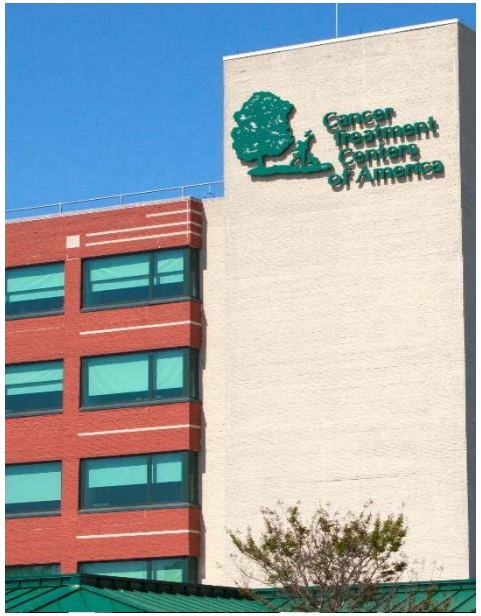
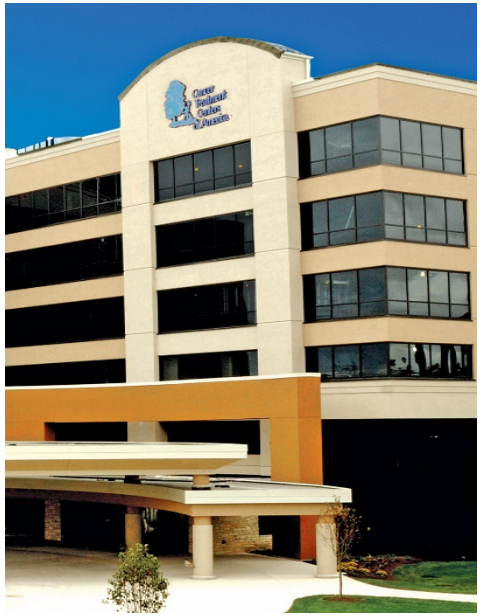
Determining Resectability and Appropriate Surgery for Esophageal Cancer






Peter Baik, DO, FACOS

Thoracic Surgery

Cancer Treatment Centers of America

1 Learning Objective

Identify esophageal cancer patients who are candidates for surgical resection and describe preoperative patient optimization (base on cancer type, location, stage, anatomical resectability, and comorbidities) bases on NCCN and STS recommendations.

2 Learning Objective

Compare and contrast the surgical and oncological outcomes between the different types of esophageal cancer surgery (transhiatal, Ivor Lewis, 3 hole, open, minimally invasive)

3 Learning Objective

Discuss surgical decision making regarding resection following neoadjuvant therapy vs salvage esophagectomy

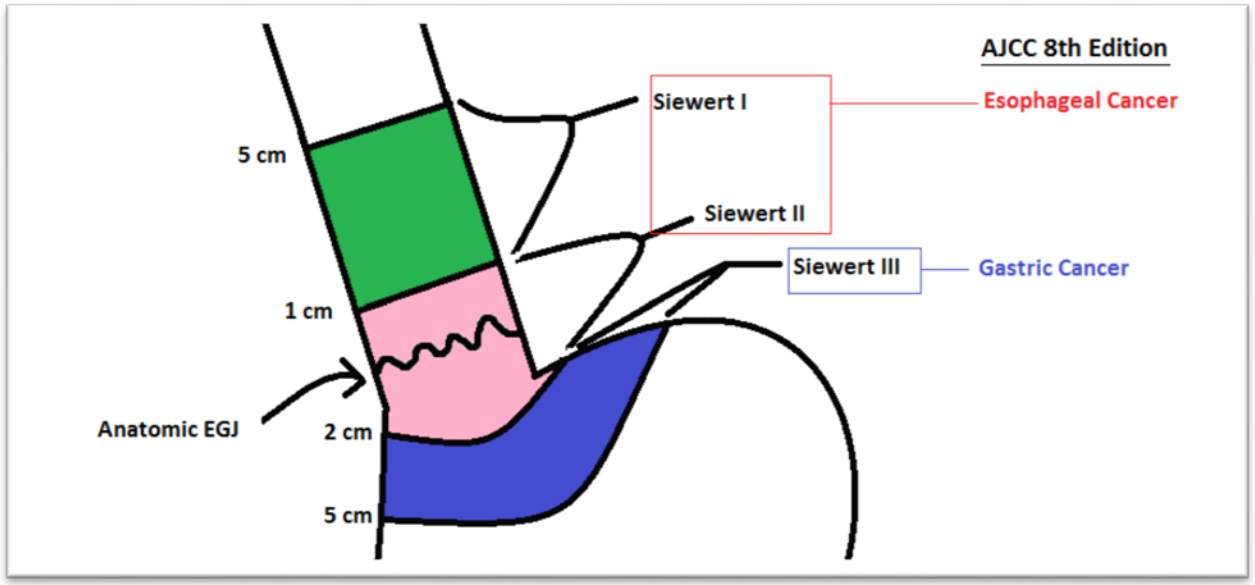
4 Learning Objective

Describe surgical tips that can be employed while operating in a radiated field

Source:

Esophageal and Esophagogastric Junction Cancers

- Siewert classification of esophagogastric junction (EGJ) adenocarcinoma
  - Type I: 1cm – 5cm above anatomic EGJ
  - Type II: 1cm above and 2cm below anatomic EGJ (true carcinoma of the cardia)
  - Type III: 2cm – 5cm below EGJ, can infiltrate the EGJ and lower esophagus from below (subcardial gastric carcinoma)



Source: The AJCC Cancer Staging Manual, 8th Ed. 2017.

Esophagectomy

- Life changing event:

  - Head of bed >30 degrees
  - Soft diet
  - Small frequent meals
  - Need to drink water while eating
  - At least 2 hours after last meal before going to bed
  - Walk after eating meals
  - May take a year or more before able to eat steak (still needs to be chewed really well)

Source:

Candidacy for Esophagectomy

*** Multidisciplinary Care ***

NCCN Guidelines – Version 2, 2017.

- Esophagectomy as the first line therapy can be considered for:
    - Adenocarcinoma
        - Tis to T1bN0M0
    - Squamous Cell Cancer
        - Tis to T1bN0M0
        - T2N0M0 – only if low risk lesions(<2cm, well differentiated)
- pTis: Endoscopic mucosal resection (EMR), ablation, or esophagectomy
- pT1a: EMR, EMR after ablation, or esophagectomy
- Superficial pT1b: EMR after ablation, or esophagectomy

Source:

Candidacy for Esophagectomy, cont…

NCCN Guidelines – Version 2, 2017.

- T1bN0M0 – T4aNxM0: After neoadjuvant chemotherapy or chemoradiation, esophagectomy can be considered
- Multi-station lymphatic involvement: relative contraindication
- <u>Unresectable tumors:</u>
    - Involving the heart, great vessels, trachea, adjacent organs (liver, pancreas, spleen)
    - Multi-station, bulky lymphadenopathy
    - Supraclavicular nodal involvement
    - Non-regional nodal disease
    - Metastatic disease

Source:

Candidacy for Esophagectomy, cont…

The Society of Thoracic Surgeons, Guidelines on Multimodality Treatment for cancer of the esophageal and gastroesophageal junction. 2014

- Multidisciplinary management

- After neoadjuvant therapy, restaging needs to be performed -> PET/CT

- Neoadjuvant chemoradiation or chemotherapy if adenocarcinoma

- Neoadjuvant chemoradiation if squamous cell cancer

Source:

Pre-operative Optimization

- Nutritional Status
- Prealbumin
- Albumin
- Total psoas muscle area

- Nutritional Support
- Jejunostomy
- Nutritional supplementation (Ensure, Boost)
- Treatment of dysphagia: RT, brachytherapy, cryoablation
- Self-expanding covered stent: - short-term

Source:

Pre-operative Optimization

Enhanced Recovery After Surgery (ERAS)

www.erassociety.org

- 2001, in Europe
- Multidisciplinary approach
- Preoperative counseling on anesthesia, procedure, expectations
- Optimizing pre-operative comorbidities
- Nutrition/Dietitian evaluation
- Smoking cessation at least 4 weeks preop
- Alcohol cessation at least 4 weeks preop
- Avoid starvation: Solids up to 6 hours prior to surgery
    - Clears up to 2 hours prior to surgery
- Physical therapy evaluation
- Mind/Body Medicine

794 U.O. Gustafsson et al. / Clinical Nutrition 31 (2012) 783–800

Table 1
Guidelines for perioperative care in elective colonic surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations.

Item	Recommendation	Evidence level	Recommendation grade
Preoperative information, education and counselling	Patients should routinely receive dedicated preoperative counselling.	Low	Strong
Preoperative optimisation	Preoperative medical optimisation is necessary before surgery. Smoking and alcohol consumption (alcohol abusers) should be stopped four weeks before surgery.	*Alcohol*: Low *Smoking*: High	Strong
Preoperative bowel preparation	Mechanical bowel preparation should not be used routinely in colonic surgery.	High	Strong
Preoperative fasting and carbohydrate treatment	Clear fluids should be allowed up to 2 h and solids up to 6 h prior to induction of anaesthesia. Preoperative oral carbohydrate treatment should be used routinely. In diabetic patients carbohydrate treatment can be given along with the diabetic medication.	*Solids and fluids*: Moderate *Carbohydrate loading, overall*: Low *Carbohydrate loading, diabetic patients*: Very low	*Fasting guidelines*: Strong *Preoperative carbohydrate drinks*: Strong *Preoperative carbohydrate drinks, diabetic patients*: Weak
Preanaesthetic medication	Patients should not routinely receive long- or short-acting sedative medication before surgery because it delays immediate postoperative recovery.	High	Strong
Prophylaxis against thromboembolism	Patients should wear well-fitting compression stockings, have intermittent pneumatic compression, and receive pharmacological prophylaxis with LMWH. Extended prophylaxis for 28 days should be given to patients with colorectal cancer.	High	Strong
Antimicrobial prophylaxis and skin preparation	Routine prophylaxis using intravenous antibiotics should be given 30–60 min before initiating surgery. Additional doses should be given during prolonged operations according to half-life of the drug used. Preparation with chlorhexidine-alcohol should be used.	High	Strong
Standard anaesthetic protocol	A standard anaesthetic protocol allowing rapid awakening should be given. The anaesthetist should control fluid therapy, analgesia and haemodynamic changes to reduce the metabolic stress response. *Open surgery*: mid-thoracic epidural blocks using local anaesthetics and low-dose opioids. *Laparoscopic surgery*: spinal analgesia or morphine PCA is an alternative to epidural anesthesia.	*Rapid awakening*: Low *Reduce stress response*: Moderate *Open surgery*: High *Laparoscopic surgery*: Moderate	Strong
PONV	A multimodal approach to PONV prophylaxis should be adopted in all patients with ≥2 risk factors undergoing major colorectal surgery. If PONV is present, treatment should be given using a multimodal approach.	Low	Strong
Laparoscopy and modifications of surgical access	Laparoscopic surgery for colonic resections is recommended if the expertise is available.	*Oncology*: High *Morbidity*: Low *Recovery/LOSH*: Moderate	Strong
Nasogastric intubation	Postoperative nasogastric tubes should not be used routinely. Nasogastric tubes inserted during surgery should be removed before reversal of anaesthesia.	High	Strong
Preventing intraoperative hypothermia	Intraoperative maintenance of normothermia with a suitable warming device and warmed intravenous fluids should be used routinely to keep body temperature >36 °C.	High	Strong
Perioperative fluid management	Patients should receive intraoperative fluids (colloids and crystalloids) guided by flow measurements to optimise cardiac output. Vasopressors should be considered for intra- and postoperative management of epidural-induced hypotension provided the patient is normovolaemic. The enteral route for fluid postoperatively should be used as early as possible, and intravenous fluids should be discontinued as soon as is practicable.	*Balanced crystalloids*: High *Flow measurement in open surgery*: High *Flow measurement in other patients*: Moderate *Vasopressors*: High *Early enteral route*: High	Strong
Drainage of peritoneal cavity after colonic anastomosis	Routine drainage is discouraged because it is an unsupported intervention that is likely to impair mobilisation.	High	Strong

Source:

Esophagectomies

Hospital Volume and Surgical Mortality in the United States

John D. Birkmeyer, M.D., Andrea E. Siewers, M.P.H., Emily V.A. Finlayson, M.D., Therese A. Stukel, Ph.D., F. Lee Lucas, Ph.D., Ida Batista, B.A., H. Gilbert Welch, M.D., M.P.H., and David E. Wennberg, M.D., M.P.H.

N Engl J Med 2002; 346:1128-1137 | April 11, 2002 | DOI: 10.1056/NEJMsa012337

TABLE 3. OPERATIVE MORTALITY RATES AND THEIR ASSOCIATION WITH HOSPITAL VOLUME.*

Colectomy					
Observed mortality rate (%)	7.4	6.9	6.4	6.1	5.4
Unadjusted odds ratio (95% CI)	1.0	0.93 (0.88–0.98)	0.86 (0.81–0.90)	0.81 (0.77–0.86)	0.73 (0.68–0.77)
Adjusted odds ratio (95% CI)	1.0	0.98 (0.93–1.03)	0.89 (0.84–0.94)	0.89 (0.84–0.93)	0.80 (0.76–0.85)
Gastrectomy					
Observed mortality rate (%)	13.0	12.7	11.1	11.3	8.7
Unadjusted odds ratio (95% CI)	1.0	0.98 (0.88–1.10)	0.84 (0.75–0.93)	0.85 (0.76–0.96)	0.64 (0.55–0.74)
Adjusted odds ratio (95% CI)	1.0	1.01 (0.90–1.13)	0.88 (0.79–0.99)	0.90 (0.80–1.01)	0.72 (0.63–0.83)
Esophagectomy					
Observed mortality rate (%)	23.1	18.9	16.9	11.7	8.1
Unadjusted odds ratio (95% CI)	1.0	0.78 (0.63–0.95)	0.68 (0.54–0.86)	0.44 (0.35–0.55)	0.29 (0.21–0.40)
Adjusted odds ratio (95% CI)	1.0	0.85 (0.69–1.05)	0.76 (0.60–0.97)	0.51 (0.40–0.64)	0.36 (0.26–0.50)
Pancreatic resection					
Observed mortality rate (%)	17.6	15.4	11.6	7.5	3.8
Unadjusted odds ratio (95% CI)	1.0	0.85 (0.72–1.01)	0.62 (0.50–0.76)	0.38 (0.31–0.47)	0.18 (0.13–0.26)
Adjusted odds ratio (95% CI)	1.0	0.88 (0.74–1.05)	0.64 (0.51–0.79)	0.40 (0.32–0.50)	0.20 (0.14–0.29)

Source:

Esophagectomies

Effect of Hospital Volume on In-hospital Morbidity and Mortality Following Pancreatic Surgery in Germany

Christian Krautz, MD, Ulrike Nimptsch, MPH,† Georg F. Weber, MD, PhD,* Thomas Mansky, MD, PhD,† and Robert Grützmann, MD, MBA, PhD**

TABLE 3. Complications and Interventions Required for Complications and Length of Stay, According to Hospital Volume Quintiles

		Hospital Volume Quintiles				
		Very Low	**Low**	**Medium**	**High**	**Very High**
Postoperative Complications						
Stroke or AMI or PE	N (%)	354 (2.9)	327 (2.7)	375 (3.1)	396 (3.3)	437 (3.6)
Peritonitis or septicaemia	N (%)	2439 (20.1)	2171 (17.9)	2014 (16.6)	1993 (16.4)	2105 (17.1)
Interventions required for complications						
Blood transfusions (≥6)*	N (%)	2457 (20.3)	2146 (17.7)	2062 (17.0)	2027 (16.7)	1905 (15.5)
Mechanical ventilation (>48 h)	N (%)	2036 (16.8)	1628 (13.4)	1461 (12.1)	1465 (12.1)	1226 (10.0)
Re-laparatomy	N (%)	575 (4.7)	485 (4.0)	442 (3.6)	455 (3.7)	356 (2.9)
Rescue pancreatectomy†	N (%)	207 (1.7)	220 (1.8)	227 (1.9)	244 (2.0)	288 (2.3)
Length of stay (d)	Median (IQR)	25 (17–36)	24 (17–35)	23 (16–34)	21 (15–31)	20 (14–30)

*Patients with rescue pancreatectomy excluded.
†Among patients with primary partial pancreatectomy.
AMI indicates acute myocardial infarction; IQR, interquartile range; PE, pulmonary embolism.

Failure to Rescue

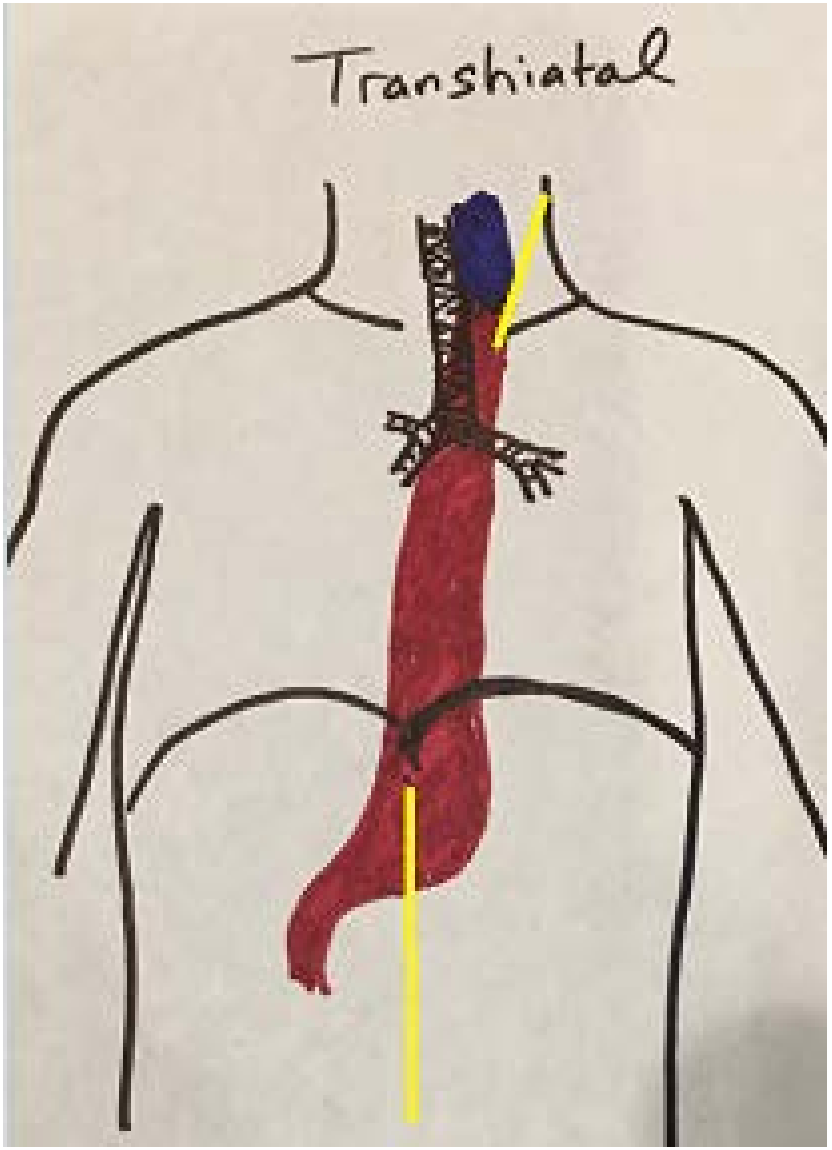
Source:

Comparison of esophagectomies

- Ivor-Lewis
- McKeown (three-field)
- Transhiatal
- Minimally invasive
- Hybrid
- Substernal
- Left thoracoabdominal

Source:

Types of esophagectomy



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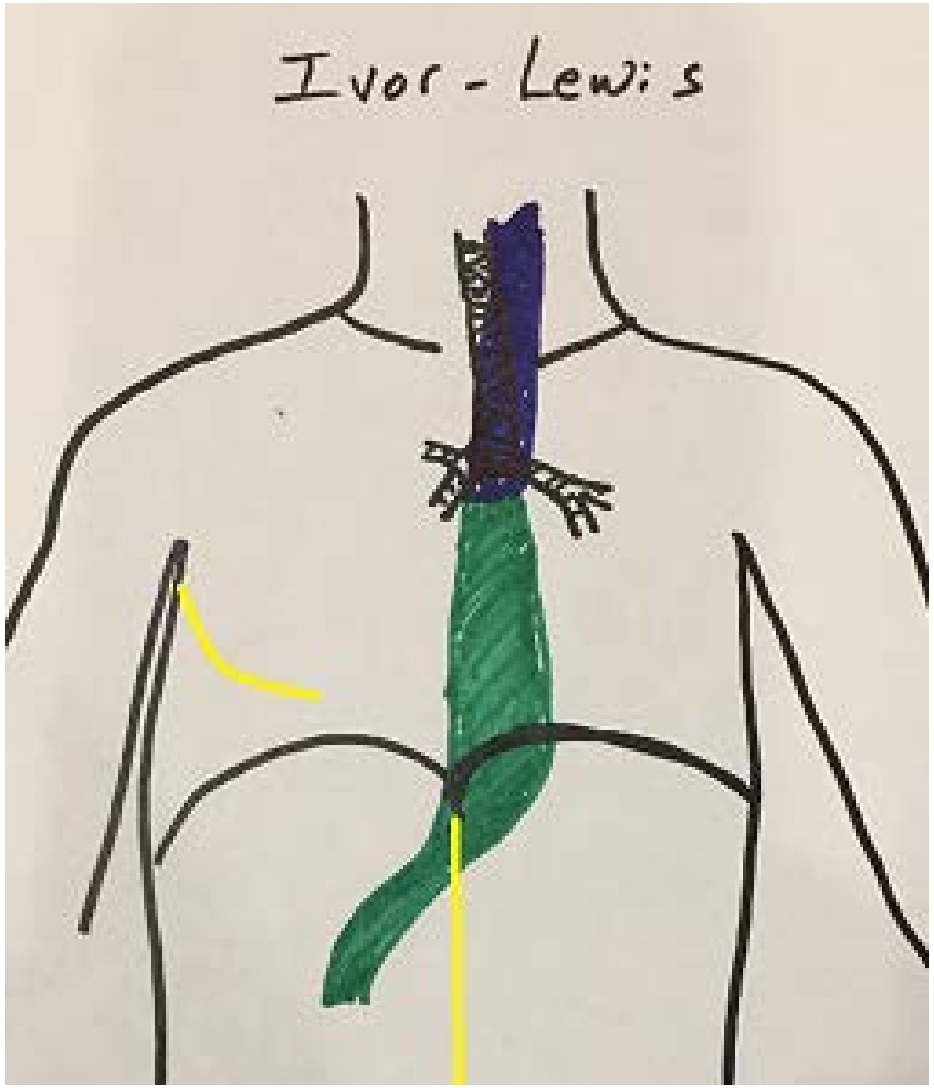
Types of esophagectomy



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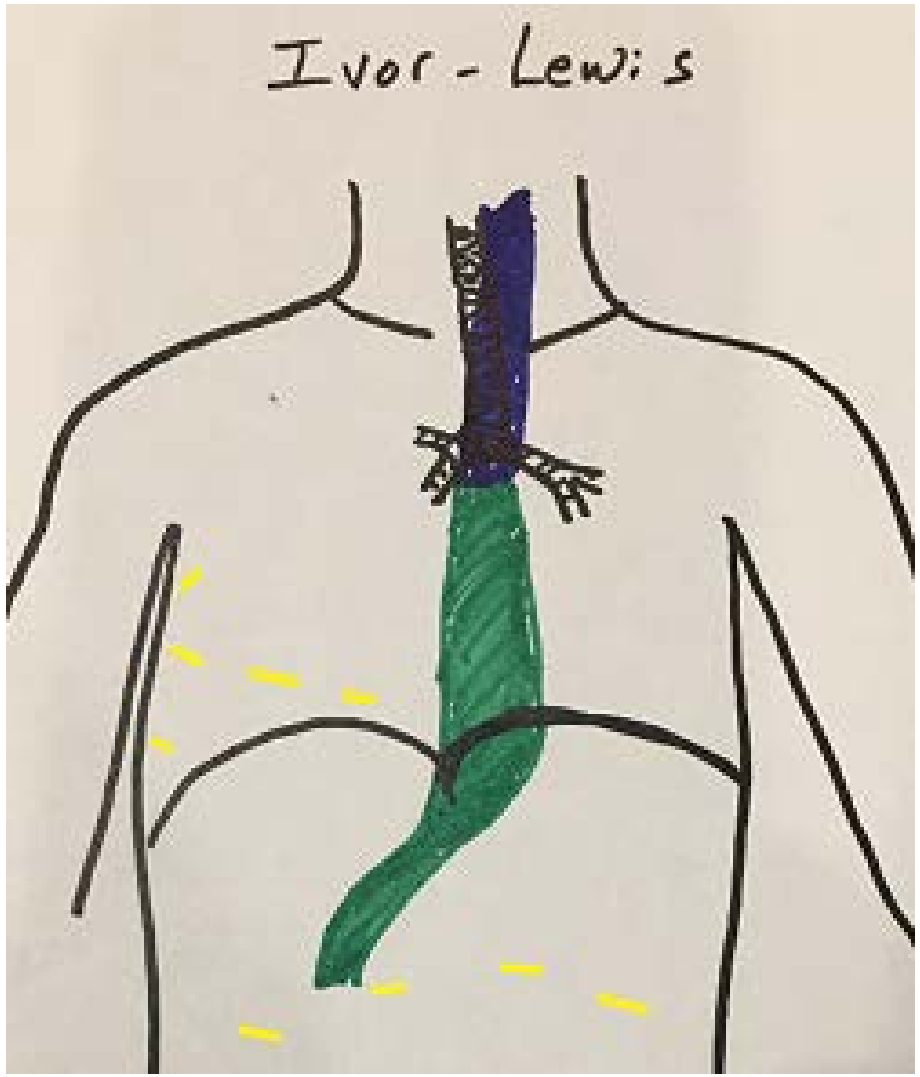
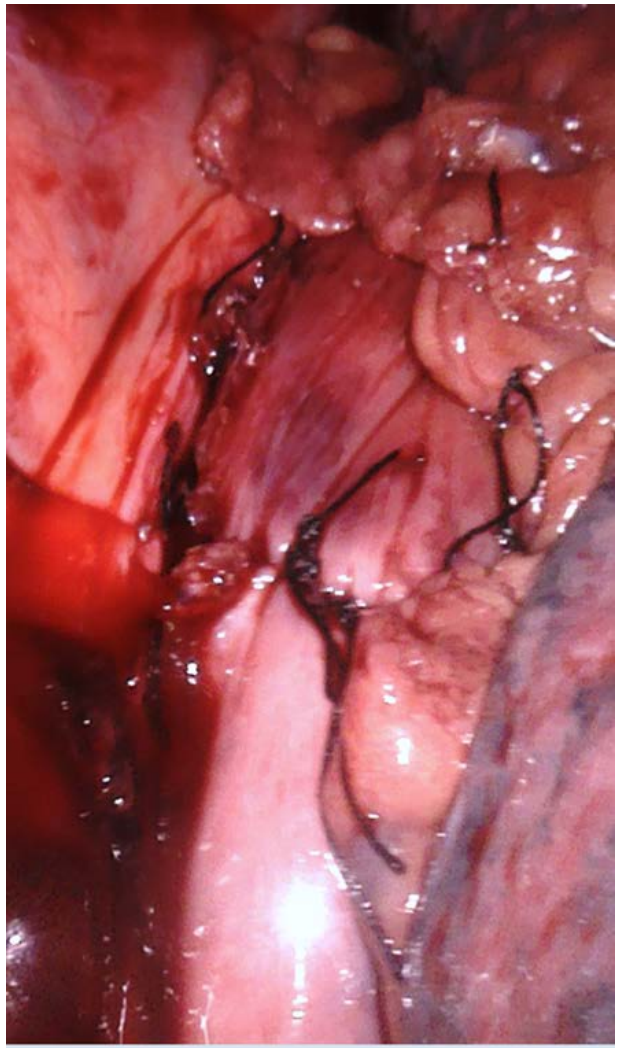
Types of esophagectomy





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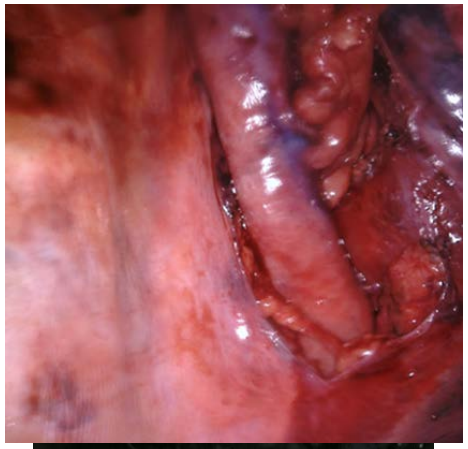
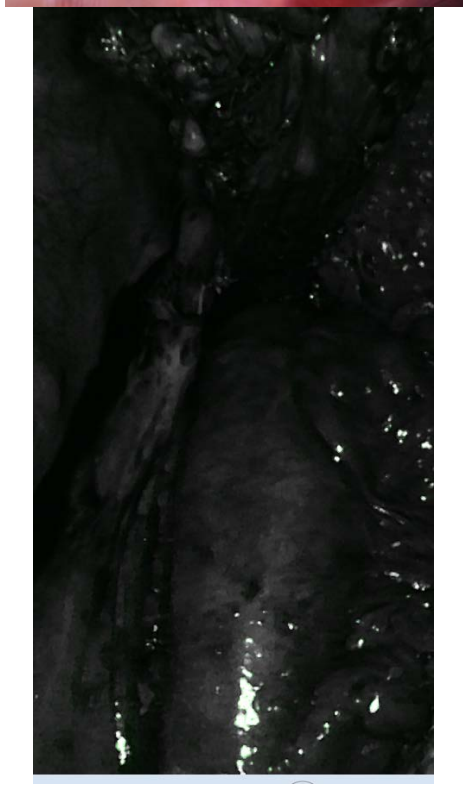
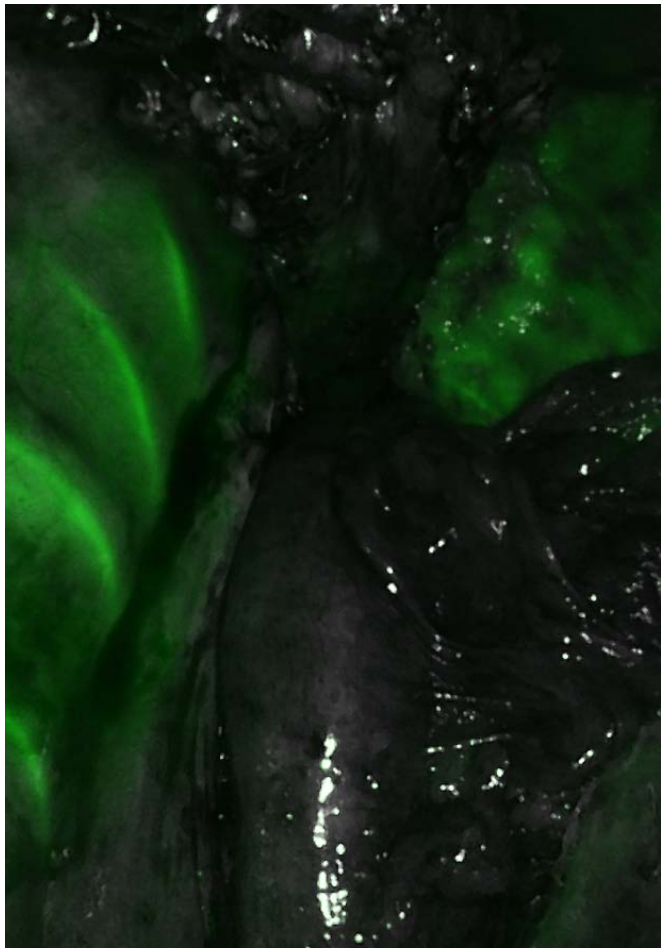
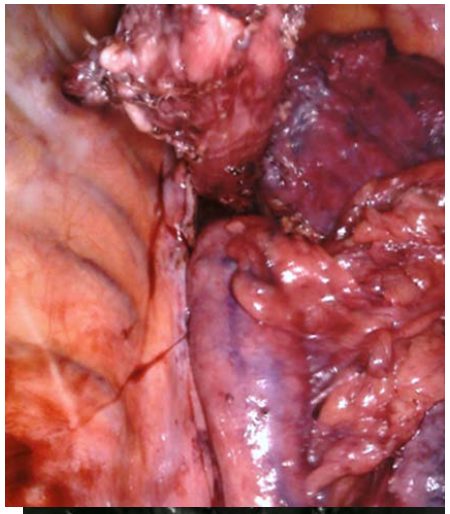
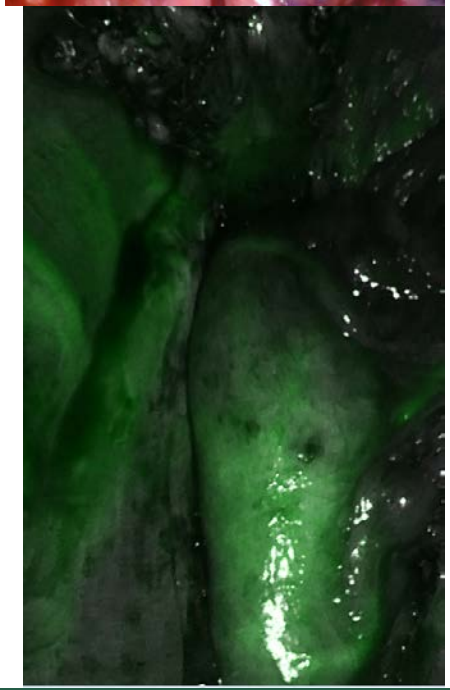




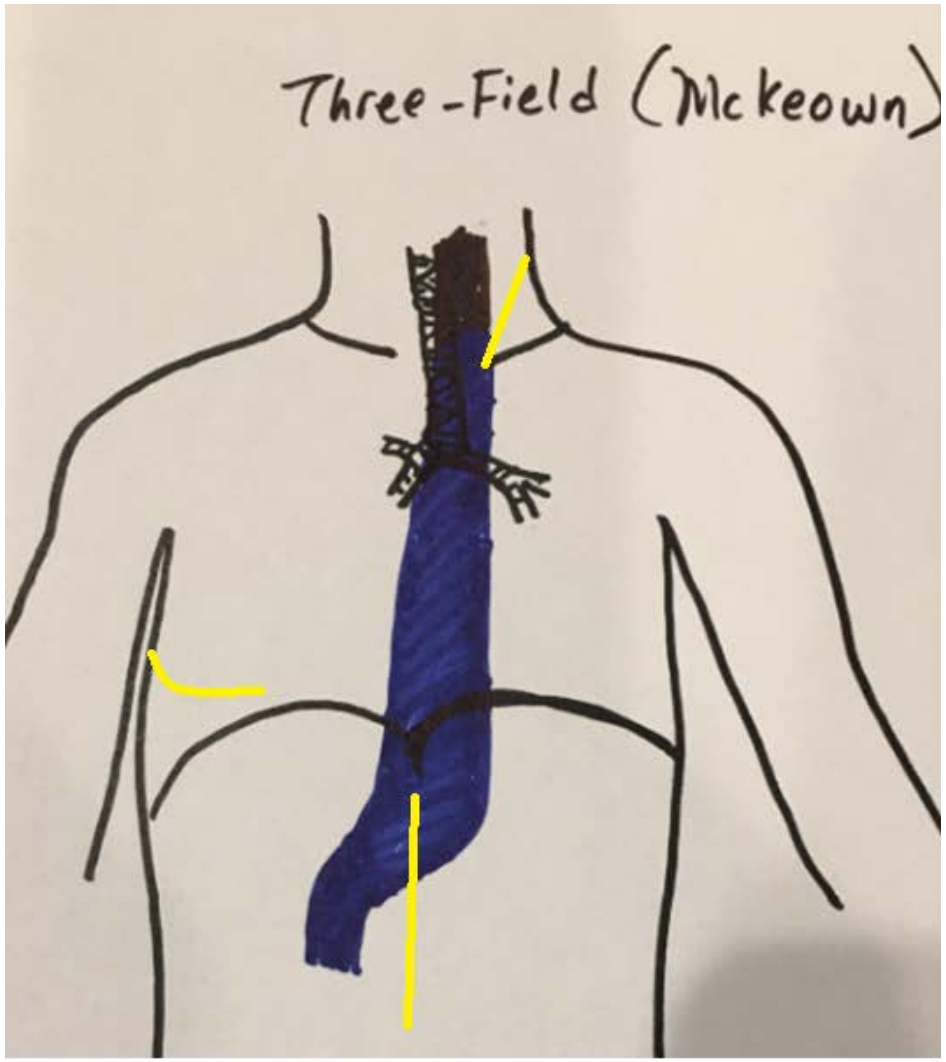


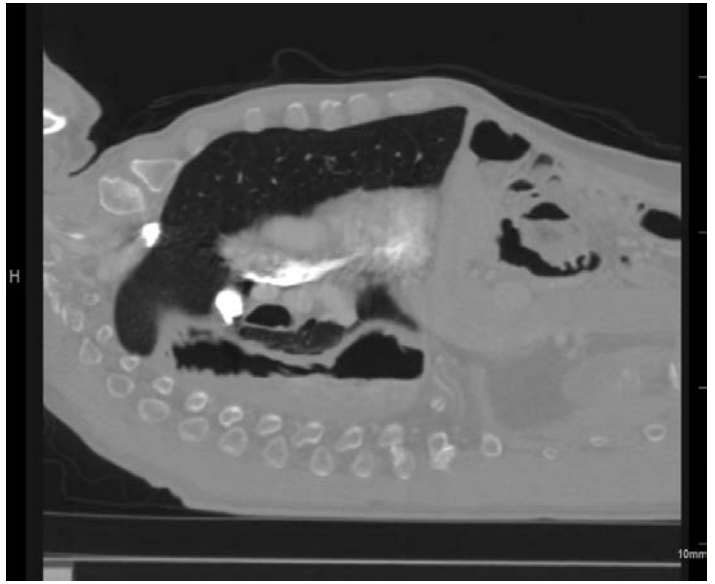




Source:

Types of esophagectomy





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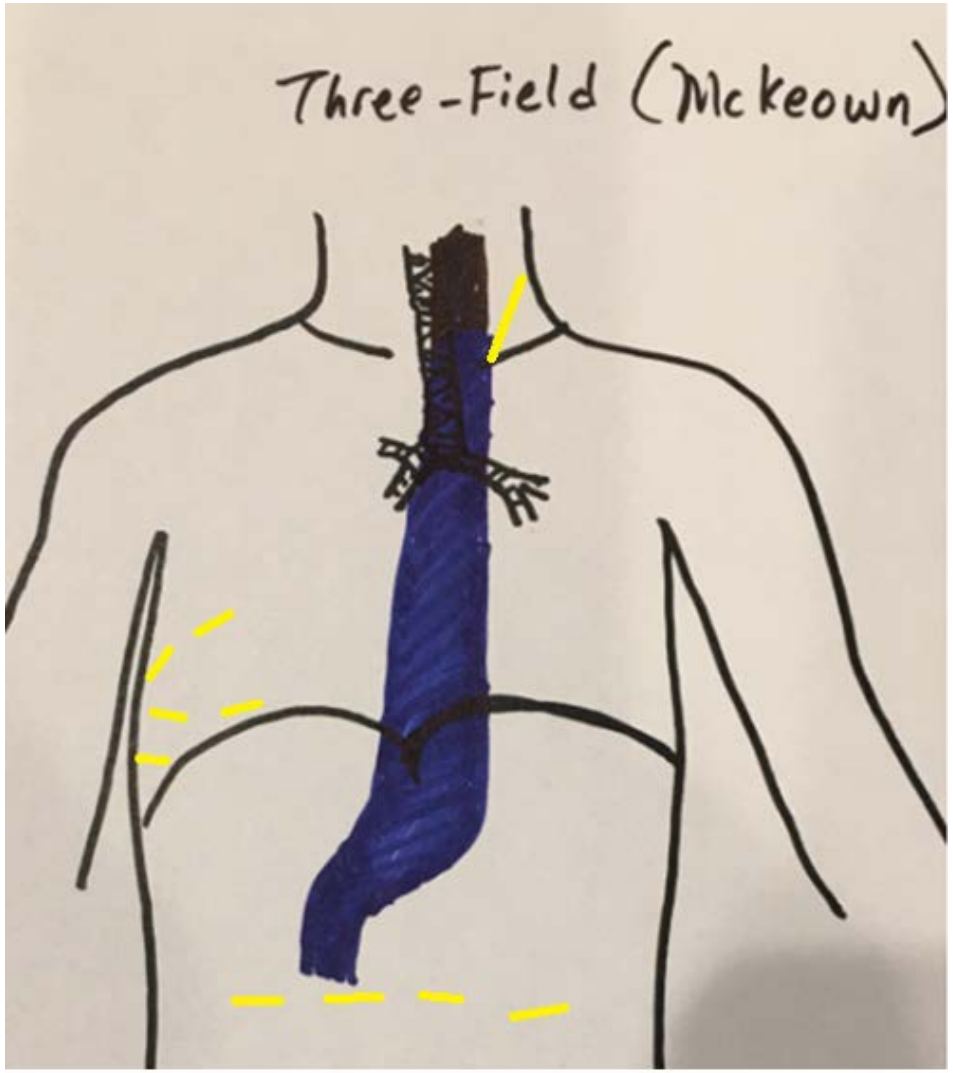
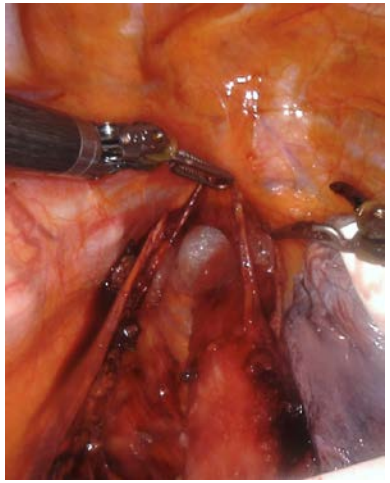
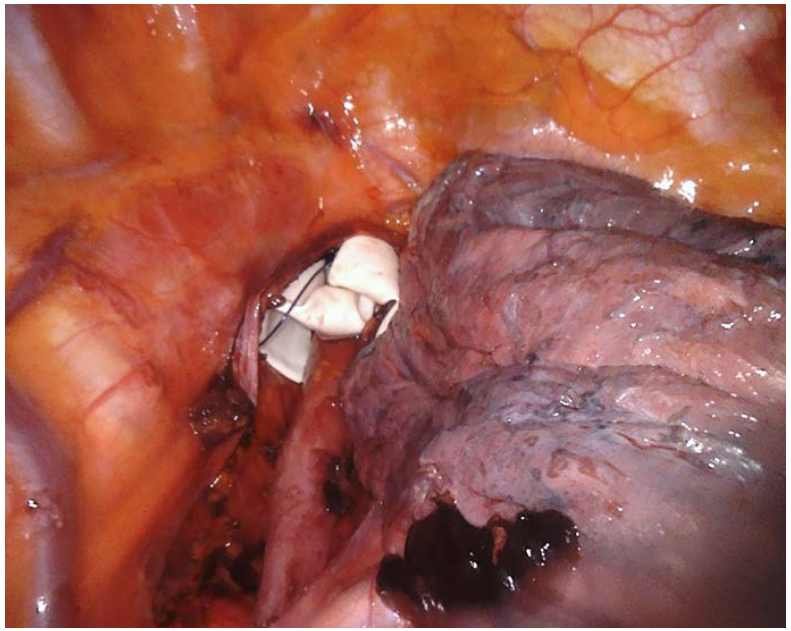


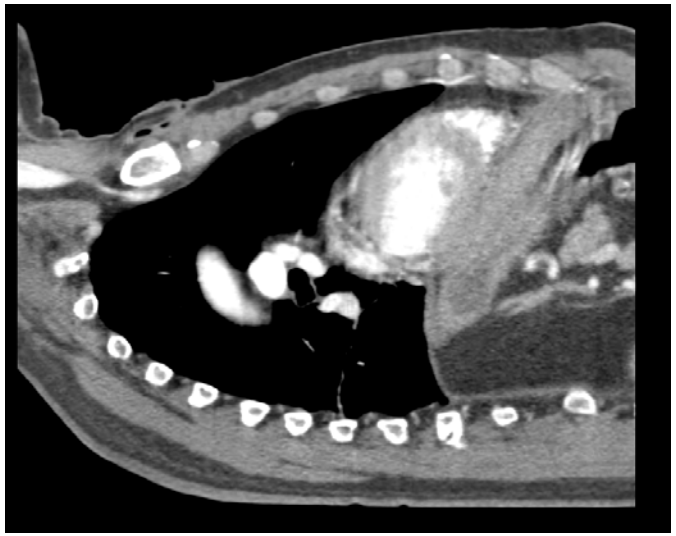


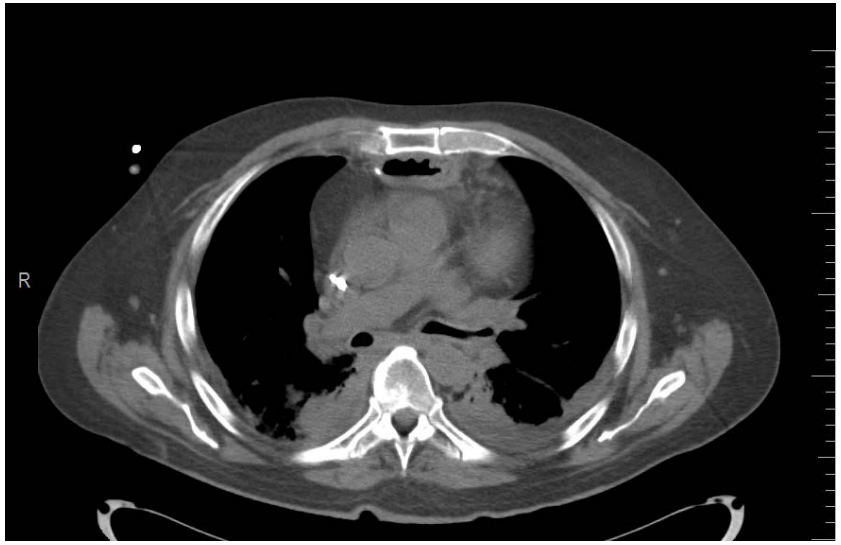


Source:

Types of esophagectomy

- Substernal esophagectomy





Source:

Comparison of esophagectomies

Table 2. Postoperative Complication Rates by Operative Approach in 1738 Patients Undergoing Esophagectomy at 164 ACS NSQIP Hospitals From 2005 to 2010

Postoperative Complication	Operative Approach, %			
	Transhiatal	Ivor Lewis	3-Field	Intestinal Conduit
30-Day mortality	2.5	4.0	2.5	7.1
Serious morbidity	41.8	44.9	42.9	50.0
Pneumonia	14.5	18.3	20.8	20.0
Prolonged ventilation >48 h	15.4	17.1	20.5	25.3
Reintubation	15.8	17.1	18.6	15.9
Overall SSI	20.7	15.1	19.1	21.2
Organ space SSI	6.1	7.2	5.3	6.5
Sepsis or septic shock	19.6	23.3	21.9	26.5
Renal failure	1.7	2.0	1.4	5.3
Return to the operating room for any indication	12.0	15.1	12.5	23.5

Abbreviations: ACS NSQIP, American College of Surgeons National Surgical Quality Improvement Program; SSI, surgical site infection.

Short-term Outcomes After Esophagectomy at 164 American College of Surgeons National Surgical Quality Improvement Program Hospitals

Effect of Operative Approach and Hospital-Level Variation

Ryan P. Merkow, MD, MS; Karl Y. Bilimoria, MD, MS; Martin D. McCarter, MD; Joseph D. Phillips, MD; Malcolm M. DeCamp, MD; Karen L. Sherman, MD; Clifford Y. Ko, MD, MS, MSHS; David J. Bentrem, MD, MS

Arch Surg. 2012;147(11):1009-1016

Source:

Comparison of esophagectomies

Table 1: MIE outcomes in institutional series, case-control studies, and systematic reviews.

Study	N	Type	Leak	Pneumonia	RLN injury	Morbidity	Mortality
Institutional series							
Luketich et al. [14]	206	MIE	11.7%	7.7%	3.6%	—	1.4%
Bizekis et al. [15]	50	MIE	6%	—	—	—	6%
Rajan et al. [16]	463	MIE	—	—	—	16%	0.9%
Nguyen et al. [17]	104	MIE	9.6%	—	—	12.5%	2.9%
Ben-David et al. [18]	105	MIE	4%	9%	7%	—	1%
Ben-David et al. [19]	18	MIE	5.6%	16.7%	—	—	5.6%
Systematic reviews or meta-analyses							
Gemmill and McCulloch [20]	1398	MIE	7.7%	13.2%		46.2%	2.3%
Verhage et al. [21]	—	Open		22.9%		60.4%	3.8%
(10 case-control studies)	—	MIE		15.1%		43.8%	1.3%
Nagpal et al. [22]	612	Open	No difference				No difference
(12 case-control studies)	672	MIE	No difference				No difference
Dantoc et al. [23]	—	Open					4.4%
(17 case-control studies)	—	MIE					3%
Sgourakis et al. [24]	1008	Open versus MIE					Total complications lower with MIE
Biere et al. [25]	1061	Open versus MIE					Trends favoring MIE, but not significant
(1 randomized controlled trial and 9 case-control studies)							
Mamidanna et al. [26]	6347	Open				39.2%	4%
	1155	MIE				38%	4.3%

MIE: minimally invasive esophagectomy.
RLN: recurrent laryngeal nerve.

Kim et al. Review of minimally invasive esophagectomy and current controversies. Gastroent Research Pract. 2012. Article ID 683213,

Source:

Comparison of esophagectomies

Comparison of Postoperative Adverse Outcomes After Elective MIE With Either a Cervical (MIE-Neck) or Intrathoracic (MIE-Chest) Anastomosis

	MIE-Neck, n = 481 (48%)	MIE-Chest, n = 530 (52%)	Total, n = 1011	*P*
Major morbidity, n (%)				
Vocal fold paresis/paralysis	37 (8)	5 (1)	42 (4)	<0.001
Empyema	31 (6)	28 (5)	59 (6)	0.431
ARDS	18 (4)	8 (2)	26 (3)	0.026
Myocardial infarction	9 (2)	11 (2)	20 (2)	0.809
Congestive heart failure	20 (4)	10 (2)	30 (3)	0.033
Anastomotic leak requiring surgery	26 (5)	23 (4)	49 (5)	0.439
Gastric tube necrosis	15 (3)	9 (2)	24 (2)	0.140
Mortality at 30 days, n (%)	12 (2.5)	5 (0.9)	17 (1.7)	0.083

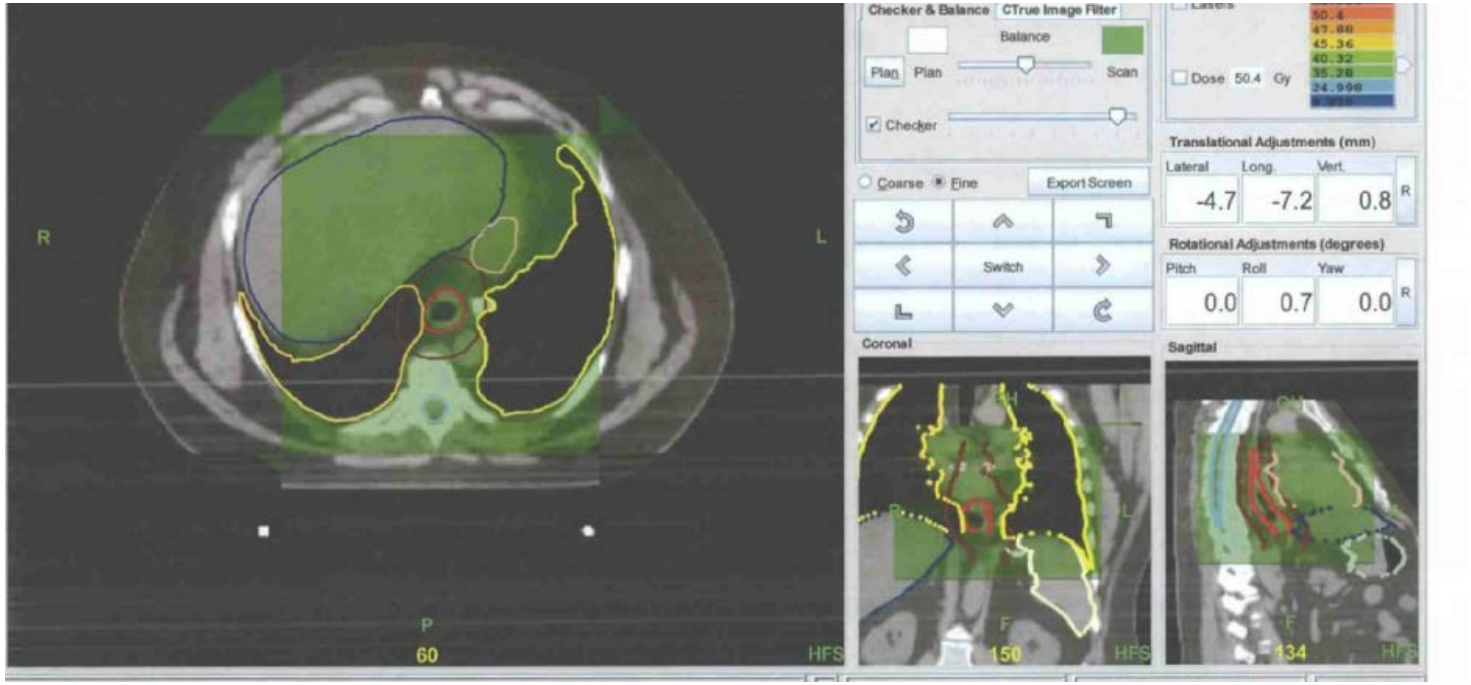
ARDS indicates acute respiratory distress syndrome.

Luketich et al. Outcomes after minimallly invasive esophagectomies: review of over 1000 cases. Ann Surg. 2012;256(1):95-103.

Source:

Surgical tips when operating in radiated field

1. Review the radiation field



Source:

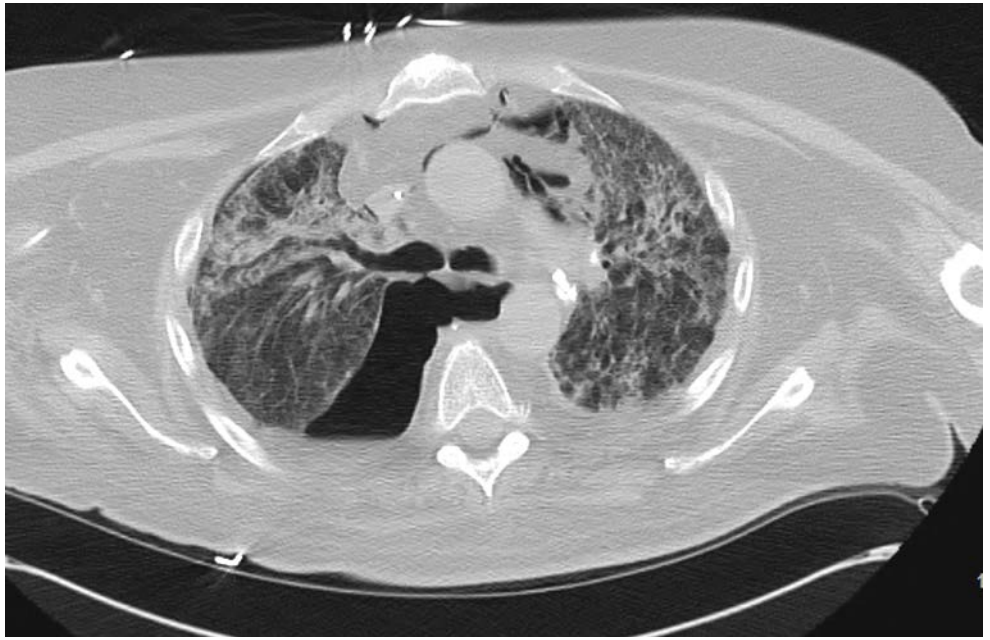
Surgical tips when operating in radiated field

2. Optimize nutrition

3. Regional anesthetic block – not all cases has to be done minimally invasively
   - minimally invasive = smaller incisions

4. Aggressive lymphadenectomy should be avoided around the membranous portions of the airway

5. Omental, pericardial, intercostal muscle flaps



Source: