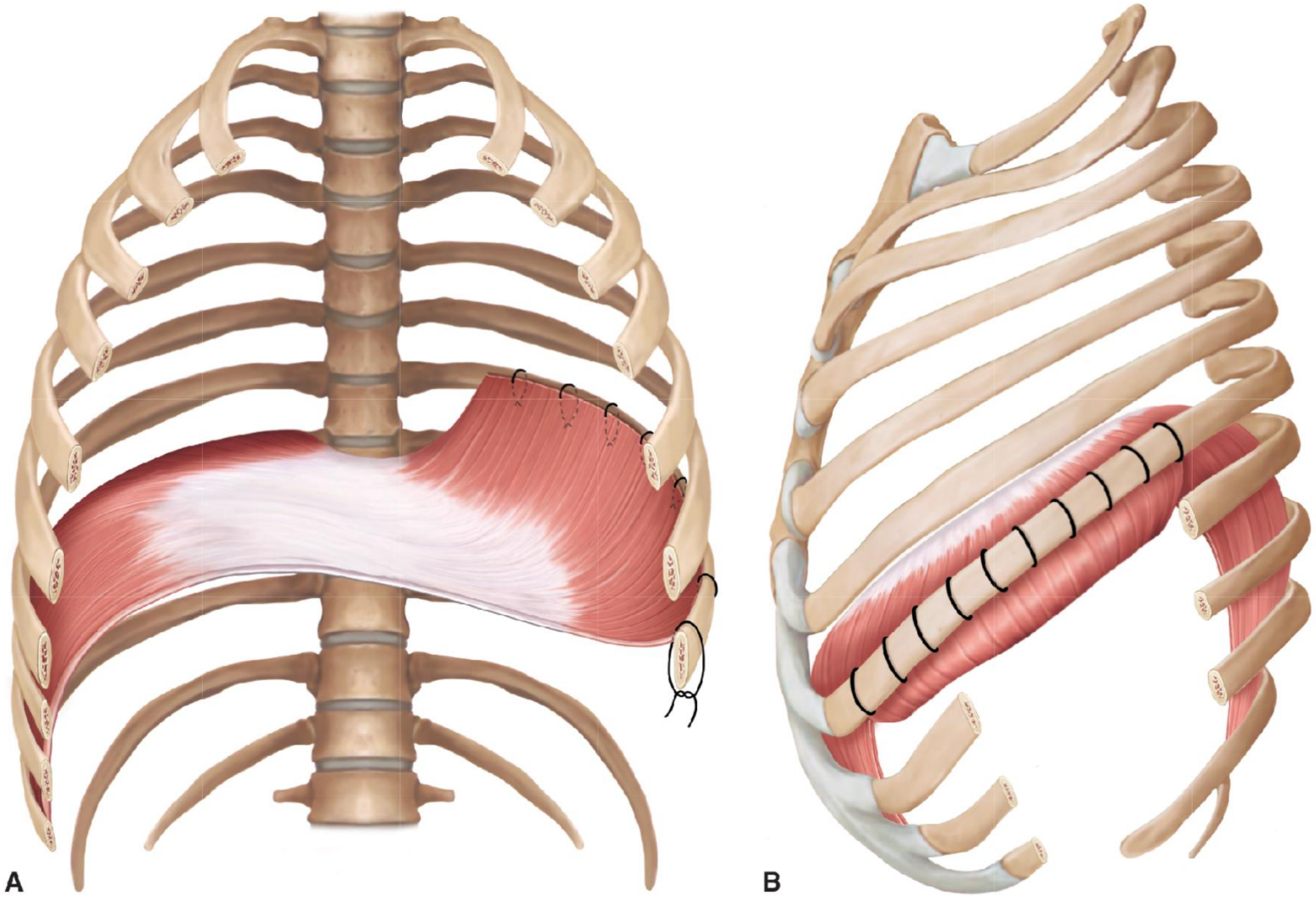


Omental flap





Lower Chest Wall Reconstruction



Thank you for attention!!!