Recent advances in surgery for esophageal cancer

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Surgery for esophageal cancer

Challenges

- High degree of technical expertise
- High risk patients
  - Elderly
  - Comorbid illness
  - Malnourished

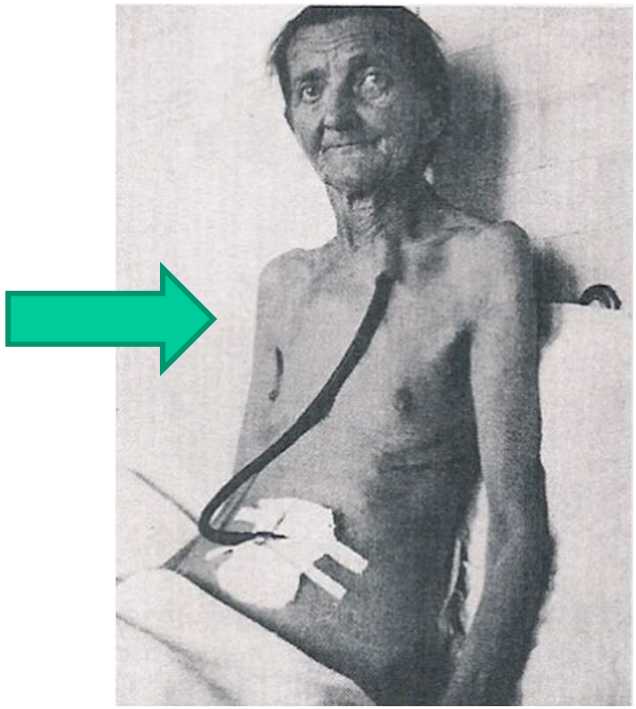
- Careful patient selection
- Optimal preoperative management

Historical aspects

- Earliest reports of esophageal surgery: removal of foreign bodies- 6th century AD
- 1st successful esophagectomy for cancer (Torrek, 1913)

Rubber tube between esophagostomy and gastrostomy

Survived 12 years



Current treatment modalities

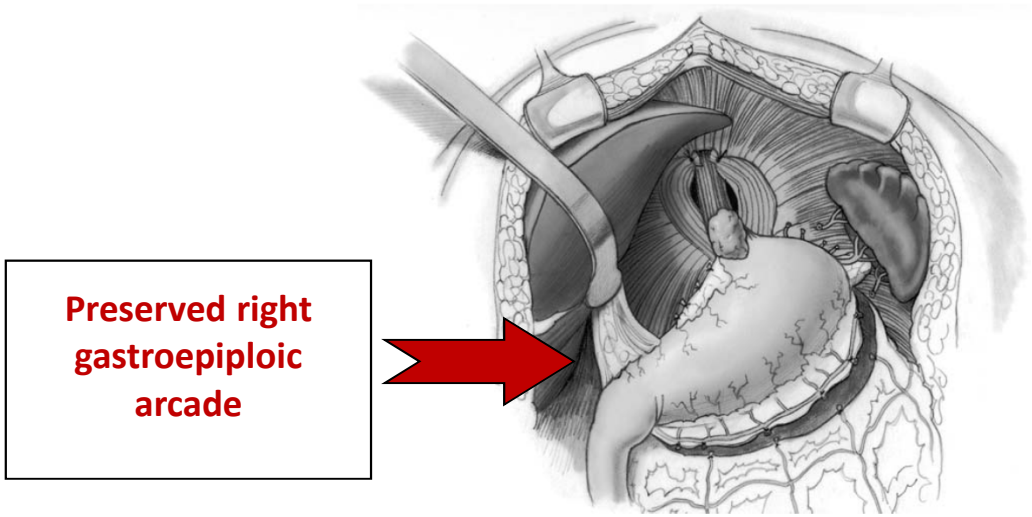
- Transthoracic/ transhiatal esophagectomy
- Radical enbloc esophagectomy
- Stage directed surgery

Transthoracic esophagectomy

- Most conventional
- Resection under direct vision
- Adequate longitudinal/ lateral clearance
- Lymph node dissection possible
- Pulmonary complications increased
- Operative time increased
- Change of position required

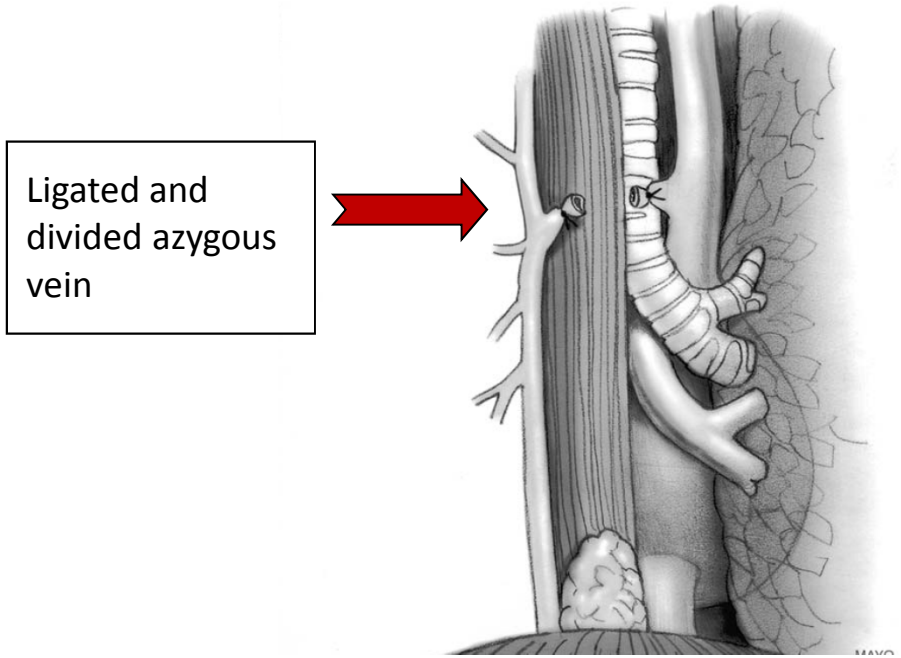
Salient technical aspects

- Abdominal incision, assessment of resectability
- Mobilization of the stomach (preserving right gastroepiploic and right gastric artery)



Salient technical aspects

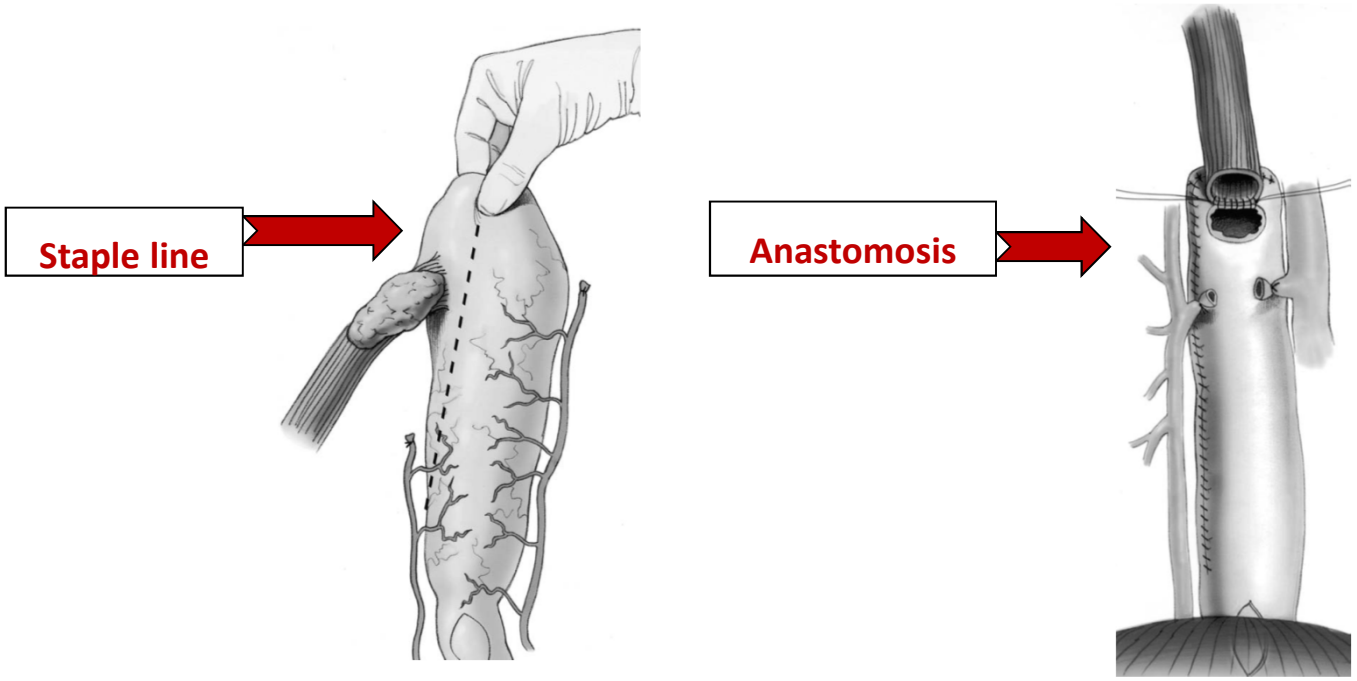
- Right thoracotomy 5th space
- Division of the azygous vein



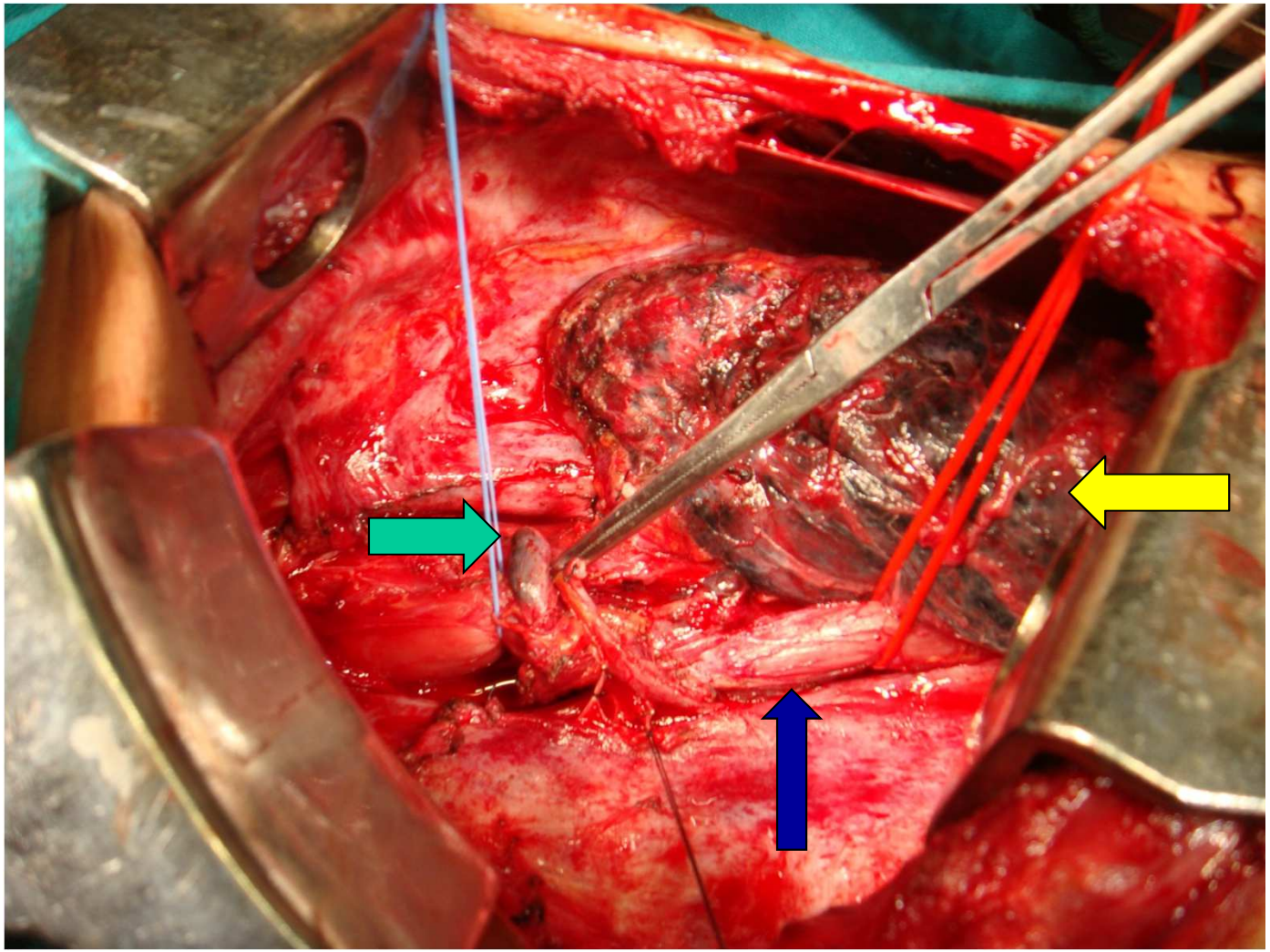
- Mobilization of the esophagus with adjacent lymph nodes and fatty tissue

Salient technical aspects

- Division of the stomach to create a gastric tube
- Mediastinal esophagogastric anastomosis



Transthoracic esophagectomy

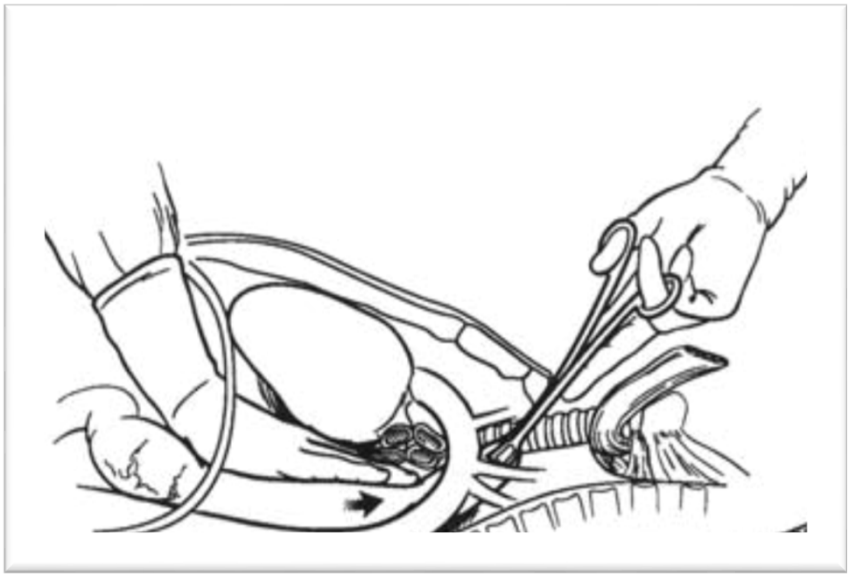


Transhiatal esophagectomy

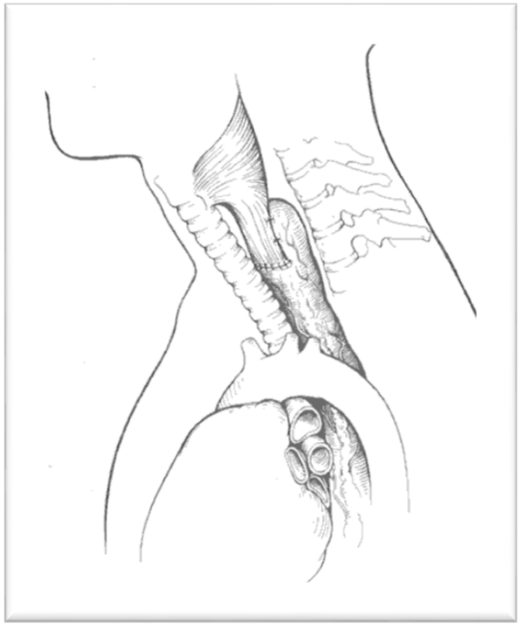
- Safe, quick, no thoracotomy
- Achieves longitudinal clearance
- Pulmonary complications less
- Lymph node dissection not possible
- Blind procedure – partly, at least

Salient technical aspects

- 3 phases
  - Abdominal phase: similar to TTE
  - Cervical phase: mobilization of the esophagus in the neck (preserve recurrent laryngeal nerve)
  - Mediastinal phase: Esophagus mobilization via dilated esophageal hiatus using sharp and blunt dissection

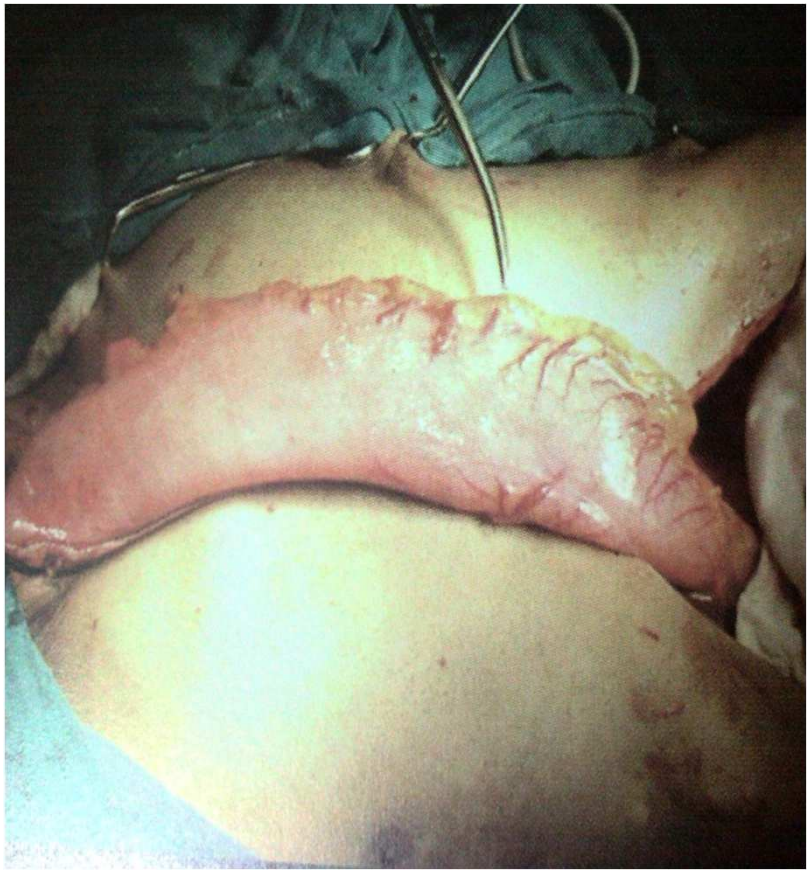


Esophageal mobilization

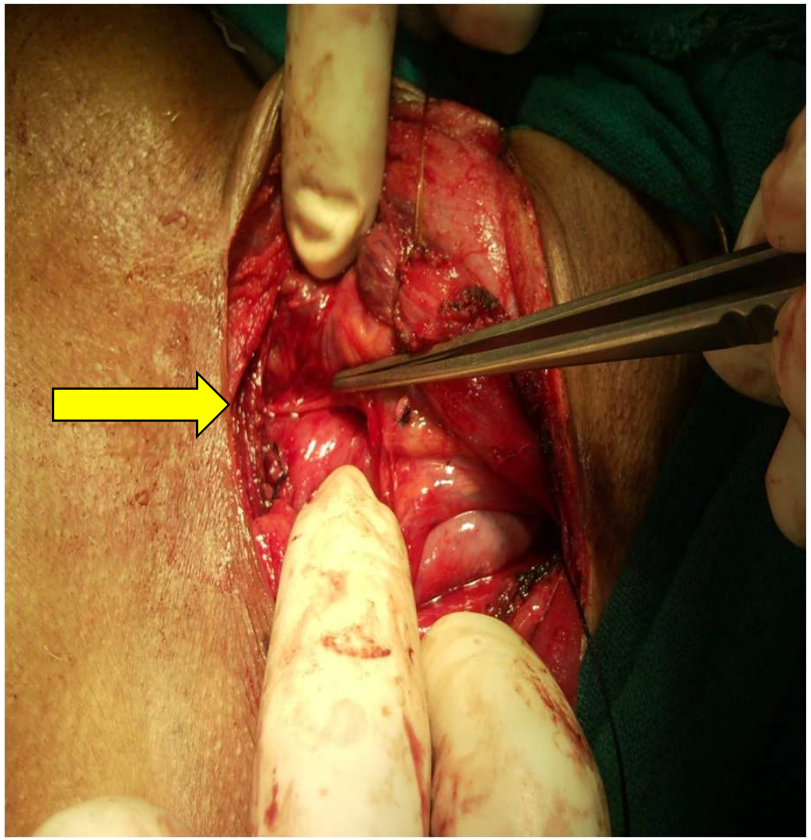


Anastomosis in the neck

Creation of a gastric tube



Cervical anastomosis at completion

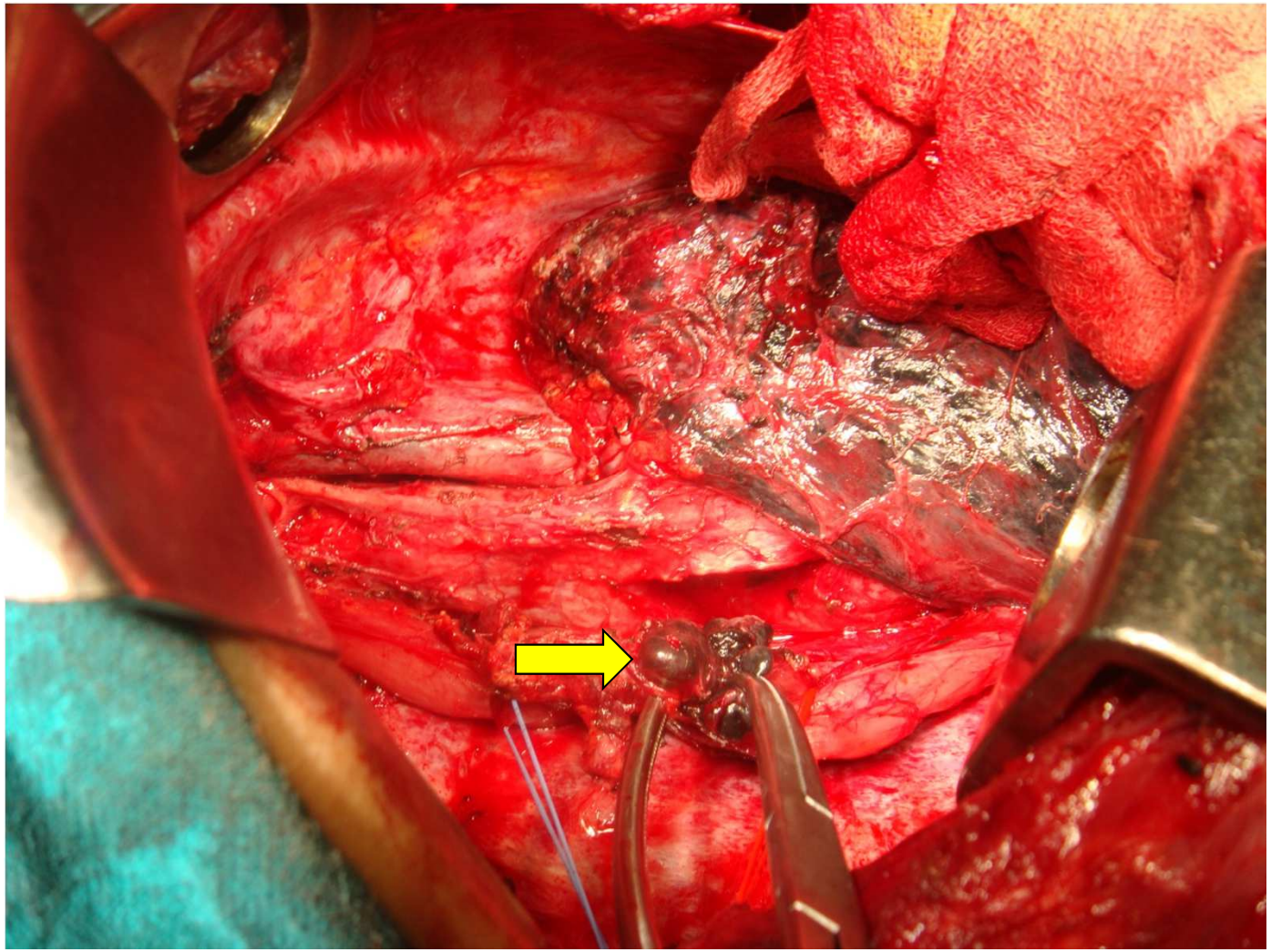


Resected esophagectomy specimen

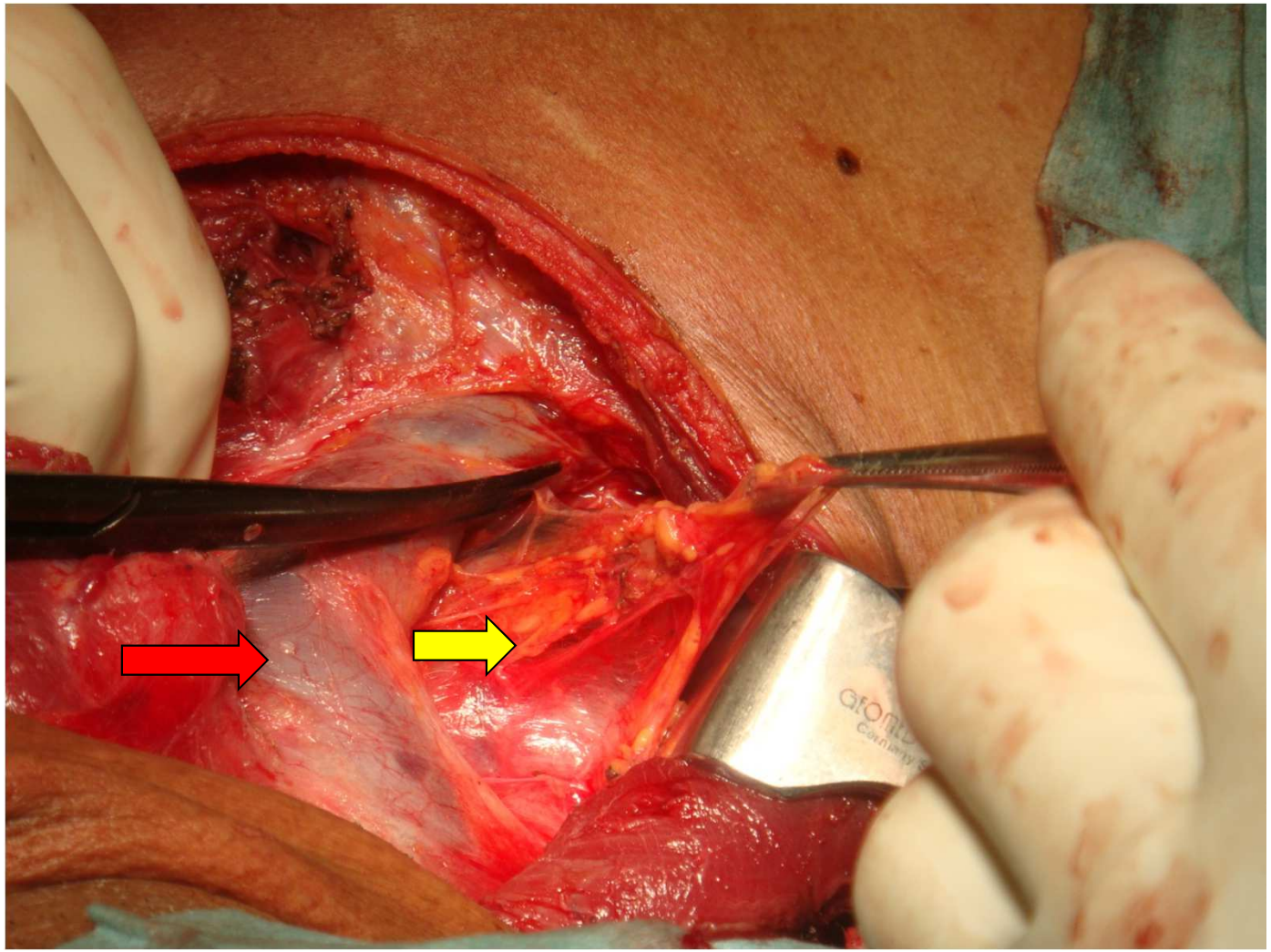
Radical esophagectomy

- Includes in addition to tumor bearing organ; pericardium, pleura, thoracic duct, lymphoareolar tissue, cuff of diaphragm, 2- or 3-field lymphadenectomy
- Two-field lymphadenectomy: nodal groups from tracheal bifurcation to celiac axis
- Three-field lymphadenectomy: Above 2 fields + excision of nodes along both the recurrent laryngeal nerves and modified cervical lymph node dissection

3-field lymphadenectomy: mediastinum

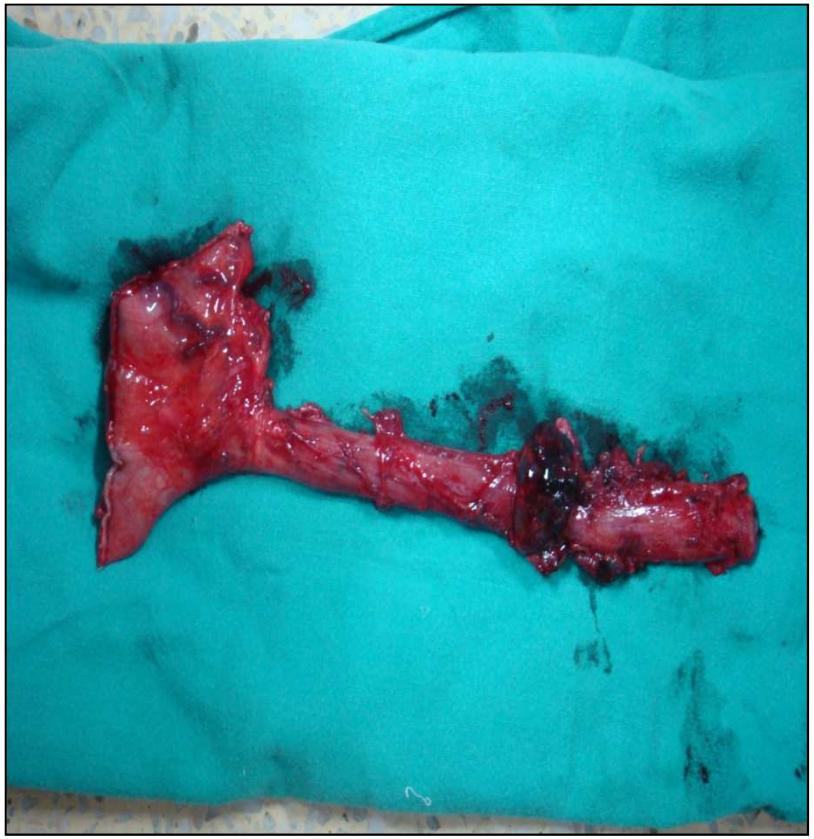


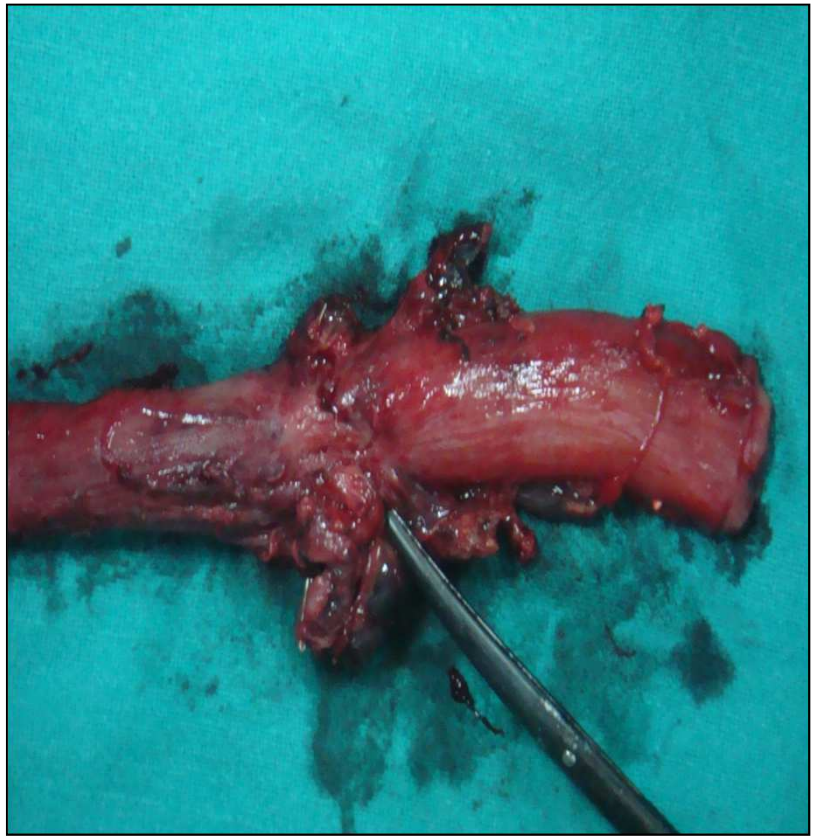
3-field lymphadenectomy: neck



At completion

Resected specimen





Radical esophagectomy

Rationale

- Conventional esophagectomy
  - Lymph node recurrence 40%
- Lymph node dissection (2 or 3 field)
  - Lymph node recurrence 10-20%

Skinner. Ann Surg, 1986

Radical lymphadenectomy

Results

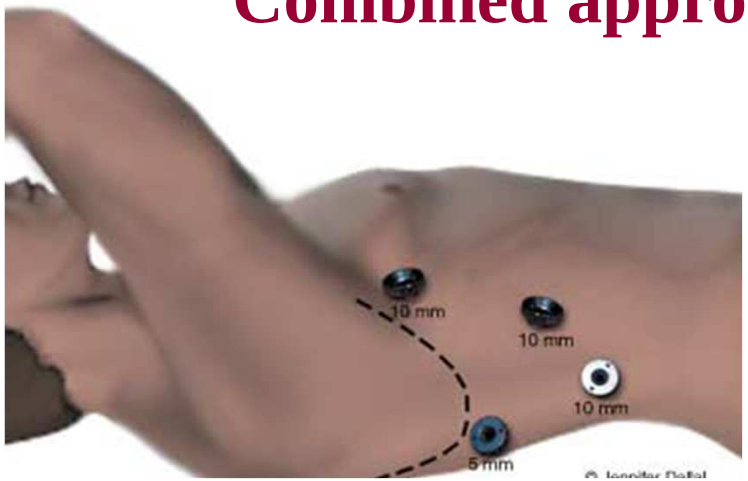
- Mortality : 3-7%
- Morbidity : 35-70%
- Survival (5 yr) : 30-40% (N_1) & 70-80%(N_0)
- Recurrent Nerve Palsy : 70%
- Quality of life: very poor
  - 20% severe hoarseness
  - 5% permanent tracheostomy
  - Poor oral intake and poor exercise tolerance

DeVita – Cancer Principles & Practice of Oncology, 2001

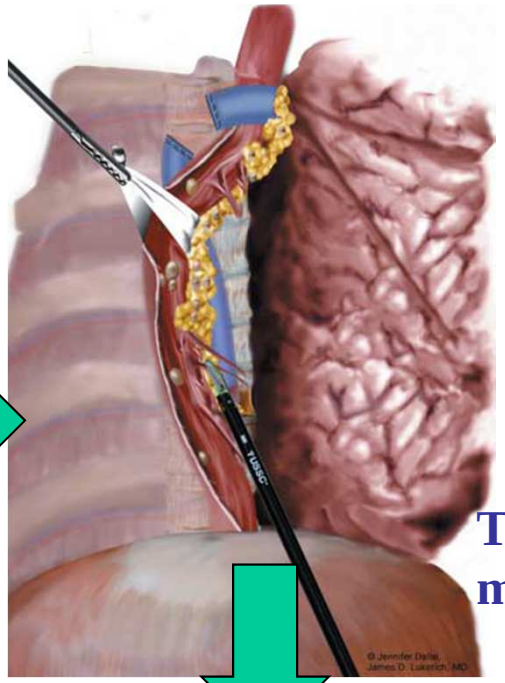
Minimally invasive esophagectomy

- Rationale
  - Decrease morbidity of open surgery
    - Pain
    - Pulmonary complications
  - Quicker return to normal function
  - Shorter hospital stay
- Approach:
  - Myriad of methods implies lack of consensus
    - Laparoscopic transhiatal
    - Thoracoscopic
    - Thoracolaparoscopic
    - Videomediastinoscopic

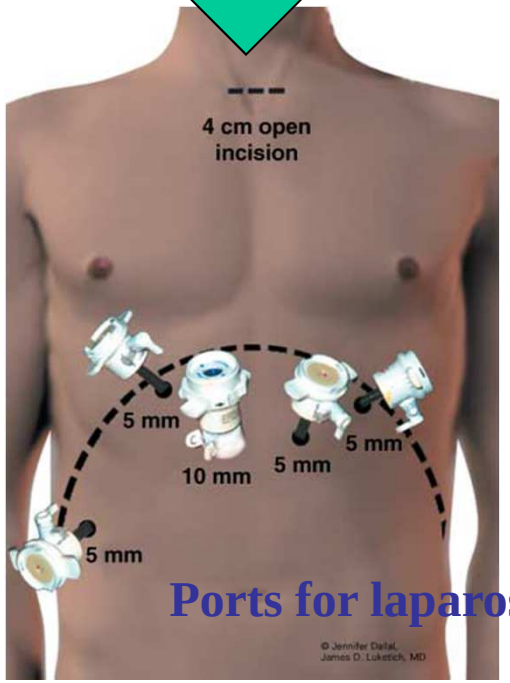
Combined approach



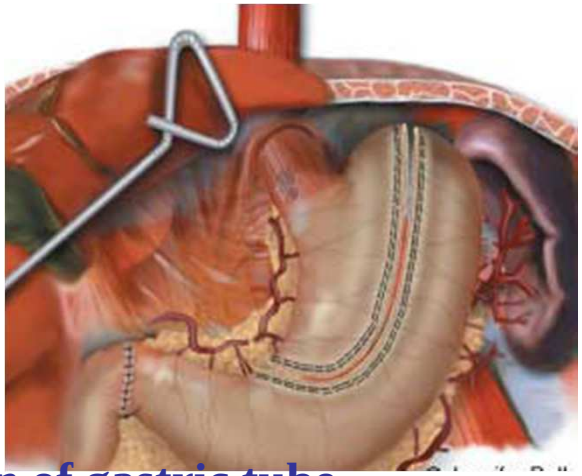
Ports for thoracoscopy



Thoracoscopic mobilization



Ports for laparoscopy



Creation of gastric tube

Minimally invasive esophagectomy (contd)

- Limitations
  - Cost
  - Steep learning curve
  - No long term follow-up studies
  - No clear proof of superiority over open

Stage directed surgery

- Rationale:
  - Depth of tumor determines nodal spread

Tumor Depth	Prevalence of lymph node metastases (%)
Intramucosal	3-6
Submucosal	20-30
Intramuscular	45-75
Transmural	80-85

DeMeester SR, 2005

Management of intramucosal tumors

- Conventional surgery: massive morbid solution for microscopic mucosal problem
- Endoscopic mucosal resection
  - Excision of disc of esophageal wall till M. propria
  - Staging tool
  - Therapeutic role
  - Indications
    - High grade dysplasia
    - Intramucosal cancers
  - Limitations: multifocal tumor

Vagal sparing esophagectomy

- First advocated by Akiyama *et al*
- Indications
  - Intramucosal tumors with no L.N.s
- Contraindications
  - Submucosal tumor
  - Prior vagal transection
- Preoperative requisite
  - EMR
  - EUS (for L.N.s)

- Technique
  - No mediastinal or transhiatal dissection
  - Esophageal stripping
  - HSV from antrum to distal esophagus

Stage directed surgery

Results

Stage	Survival	Treatment
Stage 0	100%	Endoscopic Rx
Stage I & IIa	80%	Esophagectomy
Stage IIb & III	10%	Surgery ± CT/RT

Lightdale. Am J Gastro, 1999

Carcinoma esophagus

AIIMS experience

- Total esophageal surgery : 1025 cases
- Total esophageal cancer : 763 cases
- Squamous Cell Carcinoma: 615 cases
- Adenocarcinoma : 148 cases
- Operative Mortality : 9%
- Survival
  - 1year : 70%
  - 5 year : 25%

Carcinoma esophagus

	PGI'96	AIIMS'02
• Resectability	100%	81%
• Mortality	6%	12%
• Complications	50%	20%
• 5-year survival	5%	38%

NM Gupta et al *Eur J Surg, 1996*

Rao et al Am J Surg, 2002

Conclusion

- Esophageal cancer is a lethal disease
- Aim of treatment
  - Symptomatic relief
  - Prolong life
- Surgery continues to be mainstay of Rx
- Combined modality treatment
  - May improve survival
- Stage directed surgery - ? the answer